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Mining Methods on the Gogebic Iron Range

Steel Shafts and Headframes Are Replacing Wooden Construction.
The Orebodies Are Continuous, but Intersected by Many Dikes

BY REGINALD MEEKS

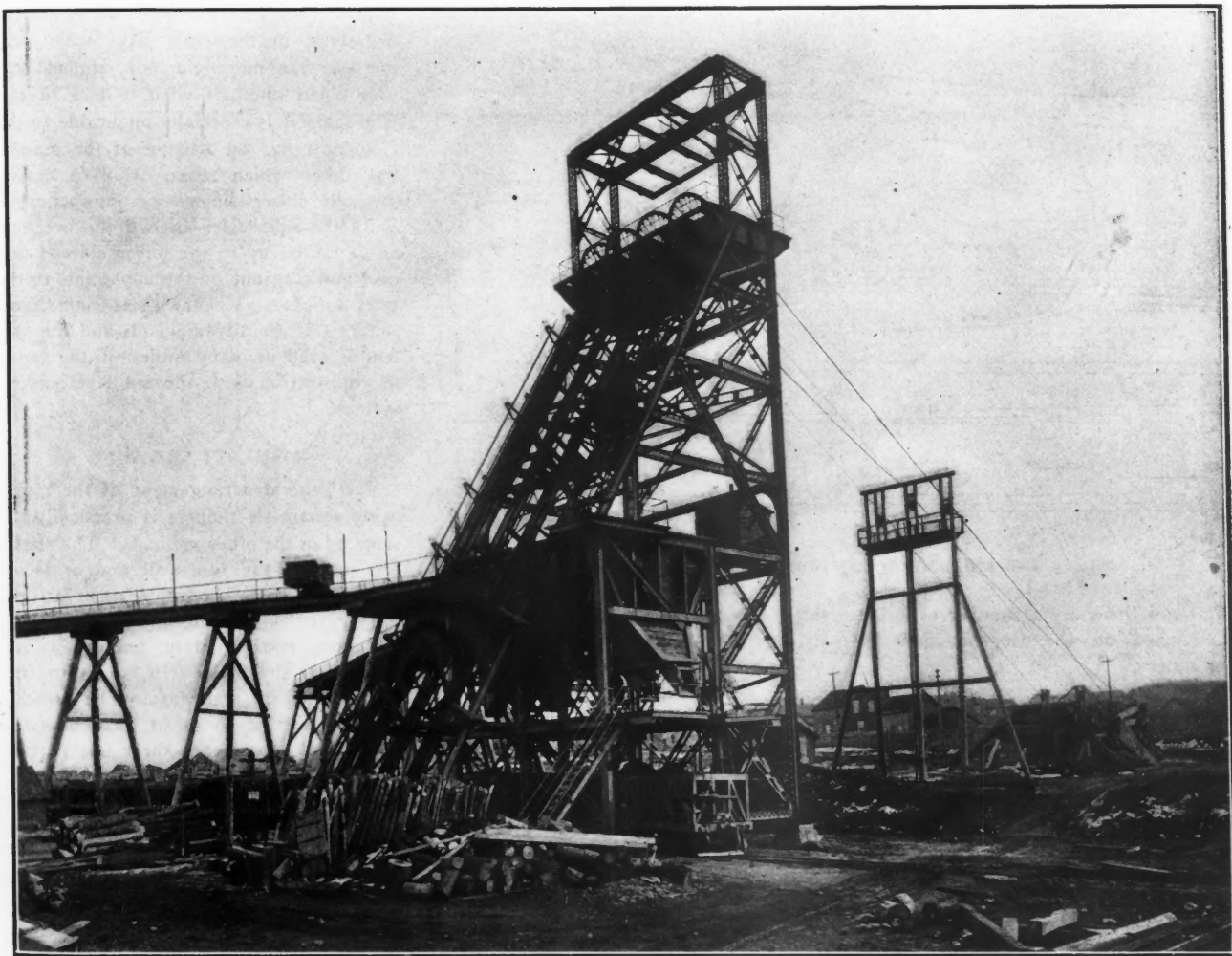
The Gogebic range extends from about Hurley, Wis., across the State line into Michigan and eastward to a few miles beyond Wakefield, Mich. This range is of later development than either the Menominee or Marquette but its discovery and development preceded those of the

between east-west and northeast-south-west; there is no exception to this rule on the range. The walls themselves, unlike those on the Menominee range, are uniform and regular, dipping steeply to the north. Above the quartzite hanging walls are found the black slates and it

to explore for copper but failed to discover the red metal.

EXPLORATORY METHODS

So regular is the formation on the Gogebic range that the mining companies adopt a system of exploration which at



STEEL HEADFRAME AT SHAFT A, NORRIE MINE, IRONWOOD, MICH.

Minnesota iron ranges by a considerable period.

The geological formations of the Gogebic range are surprisingly uniform and consist of a lower stratum of granite with chloritic slates overlying and above these the quartzite walls. The strike of the formations, all along the range, lies

has been proved that no ore occurs except between the gray and black slate. To the north of the range the country rock changes into trap, called "copper-rock" locally, in which are found indications of copper, but nothing to warrant extensive exploration.

Some years ago a company was formed

first sight would seem to be risking much capital and labor. The first step is to determine the formation by means of test-pits and from their knowledge of adjoining properties or near-by mines the engineers choose a site which they consider the most promising. A completely equipped shaft is then sunk in the slate foot-

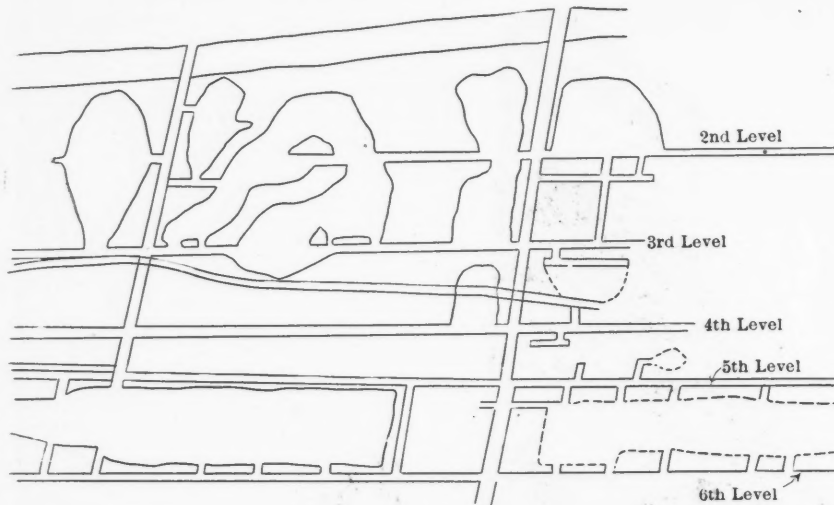
wall to a depth varying from 600 to 1,000 ft. The newer shafts on the range are constructed of steel and have compartments for two skips, a cage, a ladder-way, counter weight and pipes. This construction follows the sinking, the bearers being usually not more than two or three sets behind the bottom of the shaft. At convenient depths, crosscuts are driven to open the orebody, which may be cut at a moderate or at a great depth or no ore may be found at all, in which case two years and many thousands of dollars work may be entirely lost. However if ore, satisfactory in quantity and quality is found, the shaft is ready for immediate service. In the steel lined shafts on the Gogebic it is customary to use timber bearers for about 40 to 50 ft., where the shaft is in sand, and then start the all-steel construction at the ledge. This style of shaft has proved more satisfactory in every particular than the older timbered

pleted the shaft will conform to the lines shown in the accompanying illustration.

This will give spaces, 5 ft. 1 in. x 5 ft. 6 in. for two skips, a cage compartment 5 ft. 1 in. x 9 ft. 4 in. and ample room for counter-weight, ladder and pipes. In each set there are eight 4x7.5-in. I-beams bolted together with 3x3x3/8-in. connecting angles. The sets are about 8 ft. apart and are connected by I-beams, angles and sometimes also by 6x6-in timbers. Above and at the water level the hanging side of the shaft is lined with 2-in. planks.

STEEL HEAD FRAMES

The tendency to the use of steel for hoisting construction is shown in the head-frames used with the new steel shafts. The one shown in the accompanying illustration is typical of several on the Gogebic range. This is at A shaft of the Norrie mine operated by the Oliver Iron Mining Company. This is built for two



PILLAR AND ROOM METHOD OF WORKING NARROW DEPOSITS

shafts, and there are a number of mines so equipped on the Gogebic and the other ranges.

ALL-STEEL SHAFT CONSTRUCTION

The new shafts being sunk on the Gogebic ore formation are very thorough in construction and minimize warping, buckling and many of the common shaft troubles. When finished they give excellent service and, if the orebody has proved satisfactory, they more than repay the expense of construction.

The new shaft of the Montreal Mining Company at Hurley, Wis., has not yet reached the ledge, and at present the entire weight of the shaft is supported by bearers laid across the shaft opening. These consist of two 60-lb. steel rails and a 14-in. square stick of Oregon fir. So great is the weight to be supported that, in a span of about 17 ft., there is a deflection of 1.5 in., although the shaft is down only about 45 ft. When com-

pleted the shaft will conform to the lines shown in the accompanying illustration.

The head-frame is built of latticed columns, reinforced by I-beams, and the type is the most complete and satisfactory I have seen. The ore dumps directly into the pockets, built in the frame, or else is transferred to cars and sent along the trestle to the stock-pile.

MINING METHODS

The mines on the Gogebic range do not employ any methods of mining which are not used on some of the other ranges.

Three systems are in vogue one of which, the sub-level caving method, has been described in an earlier issue. Next to "subbing," mining with square-sets is the most popular. The third method is the pillar-and-room system used at only one mine, I believe, where the deposit is exceedingly narrow.

The most remarkable feature of the orebodies on this range is the complex

system of jasper dikes. These sometimes parallel each other, but at times intersect. It has been found that in the latter case the richest ore is found close to their intersection. A study of the orebodies of the Gogebic range with special attention to the numerous dikes, is being made, at this time by Kenneth Leith, of the United States Geological Survey. Such a study will throw much valuable light upon the occurrence and effect of the dikes, which are more numerous on this than on any of the other ranges.

MINING WITH SQUARE SETS

The miners, when questioned, say that mining with square-sets permits of a larger extraction, with less effort on their part, than in the sub-level caving system. The method permits the breaking down of a larger volume of ground per shot, and the ore falls through the timber into chutes from which it is drawn into cars. However, in the early days when this method was more common, timber cost only about one-half what it does to-day. The method is especially applicable to the Gogebic range on account of the numerous dikes which make ordinary caving methods either difficult or impracticable. With the square-set method the ore may be extracted up to the lower side of one dike and continue on the upper side to the next above. Under these conditions square-sets are advantageous and the system is used in many mines of the range in conjunction with the sub-level caving system.

LAYING OUT THE MINE

The general arrangement of the mines using square-set timbers is practically the same as in the other methods. The shafts are sunk in the foot-wall and crosscuts are run to the orebody. A main drift is then extended around the orebody, and crosscuts run at right angles to and parallel to the main drift, so as to furnish convenient tramways. The orebody itself is divided so as to form alternate pillars and rooms each three sets of timber (about 24 ft.) wide.

The sets are supplied with chutes placed about 15 ft. apart, and as the ore is broken above, it drops down the set of timber and is drawn into the cars below. As ground is broken down a new set of timber is placed upon those already in place and the room grows higher and higher. When all the ore has been extracted the standing pillars are then attacked in the same manner, the workings above and the roof, being supported by the timbers.

NARROW DEPOSITS

Most of the mines on the Gogebic range are sufficiently wide to adopt either sub-level or square set methods, but in the case of one deposit the width is only

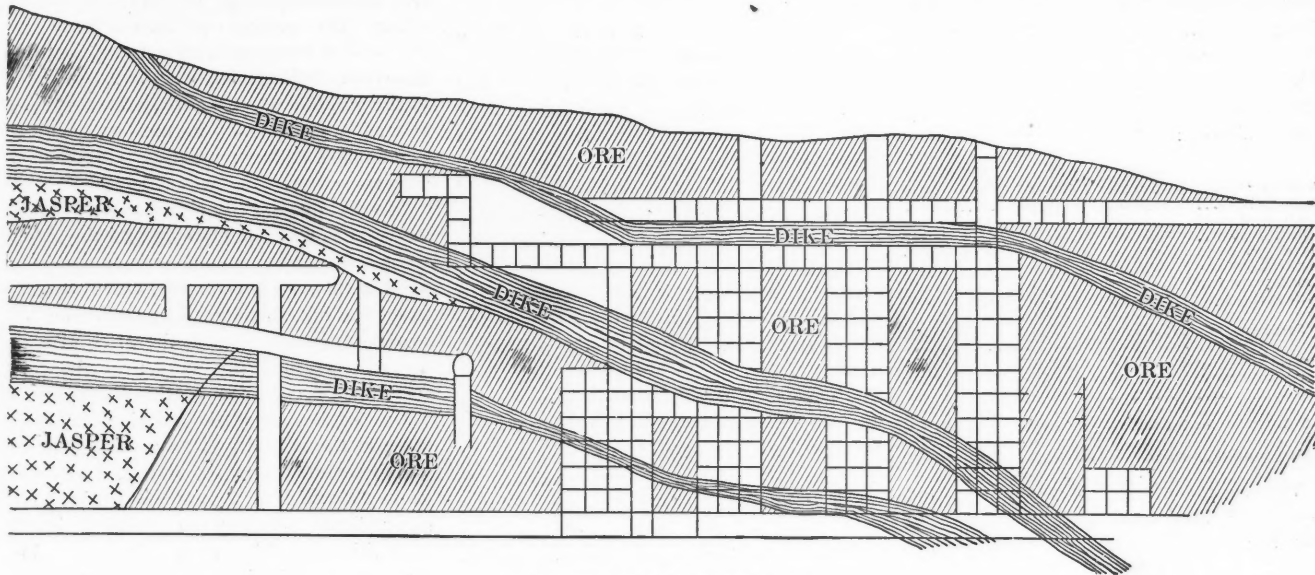
about 30 ft., while the length is more than 1700 ft.

This mine is worked by the pillar-and-room overhand stoping method. The levels are run about 75 ft. apart, and the ore is stoped out, filling the rooms as the ore is broken down. The rooms vary in

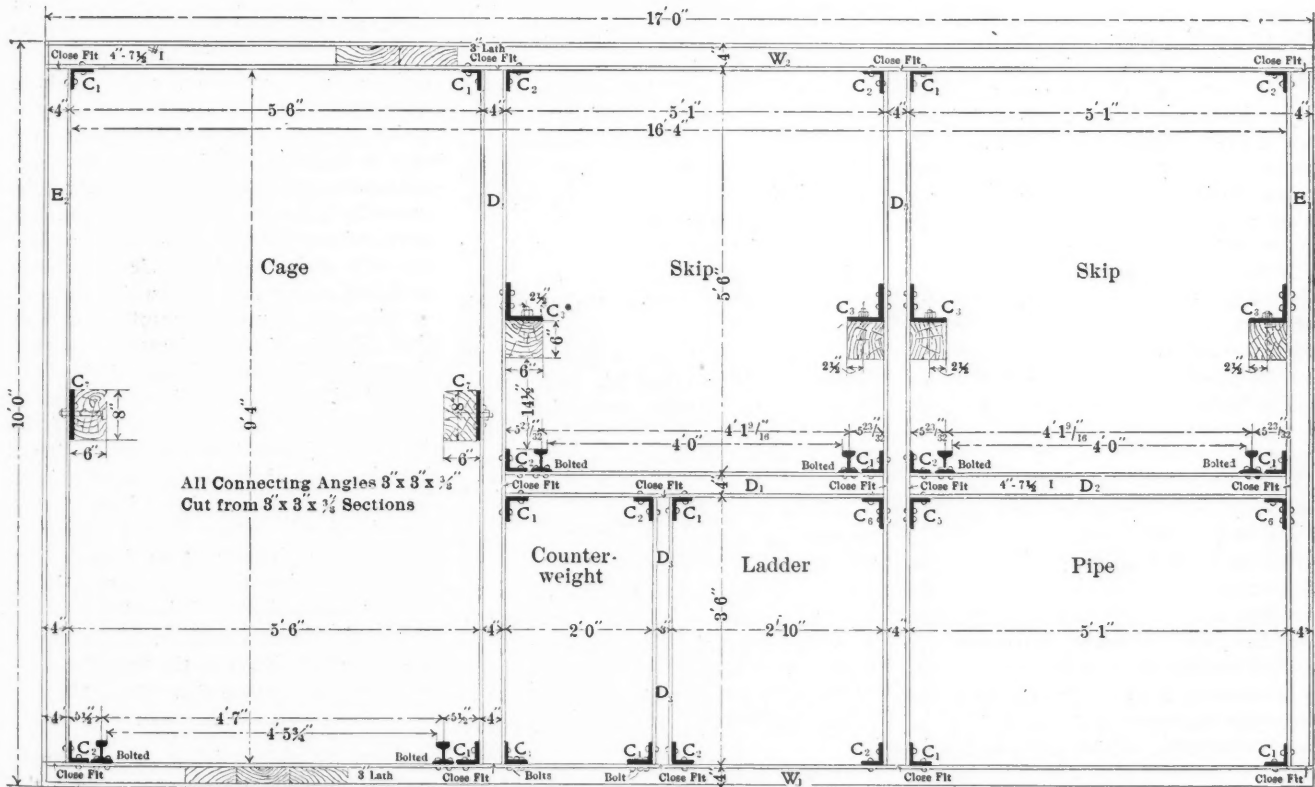
this range, and in addition a number of smaller independent companies are mining.

At the old mill of the New Jersey Zinc Company, at Franklin Furnace, N. J.,

including jig runners and drying concentrate \$0.1477; general, including foremen, enginemen, electricians, loaders, etc., \$0.2683; total \$0.5335. In the new mill of the company, which is of 1000 tons capacity per 24 hours, the operating cost is about 40c. per ton, not including interest



SQUARE-SET TIMBER METHOD



ALL-STEEL SHAFT CONSTRUCTION ON THE GOGEBIC RANGE

shape and size to meet the existing conditions.

Such narrow deposits are rare on this range, and this method of mining is not characteristic.

The Gogebic ore is entirely in the bessemer class and is in demand. Nearly all the large mining companies operate on

which was of 200 tons capacity per 24 hours, the cost of separation was 74.54c. per long ton, of which 53.35c. was for labor, 8.77c. for coal and 12.45c. for miscellaneous supplies, and repairs and renewals. The labor was divided as follows: crushing house, including drying and hand picking \$0.1175; separating house,

and amortization. The cost of this mill was about \$600,000, or \$2 per ton of annual capacity. This is stated, however, in terms of long tons, and the capacity is somewhat underrated. It would doubtless be more nearly correct to estimate the cost of the plant at \$1.75 per 2000 lb. of annual capacity.

The Calumet & Hecla Mining Company

The report of this company for the year ended April 30, 1907, includes statements of the various subsidiary companies. The present abstract refers to the Calumet & Hecla proper, the subsidiary companies being reserved for a separate account. The general account of the Calumet & Hecla proper was as follows on April 30, 1906 and 1907:

	1906.	1907.	Changes.
Cash at mine..	\$ 120,257	\$ 197,667	I. \$ 77,410
Cash in N. Y. . .	15,000	15,000	.....
Cash and copper, Boston..	7,817,994	6,264,523	D. 1,553,471
Develop't fund	1,827,544	45,145	D. 1,782,399
Insurance fund	990,858	949,841	D. 41,017
Employees' fund	4,906	3,499	D. 1,407
Bills receivable	1,140,122	1,281,769	I. 141,647
Total assets..	\$11,916,681	\$8,757,444	D. \$3,159,237
Drafts outst'ng \$	38,481	\$ 127,606	I. \$ 89,125
Bills payable..	1,248,381	1,100,895	D. 147,486
Loans.....	.....	500,000	I. 500,000
Total liabilities \$	1,286,862	\$1,728,501	I. \$ 441,639
Bal., assets..	\$10,629,819	\$7,028,943	D. \$3,600,876

The course of the development and equipment fund during the year was as follows:

Balance, May 1, 1906.....	\$1,827,594
Added during the year.....	7,350,000
Interest received.....	90,996
Total	\$9,268,540
Paid for lands, mining stock, development expenses, etc.....	9,223,395
Balance, April 30, 1907.....	\$45,145

The insurance fund shows a balance May 1, 1906, of \$990,858; interest received, \$46,725; total, \$1,037,583. Losses paid during the year were \$87,742, leaving a balance of \$949,841; of which \$536,136 was in cash and \$413,705 in securities.

During the year the company produced mineral equal to 46,297 tons refined copper, as against 43,652 tons last year. The product of refined copper was 46,949 tons. For the previous year the product of refined copper was 50,515 tons. The price of copper varied from 18¾ to 26¼c. per pound.

There have been paid during the past year three dividends of \$20 each and one of \$15, making \$75 in all.

President Agassiz says: "On the Calumet conglomerate the extension of the sub-shaft in the 'five forties' from the 57th level has been continued northward. It has now reached the 65th level. The quality of the rock in its vicinity has improved somewhat, and that of the main body of the conglomerate remains much as heretofore. We have continued to take out the shaft pillars of Hecla Nos. 2 and 3 and South Hecla No. 11.

"The year's openings on the Osceola amygdaloid are most encouraging. On this lode No. 13 shaft is at the 20th level, No. 14 at the 13th, Nos. 15 and 16 below the 12th and No. 17 at the 6th. This gives a very considerable amount of ground ready for stoping when the time comes; in all about 7100 ft. of shafts and 84,100 ft. of drifts. No. 18 shaft is to be

started this summer. The distance between Nos. 13 and 18 is 11,000 ft. There were produced from the Osceola lode 6,892,548 lb. of copper during the year. We are gradually increasing the amount of rock stamped, and the product is now at the rate of about 9,000,000 lb. of copper per year.

"Excellent progress is being made in opening the Kearsarge amygdaloid; Nos. 19 and 20 are below the ninth level, and No. 21 has reached the sixth level. One drift has been run across the whole of Section 13. The ground thus far opened is promising. The irregular occurrence of pay values in the Kearsarge lode both in length and depth of the lode, and the low average value of the copper contents, make it desirable, if not essential, for constantly successful results, to operate on as great a length of the lode as is practicable.

"In view of this and of our large stake in this lode in the LaSalle company's operations, we determined that it would be for the best interests of this company to acquire interests in the Osceola, Allouez and Centennial companies, in the lands of which companies copper in paying quantities had been discovered in the Kearsarge lode in a tract of several miles adjoining our mining location in the North. The contiguity of the lands of these companies with each other and their vicinity to this company's mine and the contiguity of the land of the Osceola to that of this company, and of the LaSalle company, also seemed to us to offer the opportunity of economical coöperation in mining between these several companies.

"Induced by these considerations, and under the authority given by the unanimous vote at the annual meeting of this company, held Aug. 16, 1905, we purchased 42,978 shares of the Allouez, 46,080 shares of the Centennial, and 22,671 shares of the Osceola companies, at a total cost of \$7,398,267. Our advent in the Allouez and Centennial companies was welcomed by the shareholders. The shareholders of the Osceola company, in response to our circular inviting those who favored the election of a board of directors at the annual meeting called for March 14, 1907, to include a majority to be elected from the list given in the circular, sent proxies representing shares which, with our own shares, amounted to a large majority of the shares outstanding.

"Shortly before the day set for the annual meeting of the Osceola company, a bill, supported by the officials in control of that company, was, without notice to interests adversely affected, passed through both houses of the Michigan legislature in great haste, which bill in its terms took away the right of mining companies to vote on shares in other mining companies previously purchased under the authority of the act of 1905. Upon protest made for us and others similarly interested, the

governor withheld his approval and the bill failed to become a law. Immediately afterward, upon a bill in equity presented by the president of the Osceola company as a shareholder therein, the judge of the United States Circuit Court for the western district of Michigan issued an injunction against electing directors or transacting other business at the annual meeting of that company until on final hearing the court could decide whether, as alleged in the bill, our purchase of shares as above related, was contrary to the laws against monopolies and combinations to control prices.

"Our object in securing a voice in the management of the Osceola and the other companies above named was to increase production and lower costs, and our purpose was not, and its effect could not be, to monopolize or control the price of copper of any kind. We shall urge the case to a final decision as quickly as possible, with confidence that the decision will conform to the lawful and proper intent with which we purchased the shares. Later the same plaintiff filed another bill in the same court directly against this company, based upon his ownership of 23 shares in this company, acquired on April 6, 1907, after the occurrence of the acts complained of, alleging, in addition to other grounds set up in his first bill, that as this company and other companies in which it holds a majority of the shares, together have more than 50,000 acres of land, their ownership is contrary to the Michigan statute that no company shall hold more than 50,000 acres, and that, notwithstanding the authority given by the law of 1905, our purchase of shares in other corporations was unlawful. We shall endeavor also to push this case to the earliest decision.

"This company owns 42,978 shares of the Allouez Mining Company, 100,000 shares issued; 46,080 shares of the Centennial Consolidated Mining Company, 90,000 shares issued; 20,000 shares of the Frontenac Copper Company, 20,000 shares issued; 50,100 shares of the Gratiot Mining Company, 100,000 shares issued; 161,750 shares of LaSalle Copper Company, 302,977 shares issued; 18,000 shares of the Manitou Mining Company, 20,000 shares issued; 22,671 shares of the Osceola Consolidated Mining Company, 96,150 shares issued; 50,100 shares of the Superior Copper Company, 100,000 shares issued."

When metallic calcium is substituted for aluminum in the thermit process the reaction between the metal and the oxide to be reduced is so violent as to eject the contents of the crucible. The reaction can be brought under control by mixing 30 to 40 per cent. of calcium fluoride, or 10 to 20 per cent. of calcium oxide, with the contents of the crucible. Metallic calcium has been tried instead of aluminum in pouring steel, but without success, as the calcium oxide cannot be eliminated from the metal.

Labor Problems in the Transvaal

SPECIAL CORRESPONDENCE

All kinds of opinions and evidence are being given before the Government mining commissions now sitting in Johannesburg. These commissions have been appointed to inquire into the numerous mining problems that must be solved, such as the use of white labor in the mines, the increased efficiency of colored labor, the use of labor-saving devices, ventilation and alleged grievances of the miners.

One of the great grievances of the miners is short measurement in contracts. Many witnesses have given evidence, miners, surveyors and others. It appears that there is no dispute in linear measurements, for the miners can check the distances with their tapes, but the trouble arises in stoping, when the miner is paid by the square fathom taken out. He does not as a rule understand the system, and in consequence seems to think he is always being imposed upon, whereas the evidence goes to prove that on the whole the contractors have received over-measurement, to make their pay up to a fair figure. One of the most experienced of the surveyors, in his evidence stated that the miners agreed that 6x6 ft. represented a square fathom, but they could not understand why 3x3 ft. did not represent half a square fathom.

The question of how much work a white miner is able to supervise is also being investigated. The miners claim that two rock drills is all one man can look after, but this assertion has been entirely disproved since the strike, for on a number of mines one energetic man has superintended six and eight machine drills. Of course, he has skilled Kafirs and Chinamen to do the work. With raw Kafirs it would take a man all his time to look after one machine drill. The question of how much work one miner can superintend depends entirely upon the helpers.

But by far the most important problem that has yet been discussed before the commission is the labor question. The Government has irrevocably decided against Chinese, in spite of the warnings of prominent mining and financial men. There are a few men who declare the Chinese can go without injury to the mines, but they are not prominent. The plea of most of the experts was for reduced working costs, without which the days of the Rand are numbered. Mr. Reyersbach, president of the Chamber of Mines, made a statement showing that the grade of the Rand ore has been constantly falling since the Rand was first exploited, so that today it is about \$7.50, if the ore is picked. Taking, however, the average value of all ores exposed in the mines today, good, bad and indifferent, one can say that the ore reserves of the

Rand stand in the neighborhood of \$6.50 per ton. Mr. Reyersbach quotes Ross E. Browne as an authority to show that, given favorable conditions and a sympathetic government, it is not impossible to get the costs down to \$3 to \$3.90 per ton instead of the \$5.25 to \$5.50, which now prevails. With costs in the neighborhood of \$4, there would be an enormous tonnage of payable ore ready for crushing, and the future of the Rand would be assured. It is claimed that, under these conditions, although the number of white men employed in individual mines would be reduced, the grand total employed by the industry, due to its expansion, would reach a maximum. To get working costs of \$2 means a constant and sufficient supply of common laborers, preferably Chinese. But as the Government has decided against Chinese, the low working costs of \$2 will never be reached. The industry must work on another scheme. What will happen is probably this: Each rock drill will be run by a white man, receiving a small wage, from \$2 to \$2.50 per day, assisted by a Kafir. About ten or a dozen of these machines will be superintended by a skilled miner, receiving a salary of about \$168 per month. In the hand stopes it seems highly improbable that white men will actually use the hammer, and here the Kafir will be used as in the past. One white miner, however, will be responsible for a larger number of native drillers than in the past. The white men, probably Dutchmen, will be used to a certain extent on tramping. They will do this work on contract. Where Dutchmen have been employed in the past on contract work tramping, they have answered fairly well. They are, of course, more expensive than Kafirs.

The strikers still seem to think there is a strike on, but no one else thinks so. In spite of all their efforts the mines are able to keep going, and although there is some inconvenience due to the loss of many skilled men, the stamps keep hammering away.

A Compound Assay Furnace

W. J. Fleck (*Min. and Sci. Press.*, May 4, 1907) describes an arrangement whereby the capacity of a portable gasolene furnace may be increased materially when the cost of fuel, the expense of building, dust and slow heating operate against the building of a larger furnace. The arrangement consists of a large standard charcoal furnace erected beside the small charcoal furnace, and fired with dry wood. The charged crucibles are first placed in the charcoal furnace and heated until slow fusion begins. The crucibles are then quickly transferred to the gasolene, which is kept at a high heat, when quiet fusion begins at once, and in 10 minutes the crucibles are usually ready to pour. With this arrangement 16 assays may be

melted and cupelled in a single-crucible combustion No. 5 Hoskins furnace in four hours, or 50 assays in a No. 6 four-crucible furnace in the same time.

The flux used is first dried in open pans at a temperature of 200 deg. F., and then intimately ground and mixed with the ore in a small wedgewood or glass mortar. The mixture is then transferred to the crucible, and a quick quiet fusion and a clean homogeneous slag is the result, the crucible being only slightly attacked on account of the short time of fusion. By this simple elimination of moisture and gases the need of salt or any other cover is obviated.

Tungsten in Queensland

During 1906 nearly 95 tons of scheelite were exported from Queensland. The principal exporters are Donaldson Brothers, Macrae's Flat, owners of the Golden Point and Mount Highly gold and scheelite properties. The lode at Mount Judah, at Glenorchy, near the headwaters of Lake Wakatipu, has been opened up during the past year, and a few tons of scheelite produced. Considerable attention has been devoted to other lodes that are known to exist in Macrae district, and on the Lammerlaw and Leaning Rock ranges, also at Barewood. At the Top Valley, in Marlborough, scheelite of excellent quality is found closely associated with the auriferous lodes, and a fair quantity of the mineral has been exported.

The refractory material, i.e., fire-clay, required for the preparation of the retorts for zinc smelting, must be of special character, which can be determined absolutely only by practical trial. Zinc smelters are extremely conservative in their use of fire-clay. Among the abundant clay resources of the United States, there is very little employed except the clay dug at St. Louis, Mo. This clay is used exclusively by the smelters of Kansas, Missouri and Illinois. The smelters of Pennsylvania and Virginia, who are remote, also use it. The United States Zinc Company, at Pueblo, Colo., after using St. Louis clay, developed a satisfactory material locally, and there is no doubt that many suitable clays exist in the United States, which could be used if the conservatism of the smelters could be overcome.

A report in London *Engineering* (June 11, 1907) says that on account of the scarcity of iron ore in Germany, and the decrease in the exports of Swedish iron ore, several German metallurgical concerns have contracted with the Dombrovo and Donetz iron-ore mines in Russia for the delivery of 35,000,000 poods of iron ore to be delivered before the end of July.

The Output of Minerals in Cornwall During 1906

SPECIAL CORRESPONDENCE

The official figures giving the output of minerals in Cornwall and Devon during 1906 have just been published in the government report. The output of tin concentrates in Cornwall was 6226 tons, and in Devonshire 32 tons, and there was also produced 1313 of undressed tin ore. These figures are almost identical with those of the previous year. Until the full details of the production are published in a subsequent report it is undesirable to enlarge on the subject here. It is sufficient to say that the figures are pretty much what was expected, as was outlined in an article that appeared in the JOURNAL in January last.

COPPER AND ARSENICAL PYRITES

The figures for the output of copper ore in Cornwall and Devon during 1906 are 4170 tons, as compared with 5466 tons during 1905. The production of arsenic and arsenical pyrites during 1906 was 1599 tons and 610 tons, respectively, as compared with 1528 tons and 641 tons, respectively, in 1905.

LABOR AND THE PRESENT SITUATION

J. S. Martin, the inspector of mines, makes some interesting remarks in his report. The labor difficulty is well reflected by his statement that the labor of the present day in Cornish mines consists very largely of boys and youths under 20 years of age, and of old men. He is outspoken in his opinion about the boom in Cornwall being overdone, especially in the press, and is of opinion that before any further companies are floated or mines started, those companies which have already been floated should be allowed to show what, under good management, they can do. His remarks on this subject may be quoted at length:

"The year has been a prosperous one for the Cornish and Devonshire mines, due rather to the high prices obtained for the minerals wrought than to any increase in the quantity. Thus, tin (white metal) attained a hitherto unrecorded price (£215 per ton) in May; copper, if it has not attained a record price (£109), has not been so high for many years past; and wolfram has been ranging at high figures. The result has been a boom in Cornwall which seems to be getting overdone. I deprecate the overdoing of the boom as much as I advocate, and have advocated, a steady investment in good and well-managed mines in the county.

"At present almost every sett in the county is being run after, presumably with a view to promotions and company mongering, which, however much it may appeal to individuals, is not for the permanent good of Cornwall.

"The industry is now in a very interesting stage in consequence of the high price of tin; the larger mines working are all making profits and it remains to be seen whether these profits will be dissipated in the payment of large dividends in order to enhance the present market value of the shares, or applied, as so much needed in the best of them, to generally strengthening their position by improved mining and dressing plant, exploration and development with a view to increased returns in the future, and the permanent enhancement of their values. I anticipate too much of the former line of action and too little of the latter. Memories are proverbially short in these matters, and all the more so in mining properties which are treated too much as speculative counters by all parties, from directors down to the smallest shareholder.

"Several new companies have been formed during the last two or three years with considerable nominal capital, of which a portion only is provided in cash for development and working purposes; the remainder, which is usually for goodwill, promoters, etc., being non-productive. Managers of the new school, who claim scientific mining education combined with more or less practical experience, have been appointed to each of the principal mines started under important companies which have been floated. They profess to be able, with the capital available for the purpose, to create payable mines, with efficient development for permanency and the most up-to-date mining and dressing machinery, etc. They will, however, have to pay dividends not only upon the money expended in developing the mine above and below ground, but also upon the large sums of unproductive capital added in the flotations for goodwill of leases and for promoters' profits and expenses. To obtain satisfactory results under these conditions the mines (which must be classed as low-grade propositions) will require to be worked extensively and with a considerable weekly output, probably 1200 to 1500 tons or more, containing not less than 25 to 35 lb. of black tin to the ton."

METHODS OF MINING

Mr. Martin's remarks on the absence of systematic prospecting and on the slow progress of machinery to make up for scarcity of labor are also of interest:

"There has been a tendency during the year to increase the number of rock drills at work in the mines, but the fact that, notwithstanding the inducements held out by the remarkably high price of tin, the mines have not been able to increase their outputs, indicates clearly what I have maintained for years past, that development work has not been carried out as it should have been. I have referred to the mines severally in past years, but do not propose doing so this year, as I have very little to say that would not be more or less a repetition of what I have already

said. I consider that the number of rock drills at work, although largely increased since I first commenced remarking on the subject years ago, is not yet nearly sufficient at any of the mines to do them justice, and to meet the deficiency already existing as regards labor, a question which may be expected to become more acute. A mine like Carn Brea, which has sufficient compressor power on the ground, should, I consider, be using two or three times the present number. Wheal Grenville, now Grenville United, Ltd., should, as I have urged for years past, have many more at work, in order to do the mine justice; here want of funds cannot be alleged, as it has been paying dividends, thus differing from Carn Brea, but I suppose a desire to show immediate profits, even though comparatively small, rather than prospective larger ones in the future, is not unnatural with mine committees."

Mines in Ireland

The output of minerals in Ireland continues to be small. The production of coal during 1906 was 93,662 tons, of which 74,915 tons were anthracite. Kilkenny is the chief county that produces coal, and its output was 61,555 tons of anthracite. The only other counties that had any appreciable output were Tipperary and Queens, which produced anthracite, and Roscommon, Leitrim, Sligo, Tyrone and Antrim, which produce bituminous coal; but the production in those counties is very small. The total number of people employed in coal-mining operations in Ireland was only 785 during the year 1906. In days gone by Ireland used to produce copper and gold, and we hear a good deal from London about the revival of these industries. The official report of the inspector of mines gives small encouragement to the hopes of a revival of mining in the country. The copper mines, of which so much has been heard, produced during 1906 only 3000 tons of ore, valued at about £4000; and probably the value was chiefly in the sulphur. The county of Antrim produced 6654 tons of bauxite, valued at £2728, and considering that the British Aluminum Company used to draw its principal supplies of ore from Antrim, the smallness of the present output is noticeable. Ireland also produces iron ore, in Antrim and Londonderry, and lead ore, which contains some gold and silver, in Donegal. The mineral riches of Ireland, however, are almost an inappreciable quantity.

In setting a tube mill, special care is necessary with the foundations on account of the constant hammering of the revolving pebbles and the vibration of the spur gears, which tend to crystallize and break the anchor bolts and drive the mill into the concrete.

The Black Sand Problem

By F. POWELL

Professor Richards' paper in a recent number of the *JOURNAL* outlining a method for the preliminary concentration of black sand, prompts me to offer a suggestion based on my personal experience of some years ago, though at the time the object was rather to get rid of the black sand than to save it.

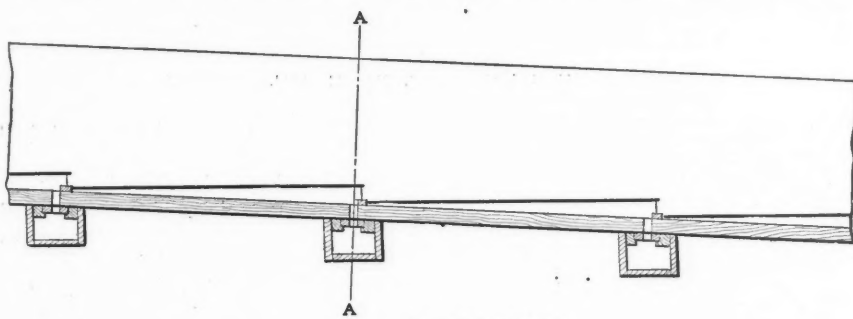
For a number of years I was interested in one way and another with gold dredging on the Snake river in Idaho, and a number of experiments were tried with different forms of gold-saving appliances. One of the devices used in a common sluice box was known to us as the Caribou riffle with a blanket beneath it. These riffles were simply sheets of perforated steel placed over the blanket in the bottom of the sluice in a series of low flat steps, the up-stream end of the sheets resting on the blanket and the lower end raised about 2 in. with sheets 3 ft. long. This form of riffle is effective

in saving very fine gold in a sluice box, provided that the box is not overcrowded, which results in the filling up of the space under the riffles or screens with black sand. Efforts were therefore directed toward the removal of the black sand and its treatment on outside blanket sluices or burlap tables.

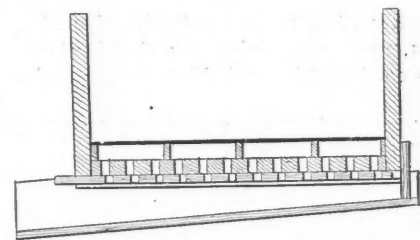
EFFECTIVE FOR COLLECTING BLACK SAND

The sluice box described with the modified undercurrents and discharge under control was very effective in extracting the black sand. The action was not only one of screening but of classification as well. The discharge could be regulated so that only a highly concentrated black sand came through, the lighter sand being carried on over the wooden riffle to the next screen. Toward the lower end of the sluice more

the common undercurrent and can be easily installed. The product will be well adapted to further treatment by magnetic separators or otherwise, being more highly concentrated than the sands direct from the ordinary undercurrent. The main item of cost is the screens. To get the small holes of $\frac{1}{8}$ -in. diameter, it is necessary to use metal not much over $\frac{1}{8}$ in. thick, costing about 25 to 30 c. per ft. Slots will choke much more quickly than round holes; $\frac{1}{2}$ -in. holes will pass all the black sand ordinarily met with and a coarser screen will not give the same degree of concentration. Sheets $\frac{1}{8}$ in. thick will stand about two months in a sluice box with the average run of gravel. They can be protected against heavy stones with bars of pick steel riveted to them lengthwise, say 4 in. apart, which will add greatly to their life. This applies to the ordinary hydraulic mining operations where the black sand is worth the expense of handling as a by-product, as well as to operations in which the recovery of black sand is the main object.



Longitudinal Section
CARIBOU RIFFLE AND UNDERCURRENT



Cross Section at A-A

and more of the quartz and other sand would of course be discharged, but by reducing the openings the degree of concentration could be increased. I was not concerned with the saving of black sand, and the black sand thus saved did not carry with it the very elusive gold dust that remains in suspension almost indefinitely in a moving current, especially with sand and gravel; nor did the removal of the black sand in the upper portion of the sluice aid materially in saving lighter gold further down.

ARRANGEMENTS OF PERFORATED SHEETS

The subsequent experiments are not of present interest, unless it be merely to say in passing that much of the Snake River gold is too fine to settle at all in a sluice box, and the sluice was abandoned for a shaking screen which drained as well as screened the gravel, this screen being, I believe, the prototype of those afterward used at Oroville. "But that is another story." The black sand extracted by this method would, without doubt, carry with it any platinum or rare metals not previously caught in the sluice itself. My suggestion is this, that the Caribou riffles as described are superior to

the requirements, but it is of course applicable only under the same condition as hydraulic mining and dredging. In these cases the black sand itself is more than likely to be a by-product.

In its application to dredging the Caribou riffle undercurrent can be placed on each gold table at the lower end and below the Hungarian or other riffles used for saving the gold. A mercury board or a blanket under the screen would also serve as a gold saver, while the black sand could be drawn off as before, collected in a sump and pumped, with a centrifugal pump to the upper deck, or to an auxiliary plant on a separate boat for re-treatment for the extraction of platinum, etc. Profit in dredging depends on capacity more than on any other one thing, even at the risk of some losses, and

ECONOMIC QUESTIONS

In the latter case, assuming a deposit of sufficient extent and with sufficient content of magnetic iron to make it worth while, the first requisite is a simple method of preliminary concentration with large capacity and low cost of installation and operation. The method described above would seem to answer the requirements, but it is of course applicable only under the same condition as hydraulic mining and dredging. In these cases the black sand itself is more than likely to be a by-product.

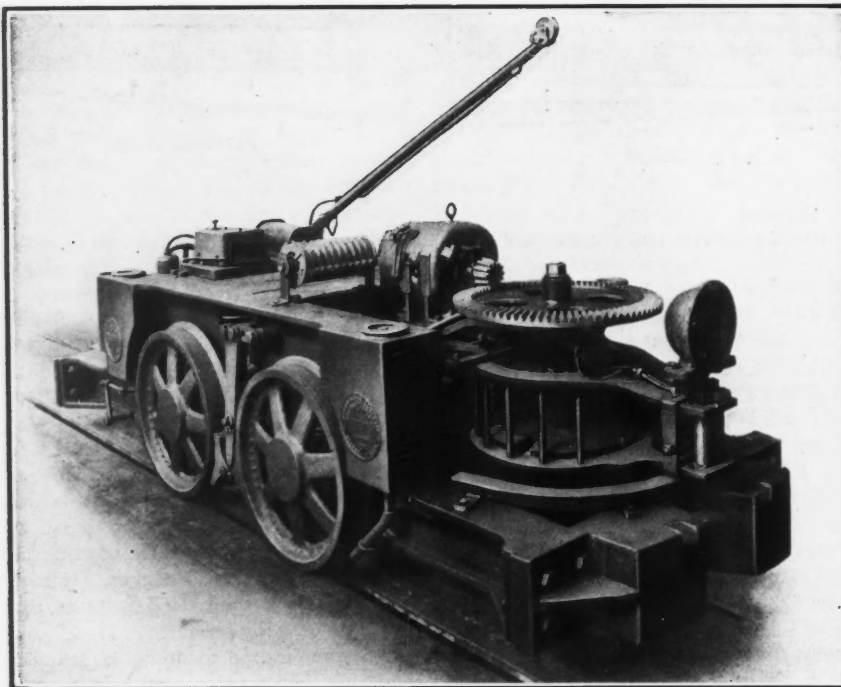
My suggestion is this, that the Caribou riffles as described are superior to

any complication of the gold-saving appliances liable to cut down capacity or liable to derangement and consequent stops, is to be avoided. The introduction of the undercurrent suggested would seem to be free from the objections named. If it failed at any time this would not interfere with the main operations of the dredge.

With regard to magnetic iron sand as iron ore and its recovery for use as the basis of iron and steel making, a good many questions are involved not at all connected with the mere concentration or even the smelting. These are the least of the difficulties. But much has already been written on this aspect of the subject. It is chiefly a case of "first procure the hare."

The accompanying sketch shows the sluice and undercurrents as actually used. A possible improvement would be to make a slight transverse depression just above the wooden riffle, say a V-groove 1 in. deep and 2 in. wide, which would be always well filled with black sand so that the lighter sand would be washed over upon the next screen.

According to *Indian Engineering* (May 11, 1907), the mining of amber in Burma is conducted in a primitive manner by dig-



ELECTRIC MINE LOCOMOTIVE WITH GATHERING REEL

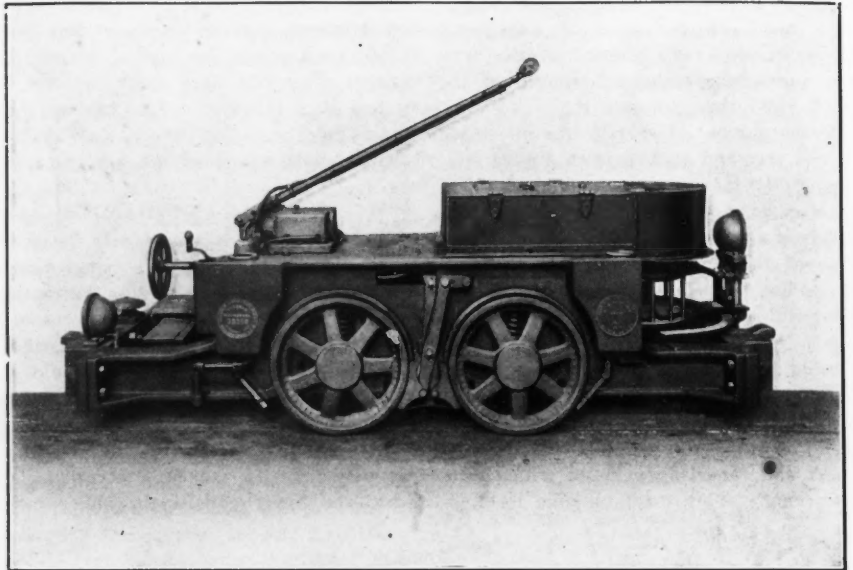
ging pits as near as possible to where amber has been found before, to a depth of 45 ft. and if nothing is found at that depth the pit is abandoned. Three men usually work in partnership. One man digs a three hours' shift, the other two sitting at the pit's mouth and drawing up earth until their time comes to go below. The amber industry brings but little revenue to the Government.

Electric Mine Locomotives with Gathering Reel

Two electric mining locomotives recently built by the Baldwin Locomotive works for the Naomi Coal Company, possess some interesting features. The en-

is 3 ft. 6 in., and the width 4 ft. 5 in. The total weight is about 12,000 lb.

The electrical equipment has been furnished by the Westinghouse Electric and Manufacturing Company. The locomotive is equipped with two No. 60 motors, each of 15 h.p. capacity, and designed for 500



ELECTRIC MINE LOCOMOTIVE, NAOMI COAL COMPANY

volts. They are operated by one R-86-B controller.

The gathering reel, which is an interesting feature of the design, is operated by one K-2 motor, and driven by means of bevel gears. The reel is arranged to carry 300 ft. of $\frac{3}{8}$ -in. wire cable. It is placed at the rear end of the locomotive, and the cable is paid out between guiding rollers.

The general equipment includes a hand brake, sand boxes with spouts for all wheels, gong, and electric headlights front and back. The top flooring is removable, so that all parts of the locomotive are readily accessible.

A very delicate indicator of the presence of hydrochloric acid gas in the atmosphere is metanil yellow. The popular name for this substance is "dolly" cream dye and it is used for giving curtains, etc., a creamy tint. The full scientific name is "the sodium salt of meta-amido-benzene sulphonic acid-azo-diphenyl-amine." Its value as a test for hydrochloric acid was accidentally discovered. At an alkali plant in the north of England something went wrong with the connections and hydrochloric acid escaped. Among the neighbors the fashion for "dolly" cream prevailed at the time. They found that their curtains were changed from cream to a heliotrope tint. On investigating the circumstance the alkali inspector found the usefulness of this substance for testing the presence of hydrochloric acid. Free chlorine and sulphurous gases have no effect on its color except to bleach it.

gines are built for a track gage of 3 ft. 8 in., the driving wheels are of cast iron with chilled tread, and measure 28 in. in diameter. The wheel base is 3 ft. The side frames are of cast iron, placed inside the wheels, and supported on coiled springs, which are mounted upon the boxes. The bumpers are also of cast iron. The length of the engine is approximately 12 ft.; the height, exclusive of the trolley,

New Developments in the Lake Superior Iron Region

SPECIAL CORRESPONDENCE

The Old Volunteer stockpile, owned by the Oliver Iron Mining Company, at Palmer, Marquette range, is being cleaned up, and the entire 25,000 tons on hand will be sent off at once. This was decided upon prior to the Mesabi strike, but other old piles will doubtless be attacked soon as a result of the suspension in Minnesota and as much ore as possible will be moved from the old ranges. Cascade range mines, of which Volunteer is one, have not been as active this year as was ex-

sidered merchantable ore, and which will be taken out. The history of this mine is typical of many in the lake region.

The Chicago, Milwaukee & St. Paul railway is to go after a share of Menominee range ore traffic from all points, and has made some connections with the Wisconsin & Michigan road, and let some contracts that will take it to important mining centers not heretofore touched. It will also build a cut-off that will permit larger trains and better service. It enters fields that have been held exclusively by the Chicago & Northwestern road.

G. A. St. Clair, who is developing the 9000 acres of the Mesaba Iron Company on the eastern Mesabi, in townships 60, 12 and 13 is meeting with encouragement.

the conclusion that a considerable amount of ore will be developed on these lands, and he is preparing to increase his operations. Most of his work has been near the old so-called "syndicate operations" in 60-12, where are the most impressive outcroppings to be found on the entire Mesabi range.

Mr. St. Clair is also opening the old Mallman exploration, one of the first finds of soft hematite found on the Mesabi, and located in section 12-59-14, almost immediately to the west of his 60-12 operations. The Mallman was under option by the Lake Superior Corporation, in 1902, and about 250,000 tons of a splendid soft bessemer hematite was measured up, covered by a very slight surface. This was in addition to some tonnage of ores found by the old Mallman shafts, and which was then of little immediate value. The Mallman was at that time six miles from a railway and the Lake Superior Corporation did not care to incur the expense of getting in. But now a road is operating within three miles, and the situation is different. Construction of the Duluth & Iron Range is proceeding to the Mallman, on its way to the "syndicate" group of St. Clair. He is stripping the slight surface over the thin soft ore and sinking a shaft into the banded ore east of it, and expects to commence shipping Mallman ore in September, and to get out 25,000 tons this year. Some Mallman soft ore went as low as 0.007 in phosphorus.



A LAKE SUPERIOR HEAD-FRAME AND TRESTLE

pected, and but little ore has been shipped as yet. The Volunteer is under option to A. Maitland, who is exploring with a drill. It is not impossible that the Volunteer has better ore at depth than the former operators have been able to mine from present openings.

The Old Jackson mine, first producer on Lake Superior, is now under development by the Cleveland Cliffs company, and about 500 tons a day are coming out of South Jackson pit. Developments in progress will permit twice as much ore to be taken out. This property was abandoned as exhausted years ago, after practically continuous operation for more than 40 years, but there seems to be a very considerable tonnage of what is now con-

Widespread outcroppings of hard hematite ores occur at several points along this distance. Indeed it was these outcrops alone that first gave rise to the hope that merchantable iron ores might exist in northern Minnesota, and it was as the result of the first, and fruitless, explorations of these outcrops that led to the discovery and development of the hard ores of the Vermilion range. Exploration at that time, and occasionally subsequently, found these surface croppings to be thin. Mr. St. Clair has been working far more thoroughly than any previous explorer. In fact he has put down as many as 45 drill holes to the 40-acre tract, and his test pitting has been at times as high as one to the acre. As a result he has come to

The Corrosion of Iron

At a recent meeting of the American Society for Testing Materials, Dr. Cushman, of the Department of Agriculture, made the statement that oxygen plays only a secondary part in the corrosion of iron and that the best preventives of rusting are to be found in the most effective oxidizing agents such as chromic acid and its salts. His theory is that the attack on the iron is not made by oxygen but by the hydrogen ion, which is a hydrogen atom that carries a static charge of electricity. Even pure water contains some such ions, and in acid solution, dissociation is greater and hence the ions are more abundant, which explains why acid waters corrode iron more readily than pure water.

The action between the hydrogen ion and the iron is conceived to be electrolytic and the efficiency of chromic acid and its salts in preventing rusting lies in the fact that they polarize the iron so that it is not acted upon by the charge carried by the hydrogen ion. This property of chromic acid of rendering the iron inert appears to be of a permanent character, but the commercial aspect of the question has not yet been investigated so that it is impossible to say how important a preventive process of treating iron with chromic acid might become.

Pig Iron Production in 1907

The American Iron and Steel Association has received from the manufacturers complete statistics of the production of pig iron in the United States in the first half of 1907. The production of pig iron in the first half of 1907 was 13,478,044 gross tons, against 12,724,941 tons in the last half of 1906 and 12,582,250 tons in the first half of 1906. The following table gives the half-yearly production since 1904, in long tons.

	First Half.	Second Half.	Year.
1904.....	8,178,438	8,323,595	16,497,033
1905.....	11,163,175	11,829,205	22,992,380
1906.....	12,582,250	12,724,941	25,307,191
1907.....	13,478,044		

The increase in production in the first half of 1907 as compared with the second half of 1906 amounted to 753,103 tons, and as compared with the first half of 1906 to 895,794 tons. The production in the first half of 1907 was much the largest in any half year in our history and it was larger than that of any whole year prior to 1899. As late as 1894 the world's production of pig iron amounted to only 25,600,000 tons, which we will certainly exceed in 1907 and almost reached in 1906.

The classification of iron made is as follows, comparison being with the first half of 1906:

	1906.	1907.	Changes.
Foundry & forge..	2,879,539	3,242,559	I. 363,020
Bessemer pig.....	6,884,881	7,185,878	I. 300,997
Basic pig.....	2,449,275	2,671,136	I. 221,861
Charcoal iron.....	207,722	205,796	D. 1,926
Spiegel and ferro..	160,833	172,673	I. 11,842
Total.....	12,582,250	13,478,044	I. 895,794

The bessemer pig included this year 95,469 tons of low-phosphorus iron. The production of spiegeleisen alone in the first half of 1907 was 143,992 tons. Of ferromanganese alone the production in the first half of 1907 was 28,683 tons.

The classification according to fuel used is as follows for 1907:

	Tons	Per ct.
Coke.....	12,514,014	92.9
Anthracite and coke....	730,305	5.5
Anthracite alone.....	18,929	0.1
Charcoal.....	205,796	1.5
Total.....	13,478,044	100.0

The production by States in the first half of 1907 was as follows, compared with that for the first half of 1906:

	1906.	1907.
Massachusetts and Connecticut.....	10,218	8,746
New York.....	746,271	859,125
New Jersey.....	167,820	195,245
Pennsylvania.....	5,688,743	5,964,884
Maryland.....	194,907	221,145
Virginia.....	257,806	260,912
Georgia and Texas.....	46,865	26,173
Alabama.....	825,090	861,771
West Virginia.....	136,662	151,643
Kentucky.....	35,533	79,013
Tennessee.....	203,569	193,371
Ohio.....	2,675,812	2,815,174
Illinois.....	1,011,639	1,263,258
Michigan.....	175,672	197,330
Wisconsin and Minnesota	190,949	160,045
Missouri, Colorado and Oregon.....	214,694	220,209
Total.....	12,582,250	13,478,044

The chief producing States this year were Pennsylvania, with 44.3 per cent. of the total; Ohio, 21.9; Illinois, 9.4; Ala-

bama and New York, with 6.4 per cent. each.

The whole number of furnaces in blast on June 30, 1907, was 359, against 340 on Dec. 31, 1906, and 323 on June 30, 1906. The number of furnaces idle on June 30, 1907, was 83, against 89 on Dec. 31, 1906, and 106 on June 30, 1906.

During the first six months of 1907 the number of furnaces actually in blast during a part or the whole of the period was 382, as compared with 374 during the last half of 1906 and 361 during the first half of that year.

On June 30, 1907, there were 29 furnaces in course of construction, all of which will use coke for fuel, as follows: New York, 1; Pennsylvania, 10; Alabama, 1; Ohio, 9; Indiana, 5; Illinois, 2; and Wisconsin, 1. In addition three furnaces were being rebuilt on June 30, of which 1 coke furnace was in Virginia, 1 coke furnace was in Alabama, and 1 charcoal furnace was in Michigan. One abandoned charcoal furnace in Tennessee may also be revived in 1907.

On June 30, 1907, there were 13 projected furnaces, all of which, if built, will use coke for fuel, as follows; New York, 1; Pennsylvania, 4; Ohio, 2; Indiana, 5; and Michigan 1. The construction of some of these furnaces is to be commenced at once; work on others may not soon be undertaken.

Iron Production in Canada

The American Iron and Steel Association has received direct from the manufacturers complete statistics of the production of pig iron in Canada in the first six months of 1907. The total production of all kinds of pig iron in the Dominion in the first half of 1907 amounted to 270,100 long tons, as compared with 259,947 tons in the last half of 1906 and 282,010 tons in the first half. This is an increase of 10,153 tons over the last half of 1906, but a decrease of 11,910 tons, as compared with the first half. The following table gives the production as classified, compared with the first half of 1906:

	1906.	1907.	Changes.
Bessemer iron.....	79,051	73,023	D. 6,028
Basic iron.....	135,298	161,403	I. 26,105
Foundry, forge, etc.....	67,661	35,674	D. 31,987
Total.....	282,010	270,100	D. 11,910

Of the iron reported in 1907 there were 265,253 tons made with bituminous coal or coke, and 4847 tons with charcoal.

On June 30, 1907, Canada had 14 completed blast furnaces, of which 10 were in blast and four were idle. Of this total 12 were equipped to use coke and two to use charcoal. In addition one coke furnace was being built on June 30 and one charcoal furnace was being rebuilt. Three coke furnaces were also partly erected on the same date, work on which had been suspended for some time.

During the first half of 1907 the total number of furnaces in Canada actually

in blast for the whole or a part of the period was 12, of which 10 used coke and two used charcoal. The number that were idle during the whole period was two coke furnaces, one blowing in for the first time in July. The rebuilding charcoal furnace is not considered in the statement.

Gold Mining in West Africa During 1906

The output of gold in British West African mines continues to show an increase. The output during 1906 was 230,957 oz. bullion, estimated to be worth £892,291. This return compares with 171,049 oz., valued at £653,820, during 1905, and 104,460 oz., valued at £378,480, in 1904. Of the amount for 1906, the Gold Coast Colony contributed 154,925 oz., while Ashanti contributed 76,032 oz. The Gold Coast Colony showed the greatest proportional increase, the figures for 1905 being 102,790 oz. The companies accounting for this increase were the Abosso, Abontiakoon No. 1, Bibiani, Broomassie, and the Tarkwa & Abosso. The largest producers were the first three, the Abontiakoon No. 1 leading the way with 39,814 oz., being an increase of 29,093 oz. over 1905. The other two had an output a few thousand ounces less. In Ashanti the chief producers were Ashanti Gold Fields, and Akrokerri, with 42,301 oz., and 23,063 oz., respectively.

In addition to the above production from mines, there was an output from dredging on the gold coast and Ashanti of 15,154 oz., being an increase of 2447 oz. over 1905.

The extraction at the basket mines totaled 86,586 oz. from 135,980 tons, and at the quartz mines, 127,799 oz. from 157,163 tons of ore.

The Niagara Falls Power Company

The Niagara Falls Power Company now has available for power generation on the American side of the Niagara river two complete plants; with an aggregate capacity for an output of about 77,000 electrical horse-power, and a considerable reserve in power-generating machinery; and on the Canadian side of the Niagara river a plant with installation for a continuous output of 40,000 electrical horse-power, one 10,000-h.p. generating unit being held in reserve. From the combined output of these plants about 95,000 electrical horse-power now are yielding revenue. It is expected that before the close of 1907 substantially all of the combined output of these plants will become revenue producing.

The whole importation of platinum into the United States is made from Paris.

Ground Breaking in the Joplin District

Holes Are Drilled with Air Drills and Squibbed before Charging.
About 1 Pound of Dynamite Is Required Per Ton of Rock Broken

B Y D O S S B R I T T A I N *

The term ground breaking is taken to include the process of so loosening the ground as to enable it to be readily loaded into buckets or cars and hoisted from the shaft or drift. In the Joplin district are encountered two varieties of ground, the hard and the soft. Hard ground consists of massively bedded rock requiring heavy blasting to loosen it. Such ground is to be found throughout the district in the

variety which stands readily without support, except from occasional pillars left from the formation itself, requires timbering to prevent caving and is most prominently exemplified in the Bumblebee mine at Joplin and the Midnight mine near Belleville.

BREAKING HARD GROUND

All hard-ground breaking is done with

have to be changed with a frequency varying with the hardness of the ground and the skill used in tempering. In most cases a change is required every 2 or 3 ft. while in others a bit can be used for twice this distance. The bit employed most commonly is known as the bull-head bit with the cutting edge in a straight line. Some of the larger Webb City mines, however, employ the diamond-edge



A DRIFT IN THE KANSAS CITY MINE FOUR MILES SOUTHWEST OF JOPLIN

same localities as the soft ground but more extensively, even to the exclusion of the appearance of soft ground in the sheet formation in the vicinity of Webb City. The Yellow Dog Mine at Webb City and the Grace mine on the Granby land at Joplin furnish well known examples of hard-ground mining which has become the most extensive in the district.

Soft ground is that which is so unstable as readily to be loosened with pick and bar or at most with a light charge of powder. Such ground, unlike the hard

machine drills and powder. The type of drill in most common use is the Sullivan UC, and the Ingersoll C 24 for shaft sinking, and the Sullivan UF 2 and the Ingersoll E 24 for heavy stoping. A few lighter and a few heavier drills of the same makes are in use, but are not common. Nearly all the machine drills in use are air drills, though some steam drills find employment in the district. Hand steel cannot be said to find a use there in breaking hard ground; it was discarded when deeper mining began. In ordinary ground an average eight-hour shift's work for a drill is 45 ft. of holes. Steels

bit with the cutting edge arranged in the form of a cross. In shaft sinking the holes are usually started with 1½-in. steel and finished with the 1-in. size. In stoping the holes are usually started with 1½-in. steel and finished with the 1¼-in. size. If the holes are deeper than 10 ft. they are usually finished with still smaller steel.

CHARGING

The holes drilled with these steels are fired either with powder manufactured by the Independent Powder Company or that of the DuPont Powder Company. In

*Joplin, Mo.

either case the explosive is in the form of sticks weighing $\frac{1}{2}$ lb. each. Placing explosives and firing are among the most important details connected with ground breaking, for upon these depend the amount of ground broken per pound of powder and, consequently to a large extent, the cost of ore production.

In order to break the greatest amount of ground at the least cost it has been found advisable in most cases to squib the

cleaned with a blow-pipe made for the purpose, and charged with the heavy charge.

In charging, the sticks are usually split down the side so that when tamped they will spread readily. Each stick is placed on the sharp end of a spoon and pressed to the bottom of the hole where it is tamped with a round wooden tamping stick of oak or hickory, 8 to 12 ft. long. It is also an occasional and perilous prac-

drawn up over the fuse above the primer and securely tied with a stout string. As additional precaution against moisture in very wet mines the tar melted from a piece of fuse is allowed to drop around the junction of the cap and fuse before introduction into the starter. The latter, after being prepared to suit local conditions, is inserted into the drill hole in intimate contact with the charge. The hole is then tamped full of clay and gravel to prevent

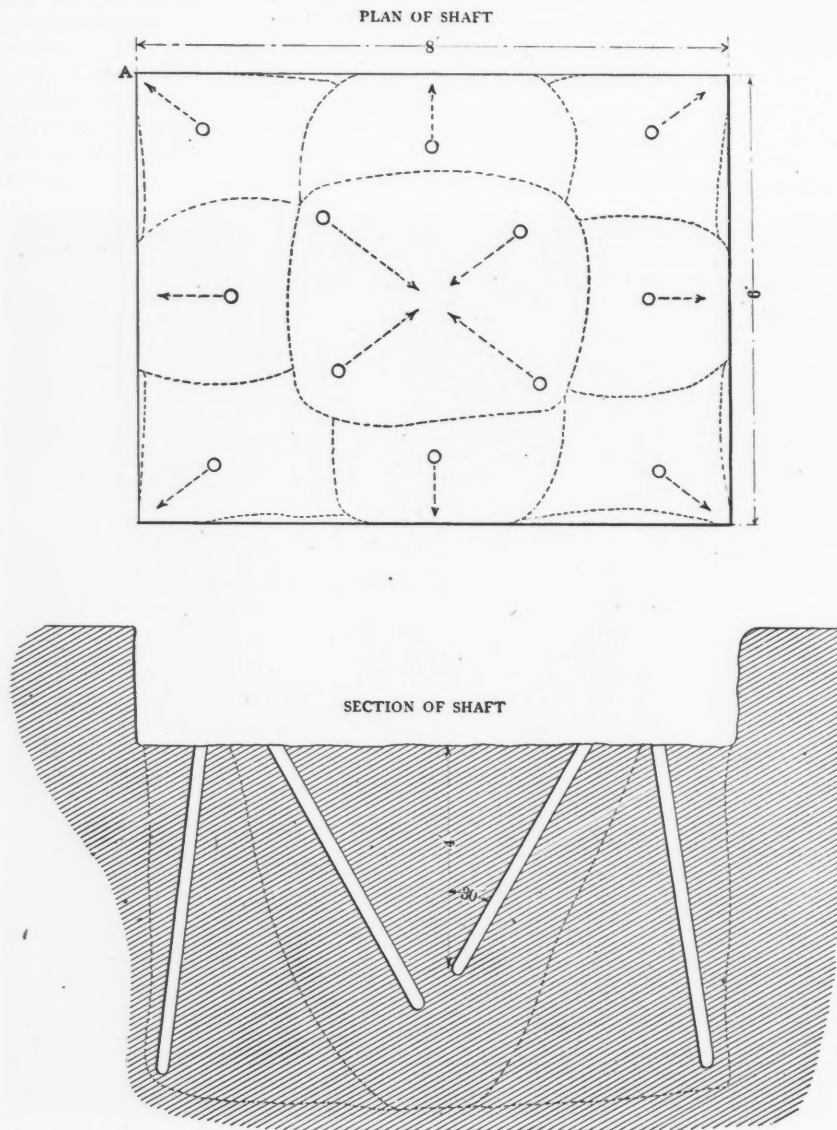


FIG. 1

holes before putting in and firing the charge intended to accomplish the work of real ground-breaking. Squibbing is the process of enlarging with powder the drill-holes so that they will hold more powder than otherwise, thus enabling each blast to lift more ground than if the holes were charged without being enlarged. It is done with from one-half to one stick of dynamite, and is repeated sometimes as many as three times in very hard ground. Two or three slight explosions so enlarge the hole that it will hold from 50 to 75 sticks of powder. The hole is then

tice to use an iron tamping bar. The last stick or part of stick passed in contains the cap, or primer, and fuse, electric firing being employed in the district only for sinking purposes. This last stick is called the starter and is prepared by making a round cavity in the end of the mass of powder with a sharp stick. The primer is slipped over the end of the fuse and tightly crimped with a pair of pincers or the teeth so as to prevent water from moistening the primer. The end of the fuse bearing the primer is then inserted into the hole in the starter and the paper covering is

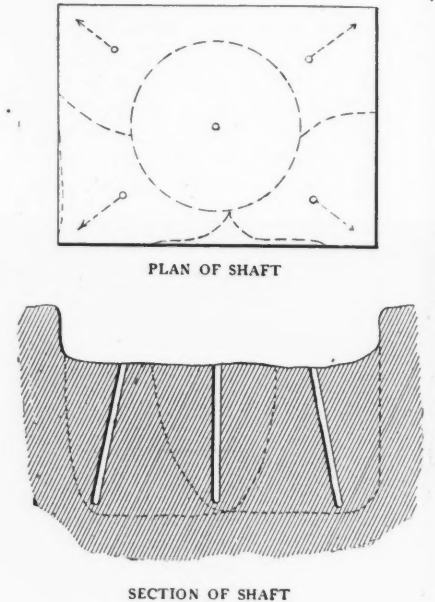


FIG. 2

the charge from being wasted by blowing out through the hole, and the blast is ready for firing, which is the only thing now necessary to complete the utility of the drill and dynamite. About 1 lb. of dynamite is required for every ton of ground broken in drifting, and 25 lb. to the foot for sinking shafts of ordinary size.

SHAFT SINKING

With these agencies, aided by pick, bar, and shovel, ground breaking, shaft sinking and stoping, is accomplished. Regularly shafts in the Joplin district are rectangular, 4x6 ft. although in the Webb City sheet ground larger shafts, 6x8 ft. are common as well as those containing from two or three compartments each of these dimensions, the larger compartment shafts being necessary for hoisting the immense quantities of ore in a given time required in order to handle the low-grade ores at a profit. In the larger shafts, one compartment is generally used as a pump shaft and the others for hoisting, although sometimes one is reserved as a man-way.

Shafts are sunk to solid rock with the use of pick and shovel, and sometimes a little powder for popping the larger boulders or spudding the ground that does not yield readily to simpler methods. The boulders are popped with a small amount of powder, one-half to one and one-half

sticks, either placed on top and weighted down with a small rock, or tamped into a shallow hole in the boulder. The process of spudding consists of driving a spud or sharp piece of 1¼-in. steel from 3 to 5 ft. into the ground and firing the hole thus formed with four to five sticks of powder.

When the shaft reaches solid rock,

in Fig. 1. The four holes occupying the middle of the shaft, and known as sump holes, are inclined, or "look" inward toward the center of the shaft at an angle of about 30 deg. from the perpendicular. They have a slant height of about 5 ft. and pull vertically about 4 ft. Four other holes are driven about 1 ft. from the corners respectively and look slightly outward

are followed by the side holes and these by the corner holes. The reason for the order is evident when the area blasted out by each series of shots, as indicated in Fig. 1, is considered. Figs. 2 and 3 indicate other arrangements of holes for shaft sinking which are now rarely used except for shale or other soft formations.

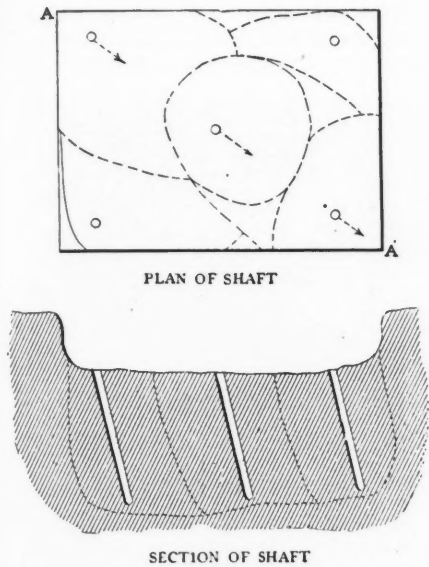


FIG. 3

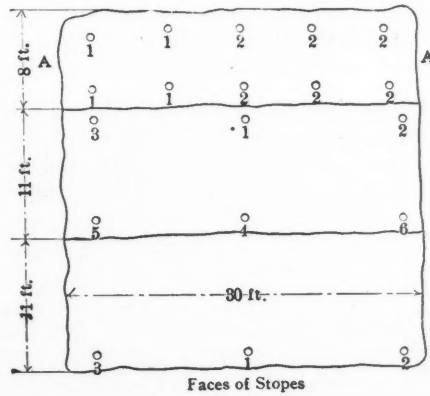


FIG. 5

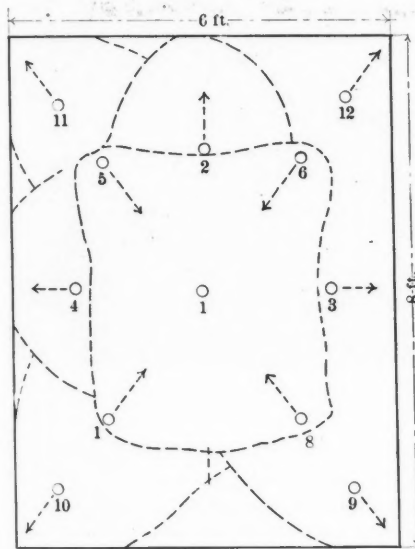
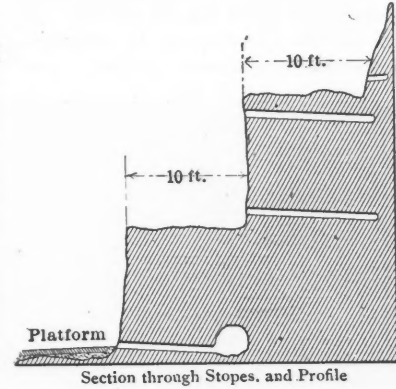


FIG. 4

which in this district usually consists of limestone or hard flint, heavy blasting is necessary. It then becomes the problem of the machine man so to arrange the holes that the powder will break in the desired direction the greatest tonnage of rock possible. As unbound or free rock blasts better than bound rock, whose position is strengthened by surrounding rock the powder charge is so arranged that the rock to be lifted lies in the path of least resistance to the explosion. As a rule 12 holes are drilled into the bottom of the shaft and are arranged as indicated

so that the shaft will break to a uniform width as it progresses downward. Likewise the four holes near the middle of the sides look outward for the same purpose. Both the corner holes and those at the sides are sunk about 4 ft. so that they will pull vertically the same distance as the sump holes, which are fired first. These

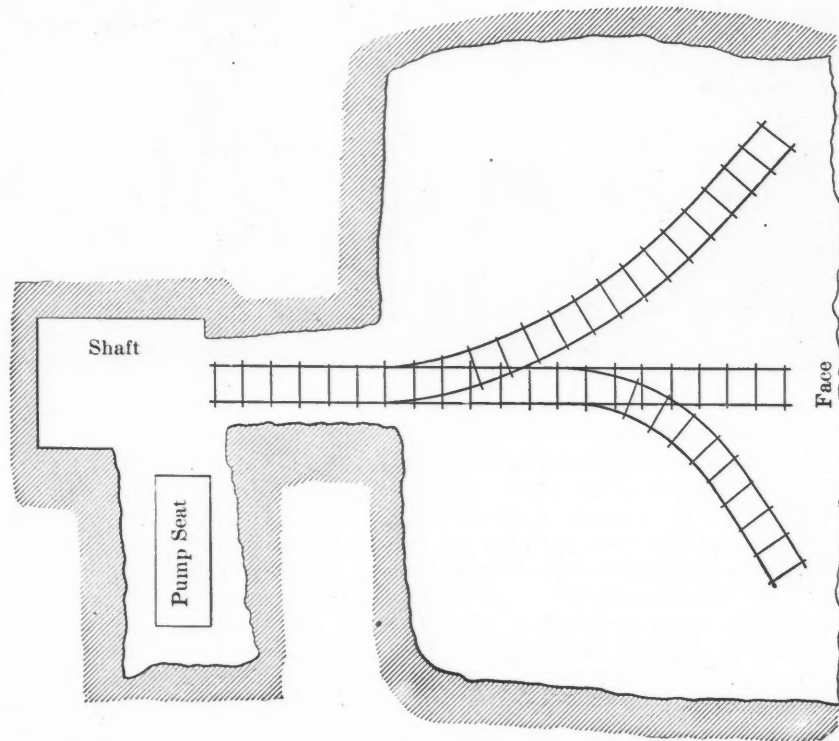


FIG. 6

DRIFTING

The process first described is continued until the shaft reaches the desired depth, when a drift usually 6x8 ft. is started horizontally into the ore or in its direction. Progress is made in much the same manner as in sinking but more rapidly on account of the greater convenience in

working and the assistance afforded by the cooperation of gravitation and the force of the powder. The arrangement of the holes is shown in Fig. 4, the same principles obtaining as to depth, inclination, and indicated order of firing as in the case of shaft-sinking.

When the ore is reached, or, if the drift started in ore, when it reaches a distance sufficient to keep the shaft from caving, it is widened to 30 to 50 ft. or until the width of the ore deposit is embraced. This widened excavation, the heading of

5. The first four holes at either end of the heading are drilled 5 ft. deep, the others 7 ft. The next series of heading holes after the first is fired, is arranged with the shallow holes at the reverse end of the heading so that each series of shots leaves the face of the heading at other than a right angle with the direction of the drift thus releasing or unbinding the rock to be blasted. The shallow holes are fired first for the obvious purpose of making the deeper shots more effective. The holes drilled in the first stope are ar-

REMOVING ORE

The heading and stopes are kept the width of the drift. The roof is kept trimmed for safety, every part of it which does not give forth the sharp ringing sound of solid rock being blown down with small charges of powder. The tops of the stopes are kept leveled so that there will be ample room and a suitable surface for the men, and the faces of the heading and stopes are kept perpendicular for convenience in drilling. When the stope is loosened by blasting, the broken



UNDERGROUND SCENE IN THE MISSION MINE, BAXTER SPRINGS

which is usually 8 ft. high, the height of the drift, of which it is but a wide expansion, proceeds along the top of the orebody. If this be more than the height of the heading in thickness, a step, or stope is taken up. Should there still be ore in the drift more stopes are taken up until the orebody is exhausted. Regularly two stopes are carried at once, giving the wide drift a depth of 30 ft., including 8 ft. for the heading and 11 ft. for each stope, which begins at the shaft, thus keeping the floor of the narrow drift always on a level with that of the wider drift so as to furnish a comparatively level surface for hauling the ore to the shaft. The heading and stopes are kept about 10 ft. ahead of the stope below.

For carrying such a drift the holes for blasting are arranged as indicated in Fig.

ranged as also indicated in Fig. 5., in two rows of three holes each, one at each corner and one near the middle of the top and the bottom of the stope. They are fired in the order of their numbers in the illustration, the upper middle hole first, then the upper corner holes, the lower middle hole, and the lower corner holes. The lower or bottom stope is drilled as indicated in Fig. 5 with a row of three holes at the bottom. Accordingly as numbered the middle hole is the first one fired, then the corner holes.

All the holes in the whole drift, except those at the top of the heading which look in such direction as is necessary to follow the top of the ore deposit, look downward at an angle of approximately 10 deg. so that they will hold water necessary for drilling.

rock tends to fall upon the stope below and continues to slide, or is "brunoed," pulled with a short-handled shovel, down upon a platform at the foot of the lower stope.

A platform, designed for the purpose of affording a smooth surface for shoveling, projects against the foot of the lower stope and receives all the broken ground from the heading and stopes. It is 16 ft. long, extends the entire width of the drift and is built of 2x12-in. oak boards which, having to be moved often to keep up with the stope, are laid loosely on finely pulverized ground to furnish a level surface. It is at this platform that the cans are filled by the shovelers.

The cans, each of 1000 lb. capacity, are brought on cars which run on tracks laid on the floor of the drift, the usual arrangement being indicated in Fig. 6. One

track leads from the shaft through the narrow drift and divides into three branches, one for the center of the drift and one for each side. One car is provided for each branch.

This system of operation is continued until all the ore, with the possible exception of the pillars left to support the roof, is exhausted on the level being operated. If, after one drift has been cut as far as the ore extends laterally, there should still be ore in the floor of the mine, other stopes are taken up after the manner of the first. However deep the successive removal of stopes should render the workings, the floor of the narrow drift, beginning with the shaft, is always kept on a level with that of the wide drift, thus giving at all times a level floor for the cars.

SUPPORTING THE ROOF

It is often the case that so many stopes are taken up that the distance from the floor to the roof of the workings is 100 ft. and more. Even then the ground may be rendered perfectly safe if the roof has been properly arched, is properly inspected from time to time, and supporting pillars are left every 50 or 60 ft. These pillars vary in size and frequency with the stability of the ground. Such supports are necessary even though the pillars be of solid ore. If they contain ore, which they do in the majority of cases, they are blasted down after the exhaustion of the rest of the deposit. Those farthest from the shaft are first blown down and the others in the order of their distance from the shaft, the most distant always being first removed. The ground being unsupported is left to cave, which is exemplified in the district by large caved areas sometimes covering acres of ground.

Soft ground is usually so loose that it has to be timbered to keep the ground from caving, and it can generally be handled with pick, bar, and shovel. Often, however, light blasting is necessary, spudding usually being sufficient. Disregarding older methods, there promises to be an innovation in the process of handling soft ground in the Joplin district. The use of the steam shovel is proposed in some of the mines of the Lehigh camp 10 miles northwest of Joplin. The ground is very loose consisting largely of creek gravel and fragmentary rock in a matrix of blue clay. Crystals of finely disseminated jack exist throughout a large area of this formation and to a considerable depth. A large cave of former workings furnishes an excellent starting point for operations, and, though the plan is tentative and could not be expected to be widely employed, it is considered by many of the operators of the district to be feasible under these particular conditions.

The Oil Fields of Oklahoma

BY CHARLES N. GOULD*

The development of the Oklahoma oilfields is as yet only in its infancy. I spent several months in the field last summer studying the geological structure of the rocks, and the conditions under which oil and gas occur. During the past winter I visited numerous oilfields, actual and prospective, and I find that approximately nine-tenths of all the oil and gas so far obtained in the region comes from three anticlinal folds, which trend nearly north and south.

PRODUCING FIELDS

The easternmost of these folds lies along the Verdigris river, the oilfield being known as the Alluwe-Coodys Bluff field. The oil is obtained at a depth of 450 to 600 ft. The second anticline lies not far from the 96th meridian, passing from the Kansas line south past Dewey, Bartlesville, Tulsa, Red Fork, and the now famous Glenn Pool. The oil along this fold comes from a depth of 1200 to 1700 ft. The third region is farther west, near Cleveland, Okla., where there is evidence of a short anticline. The oil at Cleveland is obtained at 1700 ft. depth.

Recently, at least three new localities have been found, all of them a number of miles south of the region heretofore known to be productive, near Muskogee, Okmulgee and Wewoka. The relative importance of these new fields can be determined only by extensive development, but there is no known reason why they may not become as prolific as the proved territory farther north.

OTHER PROMISING REGIONS

The most significant fact connected with the whole subject is, however, that much of the region in east central Oklahoma, where no prospecting has been done, contains numerous anticlinal folds similar in structure to those in which the oil and gas have been found farther north. The geological conditions are such as to warrant the prediction that at the present time not one-third of the prolific territory of the new State has been prospected, and not one-tenth of it developed. If these predictions are correct it is evident that the Oklahoma oilfield is destined shortly to become the most important field in America.

The wear in centrifugal pumps, caused by grit entering between the shaft and casing sleeve, may be obviated by forcing a tarry mixture of rosin, dissolved in hot linseed oil, into this space from a large grease cup.

*Professor of Geology, State University of Oklahoma, Norman, Okla.

Illinois Geological Survey

At a meeting of the State Geological Commission recently held at Springfield, plans for the season's work were approved and a number of appointments made. The coal surveys, which are being carried on in co-operation with the United States Geological Survey, will be under the direction of F. W. De Wolf, assistant State geologist.

The detailed mapping, which was carried west last year as far as Harrisburg, will be extended to Herrin, with the expectation of completing the first set of maps across the State in another season. In this work Mr. De Wolf will be assisted by A. J. Ellis.

From East St. Louis similar surveys are being carried east to Buxton. These surveys are being executed by Prof. J. A. Udden, assisted by I. R. Broman. In the Springfield district the work begun last year by T. E. Savage will be extended by F. W. De Wolf and J. C. Jones. In the Peoria district a report covering last season's work is already nearing completion.

In the laboratory Professor Parr and W. F. Wheeler will continue their studies of the composition and character of Illinois coals. David White, of the United States Geological Survey, spent May and June in a general study of the paleontology of the coal-beds of northern and western Illinois and is to return to the State in September for further work in southern Illinois. On his return, he will be joined by George H. Ashley, who made the coal survey of Indiana and is now working in Pennsylvania.

The portland cement materials of the State are to be thoroughly studied in the next two years. The field work, which is under the general charge of Prof. U. S. Grant, has already begun. G. H. Cady is mapping the older limestones of the northern counties; A. J. Ellis spent June and part of July with Mr. Savage, tracing the LaSalle cement rock to the south, and John Udden followed the Carlinville limestone down into Perry county. Messrs. Savage, Udden and Stuart Weller are now studying the limestones found along the Mississippi river, in the southern part of the State, and expect to extend their surveys eastward to the Wabash river. Samples of all available limestones are being taken and forwarded to Urbana for analyses. The laboratory investigation of these materials will be carried on under the advice of A. V. Bleininger, late of Ohio, but now connected with the ceramic department of the State University.

The work of the clays of the State will include the completion of a report upon the paving brick clays by Messrs. Rolfe, Purdy, Talbot and Baker, and some additional investigations of fireclays by E. F. Lines, who joins the survey for the purpose of taking up this work.

The oilfields of the State are to be studied and the report, issued last year, brought up to date. A detailed topographic map of the area southwest of Robinson is now being made, and data regarding oil borings in various parts of the State collected. Field studies of the Casey-Robinson field will be taken up by H. F. Bain in the fall.

In planning the topographic work of the season account has been taken of the new duties of the survey, with reference to drainage, and the study of lands subject to overflow. The field work of the present season is, therefore, being carried on in territory adjacent to the Kaskaskia, Big Muddy, Little Wabash, Embarrass and Sangamon rivers. In the special drainage surveys now being undertaken the survey is to have the co-operation of the Internal Improvement Commission and of the United States Department of Agriculture.

The preparation of educational bulletins for the use of the schools is to be continued under the direction of Prof. R. S. Salisbury, with the help of A. C. Trowbridge, at Wheaton, and J. C. Jones, at Springfield.

The Society of Chemical Industry

The celebration of the twenty-fifth anniversary of its foundation draws attention once more to the genuine sphere of usefulness of the Society of Chemical Industry. The simultaneous grant of a royal charter of incorporation very suitably indorses the high esteem in which the society is held among practical men.

It is only a short time ago that we gave some account of the history of the society, so it is not necessary to refer on this occasion to its origin, history and scope. Suffice it to say that the society has over 4000 members, and has branches in all parts of the world. The yearly subscription is probably the lowest of any society of position, being only \$6. For this subscription members receive not only the usual benefits of a society, but they are supplied with an invaluable semi-monthly journal. It is noteworthy that it is not attempted to make the membership a criterion or measure of the professional or personal standing of its supporters.

The society has always taken a militant attitude in promoting the interests of the chemical industry, and has by no means confined its energies to the reading of papers or the production of a journal. For instance, it took up successfully the question of freeing alcohol from excise duty when used in manufactures. It has also been very much to the front in agitating for patent law reform, in workmen's compensation legislation, and in the organization of international exhibitions. Technical education has received its careful consideration, and it is represented on the council of the new Imperial Technical College.

Mining Regulations in Bolivia

On April 20, 1907, the Bolivian Government issued an important decree relating to mining in that country. The decree relates to mining concessions, duties of adjoining mine-owners, method of making applications, surveying and setting of landmarks, approval and registration of claims and titles and causes for forfeiture. The most important points of the decree are summarized herewith.

It is necessary for a person holding a grant for placer working, blanket veins or surface beds, to make a second application in case he discovers veins in the sub-soil of his property. Operators in a mining group are liable to be forced to take common measures at their own expense to check floods which endanger the existence of their mines, and to drain the mines which have become flooded. Applications for mining claims must be made only upon official paper of a certain size and bearing a special stamp issued by the Government. Upon failure to do this, the prefect shall order the payment of said stamped paper plus four times its value within 24 hours. If the person fails to make such a payment, his application shall be disregarded. The survey, fixing of landmarks, and entries shall be effected within 70 days from the date of the first publication of discovery, but this rule is not to be operative when the distance and isolation of the mining claims applied for do away with any fear of causing damages to other claims. Non-compliance with any of the articles relating to the notification of discovery, application for mining license, etc., is likely to lead to the forfeiture of titles.

Mining and Engineering College in British Columbia

At a meeting of members of the Royal Institution for the Advancement of Learning in British Columbia held lately in Vancouver, it was reported that a site for the new college building had been secured from the Government for a term of years. Under the terms of the lease the society will be required to spend \$150,000 for educational purposes during the first seven years, and during the term of the lease \$150,000 in permanent improvements. It was decided to take immediate steps toward erecting the new building, to cost approximately \$100,000.

Up to the present time four chairs have been endowed in part or in whole in the college. The Robert Dunsmuir chair of mining and chemistry by Hon. James Dunsmuir; the chair of civil engineering by A. C. Flumerfelt; the chair of pure and applied mathematics by F. Carter-Cotton, and the chair of modern languages by the McGill University graduates resident in British Columbia. The Board

expressed the hope that other chairs would be endowed by friends of the Institution in the near future.

A summer school, for instruction in practical mining, is to be established in one of the mining districts of the province. It is announced that the mining department of McGill University, Montreal, Quebec, will make British Columbia the headquarters for practical mining education for the university mining classes, as well as for local students.

Monazite in Brazil

Consul-General G. E. Anderson, of Rio de Janeiro, reports that contrary to the impression which seems to exist in the United States there has been no increase in the export tax on monazite in Brazil, although the practical effect of the course of the business in that country has been such as to lead to conditions amounting to an increase. The federal authorities continue to charge about 50 per cent. on exports, or rather they allow the person handling the sand 50 per cent. of the sale value, taking the balance. In Bahia the tax remains at 27 per cent. ad valorem plus \$4.85 per ton specific export tax. In Espirito Santo the tax has been 20 per cent. ad valorem plus £1 (\$4.86), £2 or £3 per ton, specific duty, depending upon whether the exporter, a third person, or the government owns the ground from which the sand is taken. The state legislative assembly of Espirito Santo has been debating the question of an increase in the tax imposed by that State, but as yet no action has been taken.

The quality of the deposits of monazite sand now being worked in Brazil is not so good as it was formerly. It is not so rich in thorium and is more difficult to secure. So long as the tax on the sand remains at the former figure, and while the percentage of thorium is decreased, there is in fact an actual increase in the tax on thorium. Taking the Brazilian fields as a whole this decrease of richness and corresponding increase of taxation has been considerable.

Exporters of the sand say that they can do no business in the United States because the present tariff of 6c. per lb. is, at 5 per cent. of thorium, an actual tax of \$1.20 lb. and is practically prohibitive for them.

A proposition for the government monopoly of the monazite-sand business has been considered, but the failure of the coffee scheme, at least the very questionable nature of its results, has not given any further encouragement to the scheme for monopoly, but it is probable that this fact will in itself lead to new legislation and probably to less satisfactory conditions. The exports of the sand from Brazil in 1906 were 4,351,600 kg., valued at \$480,843, as compared with 4,437,290 kg., valued at \$485,184, in 1905.

Some Metallurgical Vagaries and the Results

How Some Wild Theories of Ore-treatment and Smelting Were Tried in a District in the Southwest, and Resulted in Failure

BY DWIGHT E. WOODBRIDGE*

A few weeks ago it was my fortune to visit an old and long-abandoned copper camp, once active through the exertions of chloriders and others, and now again in the initial stages of development.

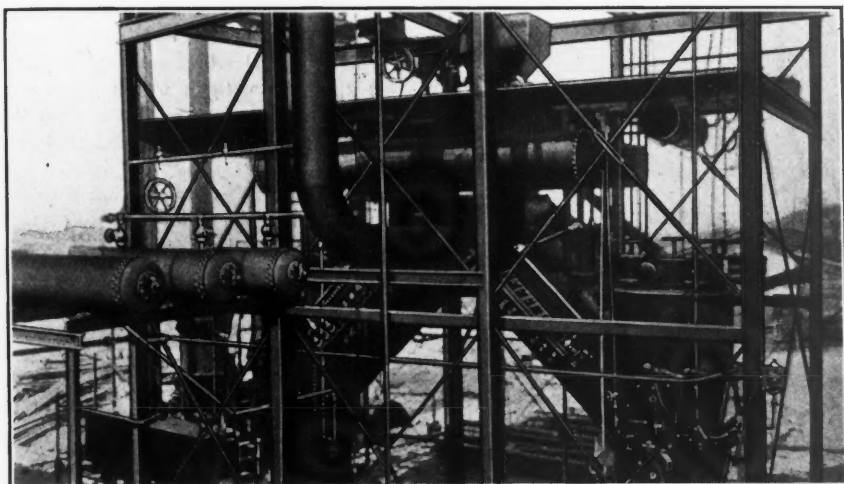
ORES AND MINING CONDITIONS

So far as is known the ores of this camp are low-grade silicious carbonates, carrying up to, say, 70 to 75 per cent. silica, and 2.5 to 3 per cent. copper, with very slight precious-metal values. The district is in the center of one of the most barren deserts of the Southwest; to the north the nearest water hole is 45 miles away, to the west 100 miles, and south

ried an average of about 3 per cent. copper, and he took occasion to point out that this is a higher average percentage of copper than is carried by the rock of the famous Calumet & Hecla mine, which has paid its stockholders more than \$100,000,000 in dividends. The owners of this fabulously rich piece of ground are unable to understand why it is that a part of their property of greater value than the Calumet & Hecla fails to furnish any profit, and they reach but one conclusion when all their efforts to earn dividends from this territory return them nothing but assessments. Their obvious and simple conviction is that all mining men are liars.

tanks, valves and furnaces. This plant is based on the ingenious and somewhat novel theory that nitrogen is the cause of all slags in the smelting of minerals, that without nitrogen there will be neither slags nor fluxes. Consequently smelting was to be done in a vacuum, which would not only exclude that most injurious and active gas, nitrogen, but also by impounding in the furnace all the vapors and fumes of combustion, would return in metal the full values of the ores subjected to reduction. Silica, and whatever other elements were undesirable, were to be volatilized and passed out of the stack. By the vacuum processes employed, every atom of carbon and every other substance forming fuel qualities, would be utilized in combination with oxy-hydrogen in the reducing flame, thereby, as stated, by the inventor, securing remarkable economy in the reduction of metals.

A pair of furnaces was built. These have tap-holes one above another, in order that the various metals, raised to a separating heat at different points in the furnaces, might be drawn off properly. It was planned that all metals contained in the most complex ores would be reduced and saved at their proper temperatures. An oxy-hydrogen flame was expected to do most of the work, and it was stated that this would give a heat like the electric arc. In order to raise the heat to certain excessive temperatures, other flames were added to this, but the oxy-hydrogen flame produced a perfect combustion by means of superheated steam, a small amount of carbon and a vacuum, and the resultant heat was similar to that of the electric furnace, and capable of reducing to gaseous matter any substance known. I am sorry that all this must be in my own unscientific language. I have no doubt the inventor would have done much better, but I was forced to accept my information from what sources were at hand. It is scarcely necessary to state that such a heat required some quite refractory substance for furnace lining, and this the inventor secured by a most interesting combination of substances, with some of which the public mind associates high fire-resisting qualities. This mixture consisted of various parts of powdered asbestos, red clay, graphite, a high proportion of sodium silicate, mineral wool, common sand, etc., etc. This dope, when plastered on the walls of the furnace, hardened till it was difficult to dent and was pointed to with the utmost pride by



FURNACE TO VOLATILIZE SILICA AND SAVE PURE METALS

and east approximately similar distances. Water at the camp is in small volume and much of it is so impregnated with hydrogen sulphide as to be disagreeable. There is no railway within 45 miles, and the nearest coalfields are at least 1000 miles still further. For an area of perhaps two or three miles by half a mile the surface is well stained with the green of copper, and a very large proportion of the rock over that area will, when broken, show copper stains. There are some shallow vertical shafts and pits, and one vertical shaft of about 200 ft. in depth, all of these without any material horizontal workings. One mining man, who made an elaborate report on the property of one company owning the deepest shaft and surrounding ground, stated that the shaft and surface colorations contiguous to it for an area of something like 40 acres, proved a tonnage of copper ground amounting to 25,000,000 tons, which car-

All these preliminary remarks are necessary for an understanding of the present situation at this camp, which affords one of the most interesting examples to be met anywhere of the vagaries of the human mind when led by a smattering of pseudo-science, combined in due proportions with charlatanical mystery, and leads one to ask, again, why are experimental processes usually attempted at experimental mines, and why does a little false science, or false metallurgy, appeal so strongly to the average business man?

EXTRAORDINARY METALLURGY

There have been attempted at this place some of the most remarkable fly-by-night metallurgical processes by those who would appear to be direct descendants of the Rosicrucians and of Count Cagliostro. In one of these experiments the copper company, whose ground is richer than that of the Calumet & Hecla, has spent between \$50,000 and \$75,000, and has to show for it a mass of pipes, steel boxes,

*Mining engineer, Duluth, Minnesota.

the inventor and his associates; but its resistance to great heat, despite the inclusion of asbestos and graphite, might be questioned.

RESULTS OF EXPERIMENTS

Unfortunately this furnace has never been blown in, and an invention which is founded on revolutionary principles still remains untested. Some slight disagreement arose between the inventor and his representative on the ground, and the officials of the company and their watchman, in the course of which the representative was shot and thrown off the top of the furnace, and as the result of this the inventor is now suing the company for \$100,000 damages.

Two less costly operations are now in the initial stages, on the same property. One of these is a leaching process, dependent on a costly acid and a dynamo current, and the other on partial reverberatory smelting. In the first, which is known as the Anderson process of treatment of silicious carbonates of copper, the soluble copper compounds of the crushed ore are dissolved in hydrofluosilicic acid, the liquid is then filtered, and the copper is deposited by electrolysis, using carbon anodes at about 1 volt pressure. A dynamo is used to generate current. By the action of this current the cuprofluosilicic solution loses its copper, regains its hydrogen and is ready for use again. This experiment has reached the construction stage.

RECENT OPERATIONS

A portion of the ground formerly owned by the leading company, has recently been sold to a Boston concern, which has paid a minor part of the purchase price. This concern is arranging with a metallurgist, who proposes to crush the ore, reduce the carbonates to metallic copper in a reverberatory flame, and then again crush, so that the metallic copper particles can be concentrated out of the gangue. In connection with this experiment the facts I have stated above as to coal and water might have some influence on the economical operation of the process.

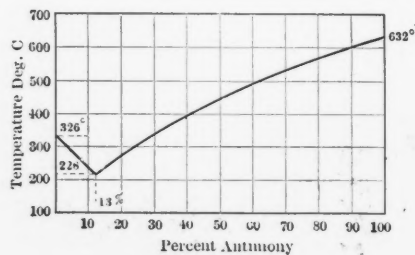
One experiment along conventional lines that seems to promise something is under way at this property. It is based on the hope that the carbonate ores may develop into sulphides with depth, and a long crosscut is being driven from the bottom of the 200-ft. shaft, cutting the formation at right angles. This is already showing indications of enriched sulphides, and the gentleman who has leased a part of the property on the theory that he may get something worth developing is much encouraged. His work differs materially from any that has ever been done in the district.

Lead wool is soft lead shredded to the thickness of heavy thread.

The Determination of Antimony in Hard Lead

Dr. H. Beckman describes in *Zeit. f. angew. Chem.* (June 14, 1907), a novel and rapid method for the determination of antimony in hard lead. The method depends on the determination of the melting point of the alloy investigated, taken in connection with the cooling curve of lead antimony alloys, which is shown in the accompanying figure.

The analysis is quickly carried out by melting some of the lead in a porcelain crucible, inserting a thermometer, and then waiting for the bath to solidify. The thermometer is made with two sets of graduations, the temperature being marked in black on the left of the capillary, and the corresponding per cent. of antimony being etched in red on the right side. One has only to read the per cent. of antimony corresponding to the position of the quicksilver when the alloy solidifies. The moment of solidification is easily determined, as the metal becomes



RELATION OF TEMPERATURE AND ANTIMONY CONTENT

distinctly viscid, a ring of solidified lead appears on the wall of the crucible, and the thermometer is moved around in the bath with some difficulty. An analysis can easily be carried out in five minutes and the amount of antimony can be determined accurately to the nearest 0.1 per cent.

As a general thing the thermometers are graduated only from 0 to 10 per cent. antimony. Reference to the diagram will show that there are two percentages of antimony, as for instance 12 and 14, which have the same melting point. This fact, also the fact that with high percentages of antimony it is much more difficult to determine the melting point, makes the method uncertain when antimony in excess of 10 per cent. is present. The difficulty is, however, easily overcome by adding a definite amount of soft lead to the assay in those cases where it is known to be high in antimony, and after determining the percentage in the mixture, calculate the amount in the original sample.

This method has the great advantage that it allows no errors due to segregation. The sample may be dipped directly from the furnace, and then tested and all danger of obtaining an incorrect sample

of borings from a segregated plate or ingot is avoided. During the cooling of the metal being assayed, no segregation can take place as the amount used is too small. The thermometers are manufactured by the firm of Dr. Siebert & Kühn in Kassel, Germany, and have been used in some smelters for a year and a half without accident and with considerable satisfaction.

The Use of Zinc in Assaying Copper Matte, etc.

D. M. Levy (*Trans. I. M. M.*, May 16, 1907) has substituted zinc for aluminum for removing the copper from solution in the assaying of matte in which iron is also to be determined. Zinc does not interfere with the delicacy of the iodide estimation for copper, so that method may be used. The author finds that with zinc a more complete separation is obtained than with aluminum, the conditions are less rigid and the method is more suitable than the thiosulphate, and can be advantageously used with most copper-bearing materials met with in works practice, especially when both copper and iron have to be determined. The zinc used is in thin strips about 3x0.25 in. rolled up for about half their length, so that they float vertically in the liquid and extend the whole depth of the solution.

The assay is conducted by dissolving the matte in fuming nitric acid, diluting with 20 c.c. of water, 5 c.c. strong sulphuric acid added and the solution heated to copious white fumes. When cool 60 c.c. of water are added, and the solution heated to a gentle boil when the zinc is introduced and a small funnel inserted in the mouth of the flask. When the precipitation and reduction are complete, the funnel is washed and removed and a glass wool plug placed in it. The solution is then decanted through the wool, the flask rinsed out with dilute sulphuric acid several times, passing the rinsings also through the wool. The iron in the filtrate is then immediately titrated with permanganate or bichromate. The funnel is then replaced in the mouth of the flask, a little nitric acid poured on the wool to dissolve any copper there, washing with about 20 c.c. of water. The funnel is removed and the iodide method for copper proceeded with in the usual way. A blank should be run on each fresh lot of zinc.

A unique method of transporting a boiler was resorted to by the Kingsford Foundry and Machine Works, of Oswego, N. Y. The boiler was of the cylindrical marine type, designed for 150 h.p., and the roads were so soft that they would not support a wagon with such a load. By rigging a pipe through the furnace for an axle, the boiler was rolled nine miles over and around the hills.

The Ultimate Crushing Strength of Coal

How Tests Were Made to Determine the Resisting Power of Anthracite and Bituminous Coals. The Results Obtained

BY JOSEPH DANIELS AND L. D. MOORE *

The tests described in this article were undertaken in connection with a study of the size of coal-mine pillars. While the number of tests made is small, and the results rather divergent, the work so far done may be considered as only preliminary to further exhaustive tests on the subject.

In order to understand more clearly the difficulties accompanying the work, a statement of the conditions and problems which had to be met will not be out of place. Specimens of anthracite coal were furnished by the Lehigh Valley Coal

diamond saw did not cut fast enough; the circular saw split the edges of the coal and did not work rapidly enough; the hack-saw was slow and laborious, and we could only saw out one 2-in. cube in about an hour and a half. Aside from the slow rate of cutting, our main difficulty was in keeping our saw blades straight and the cut faces were neither flat nor parallel. We soon realized the difficulty of working under the conditions and appliances we had, and we gave up the idea of sawing the coal. Then the coal companies came to our rescue.

SQUARING THE FACES OF THE SAMPLES

Although the specimens noted above were sawed to size, there were but few of the pieces which had plane and parallel bearing faces in the testing machine. In such cases the loading was eccentric, and the high corners spalled and cracked off just as soon as pressure was applied. To overcome this effect, one of the dies on the testing machine was shimmed or blocked up enough to make the bearing uniform. The bearing faces of the bituminous coal specimens were coated with a thin layer of plaster of paris, which was

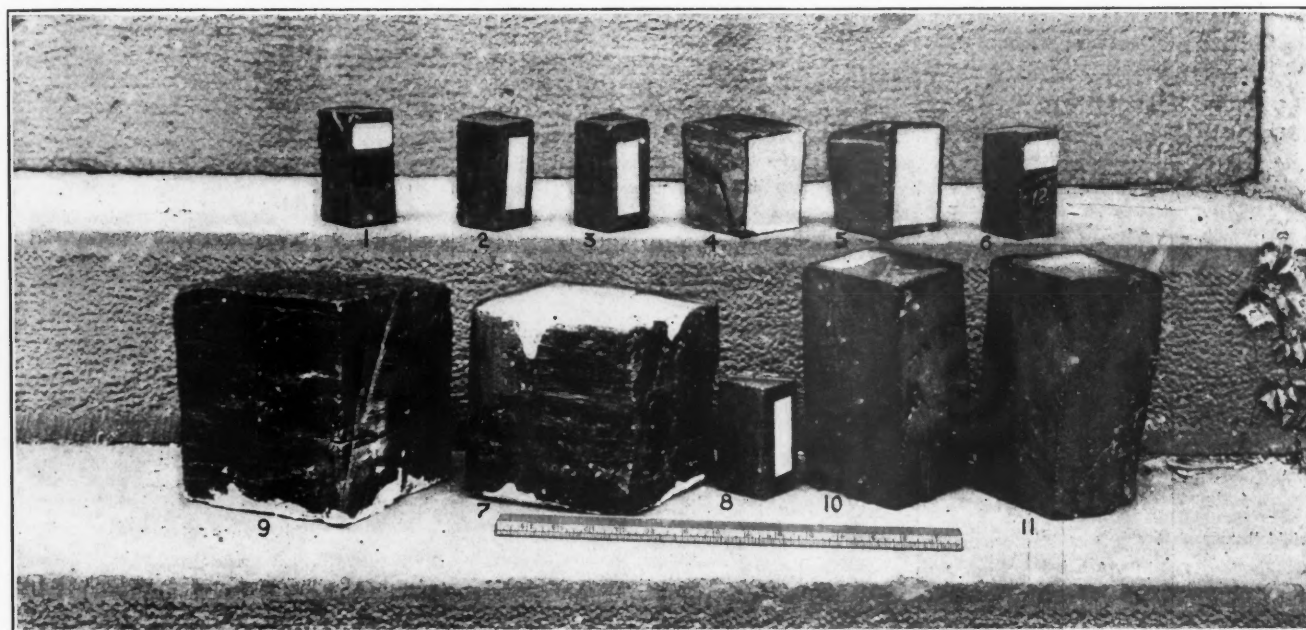


FIG. 1. SPECIMENS OF COAL, PREPARED AND READY FOR CRUSHING

Company and the Philadelphia & Reading Coal and Iron Company, and specimens of bituminous coal by the Pittsburg Coal Company. Some of the specimens of anthracite had been sawed into cubes and prisms, although some of the coal was uncut and in the rough; the bituminous had been simply broken along the cleat and bedding planes to give approximate shapes and sizes.

PRELIMINARY WORK

Our first undertaking was to saw the rough anthracite pieces into prisms. We tried a diamond saw on a petrographical lathe, a circular saw used for cutting brass, and finally a hand hack-saw. The

*Department of Mining, Lehigh University, South Bethlehem, Penn.

†Experiments carried on in the testing laboratory at Lehigh University.

CHARACTER OF SAMPLES

The Lehigh Valley Coal Company sent us a series of sawed anthracite specimens in the following sizes: Cubes 4x4x4 in., prisms 4x4x8 in. and 4x4x12 in., the bases in each case were 4x4 in. The base was intended to be parallel with the bedding in order to reproduce the conditions existing in mine pillars, but on examination we found that in some cases the bedding planes made a slight angle with the base, and in several instances the bedding was perpendicular to the bases. The Philadelphia & Reading anthracite specimens were of various sizes, 2x2x2 in., 2x2x4 in., 3x3x3 in., 4x4x4 in., 4x4x8 in. and 6x6x6 in., and showed the same variation in direction of bedding that the others did. The Pittsburg bituminous specimens generally approximated 6x6x6 in.

allowed to harden for a few days before testing, to make them flat and as nearly parallel as possible. In some cases, sand was used to give a uniform bearing.

The greater number of tests were made on a 100,000-lb. Riehle standard automatic testing machine equipped for compression. For crushing some of the larger pieces of coal, a Riehle hydraulic testing machine was employed. The indicator was used with the standard machine for getting curves showing the relation between the maximum load and the amounts of compression. Fig. 5 shows some of the typical curves obtained for both the anthracite and bituminous coals.

Table No. 1 shows the result of the tests on 45 anthracite samples. Besides the name of the colliery and seam from which each sample was obtained, we have tried

TABLE No. 1.—COMPRESSION TESTS ON ANTHRACITE COAL.

Name of Colliery	Seam	Test No.	Character of Coal	Parting	Cleat	Size of Test Piece	Direction of Force	Duration of Test	Per Cent. of Compression		Maximum Load	Crushing Strength per sq. inch	Method of Failure	Remarks
									min.	lbs.				
Philadelphia and Reading Coal and Iron Company	Maple Hill	41	Slight cracks	Slight	Slight	2" x2" x4"	10°	4	0.25	8710	2178	Flew apart	Top plastered	
		33	"	"	"	4" x4" x8"	21°	5	0.34	30260	1891	"	"	
	"	Middle split	40	Sound	"	"	2" x2" x4"	12°	2	0.20	8170	2042	Cracked and spalled	"
			36	"	"	"	2" x2" x4"	12°	3	"	13000	3250	Flew to pieces	"
	"	"	30	"	not vis.	none	4" x4" x8"	7°	"	"	48500	3030	Split and bulged	"
			45	top chipped	Indication	"	2" x2" x2"	↓ to bedding	6	"	14000	3500	Spalled and flew to pieces	Die blocked one side
	"	"	47	1/2 corner off	"	"	2" x2" x2"	↓	"	0.75	8310	2078	Spalled off	"
			31	Cr. vert. and hor.	sev. thin	none	4" x4" x8"	12°	"	0.26	48400	3025	Split not crush.	Top plastered
	"	Buck Mt.	42	split on top	"	"	2" x2" x4"	25°	4	"	11700	2930	Side split off	"
			32	Cr. 2" notch out	Indication	none	4" x4" x8"	28°	"	0.25	24300	1520	Split not crush.	"
Otto West Brookside	Mammoth No. 5 Lykens V.	2	Vert. cracks	"	"	4" x4" x4"	↓	7	"	26640	1665	Split off vert.	"	
		3	Sound	"	"	4" x4" x4"	30°	2	0.50	55430	3464	Flew to pieces	Swivel under die	
Draper	Mammoth Buck Mt.	50*	Slight cracks	"	"	4" x3 1/2" x3 1/4"	↓	"	"	19600	1400	Crushed	"	
		48	Sound	Slight middle	"	3" x3" x3"	↓	"	0.66	33710	3870	Flew to pieces	Both faces plastered	
"	"	49	Slight cracks	" bottom	"	3 1/4" x3 1/4" x3 1/4"	↓	6	1.35	13480	1260	Crushed	Sand on bottom	
		4	Sound	"	"	4" x4" x4"	66°	1 1/2	"	26620	1664	"	Sand on bottom	
Phoenix Park	Diamond	7	"	Slight top	"	4" x4" x4"	↓	5	"	20580	1290	"	"	
		5	"	"	"	3" x3" x3"	↓	2	1.26	26200	2911	"	"	
Good Spring	Mammoth	6	"	"	"	6" x6" x6"	↓	2 1/2	1.80	82970	2305	"	"	
		44	Top Split	"	"	2" x2" x4"	27° to side	"	0.25	10730	2682	Flew to pieces	Die blocked one side	
W. Shenandoah	Bottom	46	"	"	"	2" x2" x4"	26° to side	3	0.20	8400	2100	Spalled at middle	Bottom slightly round	
		43	Buck Mt.	Indication	"	2" x2" x4"	20° to side	3	0.25	4250	1062	Split not crush.	Bottom slightly round	
Bear Valley	Mammoth	69*	"	"	"	2" x2" x2"	↓	"	"	6770	1690	"	"	
		68*	"	"	"	2" x2" x2"	↓	"	"	8830	2208	"	"	
Eagle Hill	Diamond	57	"	"	Good	6" x6" x6"	↓	10	"	67500	1875	Crashed and flew to pieces	"	
		59*	Cracked	"	"	6" x6" x6"	↓	"	"	35400	983	Crashed and flew to pieces	Sand used on top	
"	Holmes	58	Vert. cracks	"	"	6" x6" x6"	↓	6	"	77300	2147	Crashed and flew to pieces	Shims under die	
		62	Sound	3/8" at mid.	"	6" x6" x6"	↓	5	0.16	50530	1400	"	"	
"	Top Split Skidmore	60	Cracked	"	Indication	6" x6" x6"	20°	4	1.16	27800	773	Split not crushed	Bot. bony, top soft, massive	
		61	Sound	"	"	6" x6" x6"	↓	6	1.16	48680	1352	Sheered and crushed	"	
Seneca	Pittston	17	Sound	Indication	Good	4" x4" x4"	↓	"	2.50	4328	2705	Crush complete	Die blocked	
		15	Cr. II to cleat	"	"	4" x4" x8"	↓	"	1.25	3360	376	Broke along crack	"	
"	"	12	Sound	1/2" at top	"	4" x4" x12"	↓	4	.00	17790	1112	Broken not crush	Photograph	
		21	Indication	"	"	4" x4" x4"	↓	"	1.05	37580	2349	Crush fine	"	
"	Marcy	23	"	Slight	"	4" x4" x8"	↓	7	1.00	32620	2040	"	Sand bottom	
		24	"	Topbony 1"	"	4" x4" x12"	↓	8	0.73	23740	1484	Half broke off & rest bent like column	Top slightly round	
Lehigh Valley Coal Company	Heidelberg No. 2	16	"	Indication	"	4" x4" x8"	||	"	"	18230	1140	Split vert.	Used sand on faces	
		8	5th Red Ash	"	"	4" x4" x4"	↓	6	2.00	37640	2353	Broke completely	"	
"	"	9	"	"	"	4" x4" x8"	↓	4	"	22900	1430	Broke at top	Sand on top	
		10	"	"	"	4" x4" x12"	↓	4	"	24810	1550	"	"	
"	6th	20	"	"	Good	4" x4" x4"	↓	3	2.12	21580	1349	"	"	
		22	"	"	"	4" x4" x8"	||	5	1.00	28100	1756	Top broke, crushed	Sand	
"	"	25	Chipped and cracked	"	"	4" x4" x12"	||	10	"	23590	1474	Fail like column	"	
		19	Sound	Indication	"	4" x4" x4"	↓	3	1.90	18480	1155	One side split off	"	
William A	Bates	11	Cracked	"	"	4" x4" x12"	↓	4	0.00	13300	831	"	"	

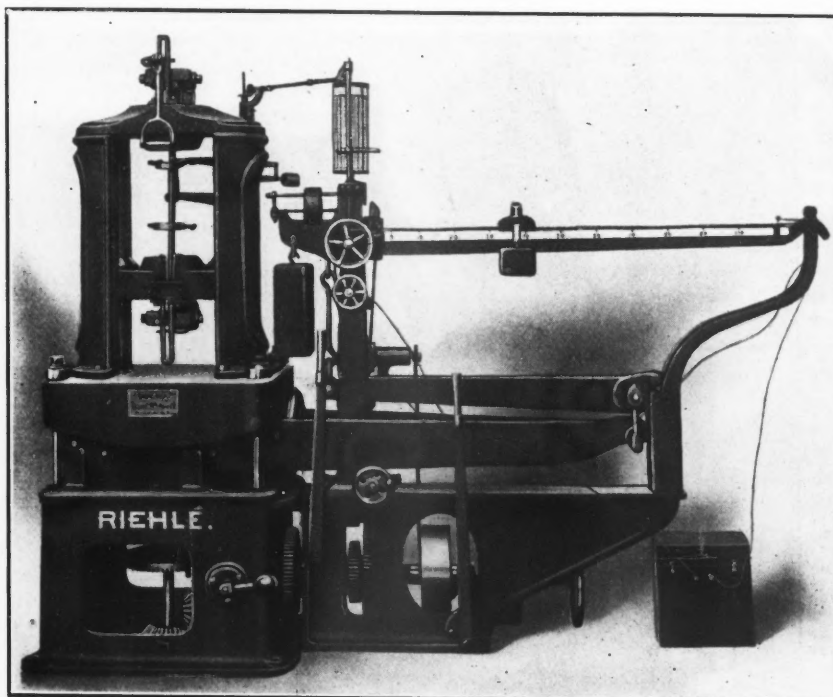
Note: * Test on Riehle 150,000 lb. Hydraulic Machine
Other tests on Riehle 100,000 lb. Standard Automatic.

TABLE No. 2.—COMPRESSION TESTS ON BITUMINOUS COAL.

Name of Colliery	Seam	Sample No.	Test No.	Character of Coal	Parting	Cleat	Size of Test Piece	Direction of Force	Duration of Test	Per Cent. of Compression		Maximum Load	Crushing Strength per Sq. In.	Method of Failure	Remarks.
										min.	lbs.				
Pittsburg	"	"	55*	Sound	Slight	Good	7" x7" x8 1/2"	↓ to bedding.	25	"	58000	1184	Flew to pieces	Plaster both faces.	
			29	"	"	"	5" x5 1/2" x5 1/2"	↓	4	1.28	42300	1538	Bulged & crushed	"	
			27	"	"	"	5" x6" x6"	↓	5	1.16	21000	700	Crushed fine	"	
			28	"	"	"	6" x5 1/2" x6 1/4"	↓	5	1.44	44000	1333	Crushed fine	"	
			56*	"	"	"	6" x8 1/2" x6 1/2"	↓	14	"	76800	1506	"	"	
			63	"	"	"	6" x6" x6"	↓	6	"	21030	584	"	"	
			64*	"	"	"	6 1/4" x6 3/4" x6 3/4"	↓	6	"	37400	890	"	Bottom face	
			10	"	"	Indication	"	5 3/4" x6" x5"	↓	6	1.40	34230	1010	"	Both
			11	"	"	"	"	5 1/2" x4 1/2" x5 1/4"	↓	6	0.13	24180	1000	"	"
			12	"	"	"	"	6" x7" x6 1/2"	↓	3	1.30	52900	1260	"	"
			13	"	"	"	"	4" x5" x5"	↓	4	1.10	23800	1190	"	"
			14	"	"	"	"	3 1/2" x4" x5"	↓	"	.50	15140	1081	"	"

Note: * Tests on Riehle 150,000 lb. Hydraulic Machine.
Others on Riehle 100,000 lb. Standard Automatic Machine.

to state briefly in this table the character of the coal and the indications of parting and cleat in the specimen. The size of the test piece is stated in every case—the first two dimensions are those of the base or bearing faces and the third is the height. The figures in the direction of force column need some explanation. The intention was to have the line of force perpendicular to the bedding, but this was not possible in many cases, because of the way in which the test pieces were sawed. In four cases, tests Nos. 16, 10, 22 and 25, on coal from Heidelberg No. 2 colliery, the bedding was parallel to the direction of the applied force. In the other cases where the perpendicular sign is not given, the figures indicate the angle which the bedding made with the bearing faces; the time of tests averaged between 4 and 5 minutes. The percentage of compression, wherever noted, was obtained by re-plotting the curves obtained on the testing machine indicator, and scaling these curves. The maximum load column gives the loads at which the test pieces failed completely. Figures for the breaking load or first crack are not given, as they are not true indications of the actual breaking load under the conditions of our testing. The next column gives the crushing strength per square inch, and is obtained in every case by dividing the maximum load by the cross-section area of



TESTING MACHINE USED FOR COAL CRUSHING TESTS

each test piece. The method of failure and remarks columns need no explanation.

Table No. 2 shows the results for bituminous coal, and is similar to that for the anthracite. No data were received in

regard to the names of collieries or seams from which the specimens were obtained so these items have been omitted.

DISCUSSION OF RESULTS

An examination of each table will show the important results to be deduced, namely; the percentage of compression, the crushing strength per square inch, the method of failure, and the relation between the crushing strengths of cubes and prisms.

In the anthracite table we see that the percentage of compression, or rather, the ratio of the amount of compression to the height of the specimens, varies from zero to 2.50, averaging approximately 0.87 per cent. There seems to be no uniformity in the amount of compression of the specimens taken as a whole or between specimens from the same seam. For example, the Top Split coal gives values of 0.25, 0.34, 0.25, 0.16, which show a wide variation, as does the Buck Mountain, which gives the following values, 0.25, 1.35, 0.25, 1.16.

The per cent. of compression of the bituminous specimens shows a greater uniformity. If we omit the two lower values, the range is from 1.10 to 1.44. The average of the tests so taken is 1.28 per cent., but if we include the two lower values, the average is approximately 1 per cent., more nearly agreeing with the result of the anthracite tests. Viewed in the light of the conditions of our experiments, it is doubtless true that the bituminous coal has a greater percentage compressibility than the anthracite product.

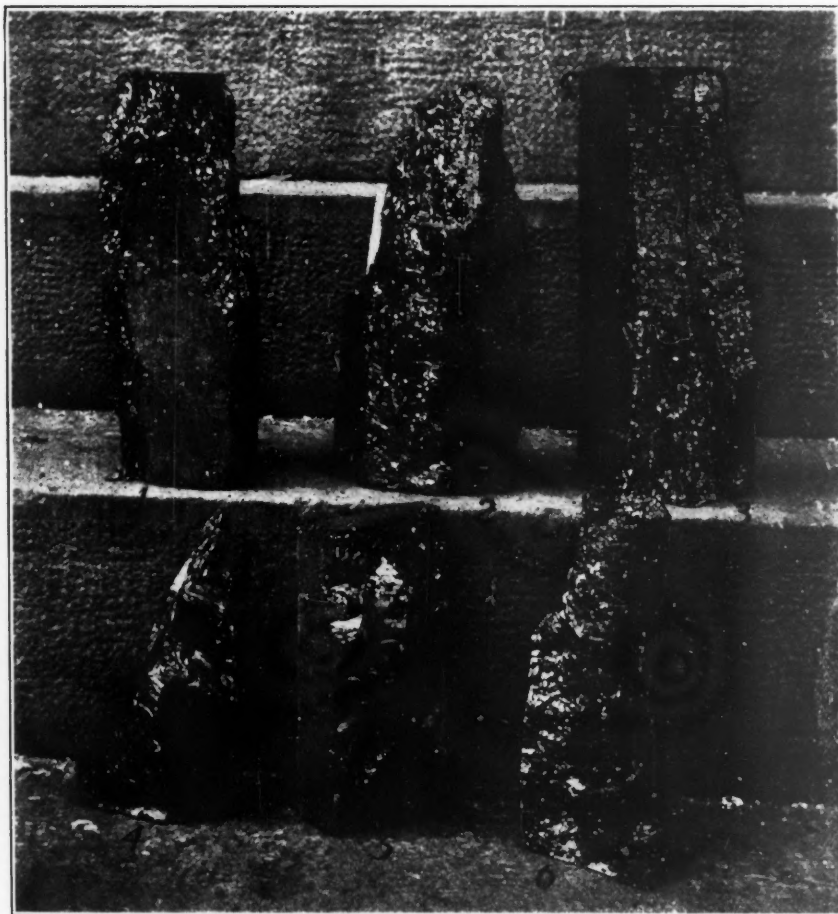


FIG. 2. ANTHRACITE SPECIMENS AFTER BEING CRUSHED

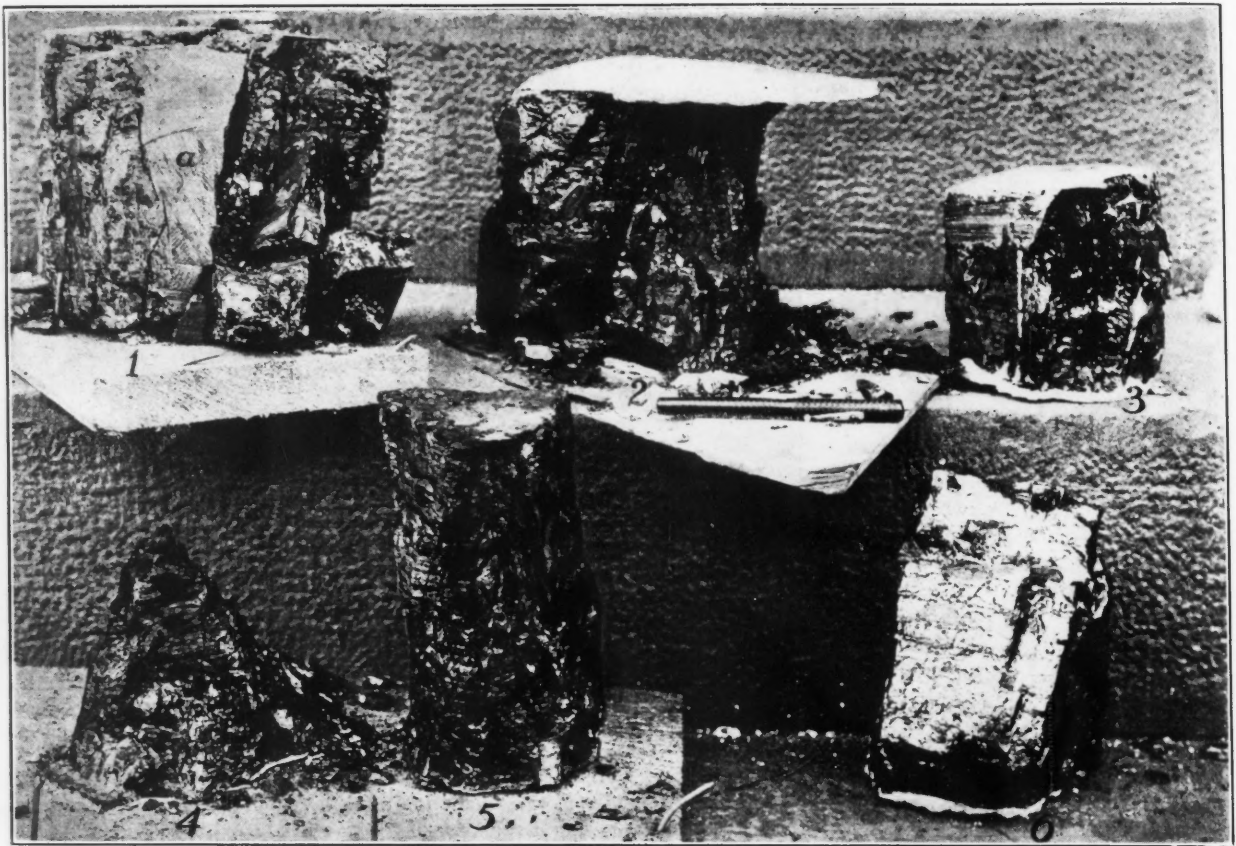


FIG. 3. BLOCKS OF BITUMINOUS COAL AFTER BEING CRUSHED. NO. 2 SHOWS PLASTER OF PARIS COATING



FIG. 4. TYPICAL BLOCKS OF CRUSHED COAL SHOWING MODE OF FRACTURE

EFFECTS OF PARTINGS AND CLEATS ON STRENGTH OF A COAL

In order to make a just comparison of the values of the compressive strengths of the coal, the soundness, the effect of parting and cleat, the size of the test piece,

doubtless true that the structure plays a prominent part in determining what the crushing load will be when the direction of the force is not perpendicular to the bedding. To determine exactly what the relation is, a number of specimens,

each of the same size from the same block of coal, should be cut with the direction of the bedding perpendicular, parallel, and making intermediate angles with the bearing faces, for test pieces.

Few of our specimens had perfectly flat and parallel bearing faces, and we had to shim and wedge our dies, and use sand and plaster to build up the irregular faces. It follows that most of the test pieces were eccentrically loaded, and as a consequence the values are somewhat lower than they would be for uniform loading. As we did not measure the eccentricity, no calculations were made to determine the effect of the eccentric loading. With perfectly flat and parallel bearing surfaces, and uniform bearing, the first crack, or breaking load, could be determined with reasonable accuracy, but under eccentric loading and irregular faces, the first crack would bear no definite relation to the applied load. These considerations also affect the method of failure.

Most of the anthracite pieces split ver-

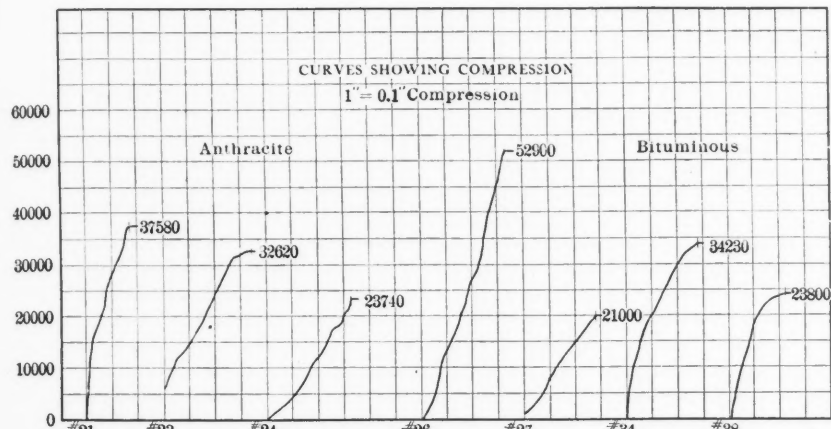


FIG. 5. COMPRESSION CURVES ..

the direction of the load with respect to the bedding and the manner of loading, must be taken into account. Two specimens of coal of the same size from the same mine, may show widely different crushing strengths, due to difference in structure, depending on the position of the sample, with respect to the height of the seam and the working place in the mine. Partings in the test piece seem to have a tendency to make the coal stronger, whereas a cleat favors vertical splitting under the compressing load. The test on Seneca-Pittston (No. 15), in which there was a decided cleat crack parallel with the direction of the force, indicates this. This specimen was 4x4x8 in., sound in every other way as far as could be told by superficial observation, but as soon as the load was applied, the specimen split along the crack, and was entirely gone at a load of 376 lb. per sq.in. In general, the specimens showing cracks gave lower crushing strengths.

In noting what effect the direction of pressure has with respect to the bedding, little can be said. The West Brookside, No. 5, Lykens Valley specimen, 4x4x4 in., with bedding 30 deg. to the bearing surface, gave a crushing strength of 3464 lb. per sq.in., against the Pine Knot Crosby specimen of the same size, but with the bedding 60 deg. to the bearing surface, and a crushing strength of 1664 lb. per sq.in.

With the Heidelberg, No. 2, Fifth Red Ash, test No. 10, 4x4x12 in. block, direction of force parallel to bedding, a crushing strength of 1550 lb. per sq.in. was given, and the specimen from the Sixth Red Ash, Test No. 25, same size with force parallel to bedding, gave a crushing strength of 1474 lb. per sq.in. The latter specimen failed like a column with sheared and bulging sides. It is

TABLE NO. 3.

COLLIERY	SEAM	2x2x2	2x2x4	3x3x3	6x6x6	4x4x4	4x4x8	4x4x12
Maple Hill	Top Split		2178					
"	"						1891	
"	Middle Split		2042					
"	"		3250					
"	"						3030	
"	Bottom "	3500						
"	"	2078						
"	"						3025	
"	Buck Mt.		2930					
"	"						1520	
Otto	Mammoth					1665		
W. Brookside	No. 5 Lykens V.					3464		
Draper	Mammoth			3870				
Pine Knot	Crosby					1664		
Phoenix Park	Diamond					1290		
Good Spring	Mammoth			2911				
"	"				2305			
W. Shenandoah	Top Split		2682					
"	Bottom							
"	Split		2100					
"	Buck Mt.		1062					
Bear Valley	Mammoth	1690						
"	"	2208						
Eagle Hill	Diamond				1875			
"	W. Primrose				983			
"	Holmes				2147			
"	Top Split				1400			
"	Skidmore				773			
"	Buck Mt.				1352			
Seneca	Pittston					2705		
"	"						(376)	
"	"							1112
"	Marey					2349		
"	"						2040	
"	"							1484
Heidelberg No. 2	Clark						1140	
"	5th Red Ash					2353		
"	"						1430	
"	"							1550
"	6th "					1349		
"	"						1756	
"	"							1474
William A. Bates						1155		
Averages		2369	2321	3390	1549	1999	1801 including all 1950	1405

tically and spalled off or flew apart with a crash, the cracking occurring quickly and without warning. In a few cases, the pieces held together in fair shape, apparently crushing without flying apart. The photographs, Figs. 2, 3 and 4, illustrate the method of failure.

In the case of the bituminous coal tests, the method of failure was quite different. In but one case did the specimen fly to pieces. The usual method of failure was by bulging and crushing fine, the specimens retaining its general shape till the dies were released, when the piece would collapse into fines. In the case of the bituminous coal, the vertical cracks also appeared as the first indication of breaking. In both the anthracite and bituminous, the "working" of the coal could be easily distinguished and detected, but the final failure was distinct and peculiar to each kind of coal.

ACTION OF THE SAMPLES UNDER PRESSURE

It was noticed that the crushed coal bore some weight after the maximum load had been applied. By running the weight back on the scale beam, it was possible to measure the amount. The amount varied with the extent of the failure. Where the failure was complete, the coal bore little weight; where crushing had not been complete, the coal bore greater amounts, sometimes increasing slightly with increased compression, showing that there was a slight readjustment of the pieces of coal. The observed results are as follows.

ANTHRACITE.		
Test No.	Weight In Lb.	Method of Failure.
36	Bore no weight	Flew to pieces
40	1150	Cracked and spalled
42	500	Side split off
44	5200	Flew to pieces
45	9250	Spalled and flew to pieces
47	6280 then rose to 8200	Spalled off
49	9530 then rose to 11000	Crushed

BITUMINOUS.		
Test No.	Weight Lb.	Method of Failure.
35	20,000	Crushed fine
38	7 500	Crushed fine
39	9,500	Crushed fine
63	11,770	Crushed fine

No definite comparison can be made between the unit crushing strengths of the cubes, nor between them and the prisms. The values for the anthracite samples is shown in Table 3, and may be enumerated as follows:

AVERAGE CRUSHING STRENGTH PER SQ. IN.	
Cubes:	Prisms:
2 x 2 x 2 in., 2369 lb.	2 x 2 x 4 in., 2321 lb.
3 x 3 x 3 in., 3390 lb.	4 x 4 x 8 in., 1801 lb.
4 x 4 x 4 in., 1999 lb.	4 x 4 x 12 in., 1405 lb.
6 x 6 x 6 in., 1549 lb.	

The average crushing strength per sq. in.; the value for the 6x6x6-in. anthracite somewhat lower than that for the anthracite. The average size of the bituminous test pieces was approximately 6x6x6 in.; the value for the 6x6x6-in. anthracite pieces is 15.9 lb. We should expect the

anthracite to have a higher value on account of its greater compactness, hardness, and more uniform structure.

It will be observed from Table 3, that, if we omit the values for the 3x3x3-in. specimens, the crushing strengths per square inch are lower for the 4x4x4-in., than for the 2x2x2-in. pieces, and similarly for the 6x6x6-in. pieces. The results for the 3x3x3-in. samples were obtained from but two tests, one value of which is very high, and it is probable that a larger number of tests would show a value intermediate between the values for 2-in. and 4-in. cubes. In the case of the prisms, a comparison of the 4x4x4-in., 4x4x8-in., and the 4x4x12-in. tests, shows that as the height increases, the strength decreases

CONCLUSIONS

The observations to be deduced from the foregoing are that the crushing strength per square inch of small cubes is greater than that for larger cubes; and with a constant base area, and increasing height, the crushing strengths become smaller.

Further study of tests is necessary to carry this investigation to a complete conclusion. A large number of test pieces of various sizes and shapes taken from different places in the mine, together with data on the character of the coal, the amount of cover overlying the seam at the place where the sample was obtained, and any other information regarding the general features of the coal, will assist greatly in this investigation. From the results of a large number of these tests, and others that will soon be carried on, it may be possible to develop a working formula for the size and shape of mine pillars.

Wire-rope Transmission of Power

In using wire ropes engineers generally require a factor of safety of from five to seven, i.e., the working load on the rope is one-fifth to one-seventh of its breaking strength. In practice, ropes for shafts usually have a factor of safety of five and for slopes where the wear and tear are greater than in shafts, the factor of safety should be seven. The distance to which wire-rope transmission can be applied varies from 50 ft. up to several miles. An example of long-distance rope transmission is found at the falls of the Rhine in Switzerland, where 800 h.p. is carried across the Rhine for a distance of two miles, and distributed among 70 different factories, situated in various places, and embracing many styles of arrangements. Rope transmission is much cheaper than shafting or belting, and is used in places where a belt or a line of shafting would be too long to be used economically. In extremely long distances it is better to

have the rope in two or more sections. The advantage of sectionalizing the rope is mainly in the greater ease of handling it.

Conciliation in the Anthracite Region

On behalf of the anthracite coal operators a statement was given out at New York recently relative to the results of conciliation in the settlement of questions arising between the anthracite miners and operators. The Board of Conciliation created by the Anthracite Strike Commission of 1902 has not a single case before it today. The operators say that it must be assumed that if the miners have no complaints to make they are satisfied with the way they are being treated. Of the work of the Board of Conciliation the statement says:

During the four years of the commission's existence 159 differences between the coal operators and their employees have been settled. The board itself—composed of three representatives of the operators and three of the miners—has disposed of 132 of the cases, and an even division of the board has made it necessary to refer only 27 cases to an umpire. Of these appeals he sustained the complainant in only six cases. Experience gained in handling the complex questions involved has enabled the board to render its decisions with increasing promptness, and of the 159 cases presented 49 were disposed of within less than a month.

Of the grievances considered, only one was presented by the United Mine Workers of America, as a body representing all the miners. Thirteen were presented by the operators and 146 by the miners. By the board's decisions 29 cases were sustained, 115 not sustained or withdrawn, and 15 settled "through the influence of the board."

Almost every element of the miners' welfare is involved in controversies brought up for consideration. The discharge of an employee, failure of another to secure reinstatement, suspension of a contract for loading dirty coal, requests for a half-holiday on pay day, and scores of other questions come before the board.

Questions affecting wages have been rarely brought before the board, for the reason that the Anthracite Strike Commission settled upon a minimum scale of wages, which was renewed for three years by the miners and operators at the expiration, April 1, 1906, of the original arrangement. To put the miners upon a profit-sharing basis the commission further awarded that for every advance of 5c. above \$4.50 in the wholesale selling price per ton of domestic sizes of coal at tidewater, the wages of every man about the mines should be increased 1 per cent. above the schedule.

Colliery Notes, Observations and Comments

Practical Hints Gathered from Experience and from the Study of Problems Peculiar to Bituminous and Anthracite Coal Mining

DEVELOPMENT AND MANAGEMENT

In pumping water from a mine it should be remembered that by doubling the diameter of a pipe, its capacity is increased four times.

The props used in working faces should be round timber, and they should be cut square at each end, so as to bear evenly over the whole sectional area.

The Lancashire coalfield is one of the most important coal measures in England. It contains about 18 workable veins, the two most valuable beds being the Arley seam, and the cannel coal, which latter has Wigan for a center and gradually thins out in all directions. The seams generally dip toward the sea.

The strata overlying coal seams consist mainly of sandstone, shale and loose earth; taking the average specific gravity of the strata as 2.3 to 2.4 or 150 lb. per cu.ft., the following is the pressure of the strata at various depths:

Depth.	Per Sq.Ft.	Per Sq.In.
700 yards.	141.0 tons.	2,184 lb.
800 yards.	161.0 tons.	2,498 lb.
900 yards.	181.0 tons.	2,808 lb.
1000 yards.	201.0 tons.	3,120 lb.
1500 yards.	302.0 tons.	4,680 lb.

Properly prepared bricks are more suitable and cheaper material for shaft lining than stone. They should be rich in alumina and entirely free from lumps of calcareous matter. If they do not contain sufficient alumina, they will be porous and liable to crumble, while if they are too rich in alumina they will be too smooth to hold tight against the mortar. Lumps in bricks swell on exposure to moisture and fracture the bricks. Fire-clay bricks are the best kind for shaft lining.

When mine water contains a large quantity of acid, it is the practice at several anthracite mines to use cast-iron column pipes lined with thin pine lathes. The lathes are narrow strips with the sides planed off at a bevel to fit the radius. They should be put in when dry and fitted close without being too tight, for if they are too tight they will swell and buckle out of place. The ends should be dressed off to meet without buckling when the flange-belts are screwed tight. The life of such a pipe column depends on local conditions, but a fair average is from 5 to 15 years.

In building the masonry work in the upper part of a shaft, experience has shown that, for stone work, a stone having schistose structure should not be used, as it rapidly disintegrates from exposure to the atmosphere. A hard compact sandstone should be used for such purposes. The blocks should be of moderate size and uniform shape. In using very small

blocks it is necessary to use a large amount of mortar, which is not desirable and should be avoided. Each block should be tooled on five sides and the rough side should be placed in contact with the shaft side.

The determination of the existence of coal in any locality, whether the locality is new or bordering upon another locality where the measures are known to exist, is purely a geological problem. The application of geological knowledge in such investigations should be wide and very general in character. Experience obtained in mines is of a local character and is not sufficient for such purposes. A knowledge of the broad facts of geology is absolutely necessary, together with accurate mineralogical knowledge; having this the prospector is able to search for coal in a systematic manner.

A screen for screening bituminous coal should be made of bars capable of adjustment so that the mesh can be changed to meet the requirements of trade. The bars should be made of malleable and cast iron. They are usually $4\frac{1}{2}$ ft. long, made with rough nogs at each end and at the center. There is a $\frac{1}{2}$ -in. hole through each nog, allowing a group of five or more bars to be firmly riveted together, thus forming a uniform mesh over the whole surface of the screen. The riveting together also greatly facilitates the removal of the bars when a larger or smaller mesh is required. The bars should be thinner at the lower edges than at the surface edges in order to avoid clogging.

The usual practice in testing a steam boiler is to employ hydraulic pressure to twice the working pressure. The hangers should be uniformly tight and the ends free to move by the expansion. The brickwork should be examined and the fire should not reach the shell above the water line; the safety valve should be free from sticking. The feed and circulating pipes should be free from binding so that the expansion will not shear off the flanges and the gage cocks should be unobstructed. For internal inspection the boiler should be blown off. The safest method of ascertaining the thickness of suspected sheets is to drill a small hole through the metal and measure the thickness; after examination the hole can be closed by a rivet.

In approaching abandoned workings experience has shown that water and gas are the principal elements of danger. The usual method employed in the anthracite coalfield is to drive a pair of headings,

keeping the bore-holes in advance at least 10 ft. ahead on each flank; one of the headings should be kept a few yards in advance of the other so as to be used for a return, so that in case gas is liberated from the old workings, the men can retreat to the intake. The crosscuts should be as small as practicable, usually 4 to 6 ft. wide, and should be driven above the bottom so that when the water is tapped it cannot flood both headings. If the vein is too thin to follow this plan, then the crosscuts may be driven within 5 ft. of the other heading and the roof can be taken down. Failure to take these simple precautions often costs many lives.

To make concrete for engine foundations or retaining walls mix, while dry, one cubic yard of broken rock small enough to pass through a 3-in. mesh screen one-half cu. yd. of sand and one barrel of portland cement. Water should not be added until it is ready for use, then add enough water to make a thick mortar, mix in small quantities and use at once; thoroughly tamp with a suitable bar. The cement will set enough in 24 hours to carry a load and in three days it will be hard enough to run machinery on. In case gravel is used instead of broken stone, it must be clean and uniform in size. For rubble masonry, use five yards of stone and one yard of sand to one barrel of cement. One-third yard of stone is required for one yard of masonry. For the walls of boiler-houses use one yard of sand and one barrel of cement per 1000 bricks.

The cost of timbering demands that there shall be as little waste as possible, and the safety of the workmen demands that the method adopted shall be efficient. To secure the maximum safety with the least cost in timbering, under all circumstances, will task the ingenuity and knowledge of the most clever mine superintendent. Economy is essential in the present state of coal mining and a saving may be effected by an intelligent system of timbering. An experienced miner knows the spot where a prop is required and where it is unnecessary. It should be remembered that there is no economy in using inferior timber because of its cheapness. In Welsh mines, brick and stone archings are frequently used in the main haulage roads, especially at the foot of shafts. Such supports on the long run, are the most economical. Much of the value of props in mines is wasted by failing to place them with the direction of the roof pressure.

Diamonds in Arkansas

An Arkansas company is developing a diamond deposit which Messrs. Kunz and Washington, of the United States Geological Survey, believe to be the most promising that has been opened in North America. The company holds an area of 600 acres in Pike county, and within an area of 30 acres 130 diamonds have been found. The diamonds include all sizes, shapes, and colors, ranging in weight from $1/64$ carat to $6\frac{1}{4}$ carats and the color varies from dark brown to canary and the highly prized blue-white.

John Wesley Huddleston, living near Murfreesborough, found the first diamond on his farm last Fall and sent it to Charles Stiff, a Little Rock diamond expert, who, after two others were found, sent them to a New York firm which reported favorably on the gems. Then Mr. Stiff visited New York and induced Dr. Kunz, the gem expert, to visit the deposit in January, by which time 21 diamonds had been found. Dr. Kunz was impressed with the geological features of the district and advised those interested in the discovery to prospect the ground thoroughly. The country rock is a coarse-grained sandstone which is intersected by peridotite dikes. Most of the diamonds have been found in the surface soil, and in decomposed peridotite. One small diamond was found in a solid peridotite matrix. Dr. Henry S. Washington is making a series of thorough petrological analyses of the rock formations in the district and a full report on the deposit will be made by Dr. Washington and Dr. Kunz. This report will form a feature in a bulletin on the occurrence of diamonds in the United States which will shortly be issued by the U. S. Geological Survey.

Dr. Kunz stated that the deposit is situated near the village of Nashville, about 60 miles from Little Rock. The property is all controlled by one company, and is being actively prospected. The course of the owners so far has been conservative. One hole has been sunk 186 ft., and another 140 ft., and both are in the igneous rock all the way.

Dr. Kunz takes a great interest in the development work and states as the result of his recent visit to the scene of the find that he is of the opinion that at last a genuine, permanent diamond mine has been found in the United States. Much will depend on the manner in which the property is developed. A diamond was found in Arkansas in 1842, another in 1846, and others in 1888 and 1889. Only recently has the right kind of an investigation been made of the peculiar geological formation.

This is the first time a diamond has been found in a matrix in the United States. Dr. Kunz has traced diamonds found in Wisconsin, Michigan, Ohio and Indiana and found them to be within the glacial moraine, which carries their source

north of lakes Superior and Huron. About 200 individual diamonds have been found in the gold mines of central California. One was found near Richmond, Va.; one in Montana and one in Idaho. But all these stones were found to have floated from other places.

None of the Arkansas stones have yet been cut, but their quality is pronounced by Dr. Kunz to be superior. The region in which they were found is amply supplied with coal, wood and water for operating purposes.

Small diamonds have been found in isolated spots at different times in the track of the glacial moraine from the northern district of Ontario to a point a little north of St. Louis, and about 400 miles north of Nashville. Although large conglomerate deposits occur near the new find in Arkansas, Dr. Kunz is of opinion that the conglomerates are in no way connected with the moraine deposits and are of much later date. The Arkansas diamonds are believed to have originated in the peridotite dike formation, while the diamonds are believed to have been derived from the decomposition of volcanic rocks in various places between the Lake Superior district and northern Labrador. By plotting backward the courses of the glacial striæ from the places where the different diamonds have been found in the moraine drifts, the probable locality where the lines would nearly converge has been found to be in the northern portion of the Labrador peninsula. The distance between St. Louis, Mo., and northern Labrador is over 2000 miles. The striæ have not been shown to run in this area in a continuous and straight course, and the glaciation has been shown to have occurred at different periods of time. The striæ on the east coast of Hudson's Bay generally strike in a southerly direction, while at the southern extremity of the bay they strike southwest. On the Canadian shores of lakes Superior and Huron the glaciation has sometimes been in a southeasterly direction, and this possibly accounts for the finding of diamonds in several portions of the State of New York. The moraine matter is largely composed of boulders and pebbles of jasper.

In a report on the discovery of a diamond near Milwaukee, Wis., in 1894, Professor Hobbs pointed to the fact that there are basic intrusive rocks cutting through shales containing considerable quantities of carbonaceous matter in several parts of the Menominee Range on the northeastern boundary of Wisconsin. As those formations in some respects resembled the South African diamond formations he was of opinion that the Wisconsin and possibly Indiana diamonds originated in the Menominee Range. Fragments of the Indiana drift, however, were found by Messrs. Barlow and Wilson, of the Canadian Geological Survey, to be identical with similar drifts in northern Ontario. The prevalence of jasper and

jaspilite is a marked feature of these drifts and they are also characteristic of the iron-ore formations in the Michipicoten and other iron-ore districts north of Lake Superior.

A detailed investigation of the Indiana drift material was made for the Canadian Geological Survey by Dr. F. D. Adams, of McGill University, and he reported that in more than 30 different samples he detected over 200 specimens of rocks and minerals. Roughly the drift matter was comprised as follows: Laurentian gneiss, 14.4 per cent.; quartzite, 29.8; chert and jasper, 32.7; iron ore 9.6; amphibolite and green schist, 6.3; trap, 0.8; sandstone, 4.0; limestone and shale, 2.4 per cent. These are typical of fragments of the Laurentian pegmatites, the Huronian and Keewatin iron-ore rocks, and the Keewenawan sandstone formations.

Although at present indications do not appear to point to any direct connection between the Arkansas diamond deposits and the more northern moraine deposits in which diamonds occur, it is not impossible that further exploration will show that the point of origin was in the north. The further developments of the Arkansas deposits will be followed with interest. Should diamonds be found *in situ* in Nashville peridotite dikes it will not be possible to connect the recent diamond finds with those in the moraine deposits. Otherwise it is probable that renewed attention will be given to the investigation and prospecting of the moraine formations.

Besides the design and arrangement of the magnets of ore separators the method of presenting to them the material to be separated is of great importance. This is done usually by distributing the material in a thin sheet by means of a shaking tray, a traveling belt, or by spreading it over a magnetic drum. The rapidity with which it is passed into the magnetic field is a highly important consideration. For example, in testing a mixture of magnetite (strongly magnetic), rhodonite (feebly magnetic), and blende (very feebly magnetic) on a machine of high intensity, it was found that at a certain speed of the belt only the magnetite was attracted. At a reduced speed, the rhodonite was partially attracted. At further reduction the rhodonite was completely attracted and the blende was still uninfluenced. At still further reduction the blende was completely attracted. The size of the particles is also of importance. Theoretically, there should be no difference on this score, save that a closer adjustment of the distance between the magnets and the sheet of ore is possible with evenly sized particles, but practically it is found that reasonably close sizing gives the best results in magnetic separation, and in well designed mills this is arranged for. The treatment of the very fine ore is a serious difficulty in magnetic separation.

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Contents PAGE

Editorials:	
Drift Mining Locations in California	271
Iron Production in 1907.....	271
Separating Copper.....	272
Electric Power in Mexico.....	272
The Mesabi Miners' Strike.....	272
*Mining Methods on the Gogebic Iron Range.....	245
The Calumet & Hecla Mining Company	248
Labor Problems in the Transvaal.....	249
A Compound Assay Furnace.....	249
Tungsten in Queensland.....	249
Output of Minerals in Cornwall during 1906.....	250
Mines in Ireland.....	250
*The Black Sand Problem.....	251
*Electric Mine Locomotive with Gathering Reel.....	252
*New Developments in the Lake Superior Iron Region.....	253
Corrosion of Iron.....	253
Pig Iron Production in 1907.....	254
Iron Production in Canada.....	254
Gold Mining in West Africa During 1906	254
*Ground Breaking in the Joplin District.....	255
Oilfields of Oklahoma.....	259
Charles N. Gould	259
Illinois Geological Survey.....	259
Society of Chemical Industry.....	260
Mining Regulations in Bolivia.....	260
Mining and Engineering College in British Columbia.....	260
Monazite in Brazil.....	260
*Some Metallurgical Vagaries and the Results.....	261
D. E. Woodbridge	261
*Determination of Antimony in Hard Lead.....	262
Use of Zinc in Assaying Copper Matte, etc.....	262
*The Ultimate Crushing Strength of Coal.....	263
Joseph Daniels and L. D. Moore	263
Wire Rope Transmission of Power.....	268
Conciliation in the Anthracite Region.....	268
Coalery Notes.....	269
Diamonds in Arkansas.....	270
Correspondence:	
Disposal of Smeiter Smoke.....	273
W. M. Wetzel	273
Platinum in the Yukon.....	275
G. L. Holmes	275
New Publications.....	275
Power Plant in the Yukon.....	275
Garnet Mining in North Carolina.....	275
Personal.....	276
Obituary, Societies and Technical Schools, Industrial, Trade Catalogs, Construction News.....	276
Special Correspondence.....	278
Mining News.....	281
Markets, etc.....	285
*Illustrated.	

Drift Mining Locations in California

The recent decision of Secretary of the Interior Garfield reversing a decision of the commissioner of the General Land office, in the matter of certain gravel tracts in Placer county, California, is of marked interest to those engaged in the drift mining industry of that State. Timber locators tried to patent lands on the lava-capped ridge of the Forest Hill divide, and mineral claimants filed a protest. These protestants were Frank A. Leach, the recently appointed director of the United States Mint, and Chas. F. Hoffman, representing the Société Anonyme des Mines de Golden river. The protestants averred that the lands in question were more valuable for mineral than for timber or agricultural purposes. Secretary Garfield agrees with them; reverses the General Land Commissioner and declares the ground to be mineral in character. In doing so he cites the maps and testimony prepared by Ross E. Browne, "an eminent geologist and an authority on deep-channel placer deposits of the character involved." He also cites the testimony of Waldemar Lindgren, as given in the text of the Colfax folio of the United States Geological Survey.

It was really a matter of indirect proof that seemed convincing to the geologists and miners interested, but this had been entirely disregarded by the commissioner of the General Land office. That official stuck by the detail of the laws which provides for actual discovery of mineral of value on the ground. Should this provision be always enforced, no one could locate a drift mine. Usually such buried auriferous channels are 500 to 900 ft. under a barren lava cap; and where the mouth of a bedrock tunnel perhaps 5000 or 6000 ft. long is located to open the channel, there is no mineral to be seen. Yet the drift miners spend thousands of dollars in advance of possible profits to open these buried channels. An instance may be cited where only a few days ago gravel was finally struck in the long-sought for channel at the end of a 6000-ft. tunnel, where the owners had paid 136 consecutive assessments, covering a period of 12 years from starting the tunnel. This also is in Placer county, in California.

If miners are willing to spend their money to open these hidden channels, the law ought to recognize their existence.

This final decision of the Secretary of the Interior is of great importance in this connection, for if the ruling of the Land Commissioner had held, it would be impossible to hold together a sufficient number of undeveloped claims to justify an enterprise, and drift mining on a large scale would be given up in California. It would seem as if some separation of surface rights from those underground could be effected, and thus end the present difficulty. The miners, of course, need timber for drift mines but only enough for that purpose. At the Hidden Treasure drift mine on the Forest Hill divide, the largest of the kind in the world, they use 1,500,000 ft. of timber yearly to hold up the ground. But in this mine and the several claims contained, there are 20,000 ft. of tunnel already cut, and it is 2½ miles underground from the mouth of the tunnel to where the men are breasting out the gravel to be sent out on the electric tramway to be washed.

In view of all the facts, Secretary Garfield's decision seems fair to the drift miners, while it works no injustice to agricultural or timber claimants. It is marked by common sense and a full recognition of the facts affecting the case.

Iron Production in 1907

In the first half of 1907 the blast furnaces continued the activity which marked the entire preceding year. The increase in producing capacity, for which preparations were made in 1906, also began to show its effects in an output exceeding that of any previous half-year on record; and, indeed, greater than that of any full year in our history prior to 1899. The figures collected by the American Iron and Steel Association show the following production for the first half of 1907, comparison being made with the first half of the preceding year:

	1906.		1907.	
	Tons.	Per Ct.	Tons.	Per Ct.
Foundry & forge..	2,879,539	22.9	3,242,559	24.1
Bessemer pig.....	6,884,881	54.7	7,185,878	53.3
Basic pig.....	2,449,275	19.5	2,871,136	19.9
Charcoal iron.....	207,722	1.6	205,796	1.5
Spiegel & ferro....	160,833	1.3	172,675	1.3
Total.....	12,582,250	100.0	13,478,044	100.0

The chief changes in proportion were the increase in foundry and forge iron and the decrease in the percentage of Bessemer pig. Basic iron showed a smaller proportionate increase than for several year past; but it is quite probable that some of the iron classed as foundry and forge went to the basic furnace.

The number of furnaces in blast during the whole or part of the first half of 1907 was 382. The average number in blast during the half-year was 350, giving an approximate output of 38,509 tons per furnace, or nearly 213 tons per day. This shows the greater proportion of large stacks now in use.

The approximate consumption of iron in the half-year was as follows, neglecting stocks on hand, which were probably about the same on June 30 as on Jan. 1:

Production	13,478,044
Imports	331,144
Total	13,809,188
Exports	41,645

Approximate consumption..... 13,767,543

This shows a consumption for the half-year of approximately 358 lb. of pig iron per capita in the United States.

The production by districts may be arranged as follows:

	1906.	1907.	Changes.
N. Engl'd N.Y. & N.J.	924,309	1,063,116	I. 138,807
Maryland	194,907	221,145	I. 26,238
Southern States.....	1,505,525	1,572,883	I. 67,358
Pennsylvania.....	5,688,743	5,964,884	I. 276,141
Ohio.....	2,675,812	2,815,174	I. 139,362
Illinois.....	1,011,639	1,263,258	I. 251,619
Mich., Wis. & Minn.	366,621	357,375	D. 9,246
West of Mississippi	214,694	220,209	I. 5,515
Total.....	12,582,250	13,478,044	I. 895,794

This district classification gives an indication of the ores used in our pig-iron production. Necessarily, the State lines are not an exact guide, but the inaccuracies in great part balance each other. Thus the New York furnaces which use Lake ores probably offset the Pennsylvania stacks in the Lehigh and Susquehanna valleys, which use local ores. From the classification given it is evident that approximately 77 per cent. of the iron made this year was from Lake Superior ores, which supply the furnaces of Pennsylvania, Ohio, Illinois and the Northwest. The Maryland group of furnaces uses chiefly Cuban ores. The Northwestern group is fed by the Lake mines; in the South and west of the Mississippi local ores are smelted.

The only group showing a decrease was in the Northwest, where the decline was due to the gradual decrease of the charcoal iron industry.

Separating Copper

The assertion that Sir William Ramsay had succeeded in dissociating at least one of the metals which have been considered elements, first made a few months ago, is now repeated by cable from London, with some positiveness. In this case it is reported that the eminent chemist

has, by treating copper with gas evolved from radium, separated it into an unknown gas and into lithium, a lower member of the same series. As he promises, according to the cable, full particulars in a short time, it will be well to wait for this account before accepting the statement as it comes to us now.

That some—possibly all—of what we now call elements, may hereafter be separated and shown to be really compounds is believed by many chemists. If it is actually proved that this has been done in one or more cases, our present system of chemistry will have to be revised once more—as it has been many times before. Until something positive reaches us in the present case, it will be well to suspend belief as to the transmutation of copper.

Electric Power in Mexico

The application of electric power is likely to have quite as far-reaching an effect upon the mining industry of Mexico as the introduction, many years ago, of the lixiviation process and later the construction of large custom smelting works. Each of these steps in the progress of reduction rendered available ores which before had been too poor or too refractory to handle at a profit. The use of cheap electric power is effecting another reduction in costs, which will bring a great tonnage of material within the range of profitable treatment.

There is no better climate for mining operations than that of the mining regions of Mexico, and the labor is excellent and cheap. The only factor necessary to make the conditions ideal for mining and metallurgical industries is a supply of fuel and power. The country's resources of coal and oil have not as yet been sufficiently developed to satisfy the needs of metal mining. Power costs have been high in comparison with other items on the expense sheet. The utilization of power from the rivers and streams of the east and west slopes of the central plateau promises to remove this last disadvantage and to render the country as suitable for industrial purposes as any other region in the world.

The first effect of the new supply of mechanical power is felt in the great camps where mining and milling are carried on in the same inclosure, but there is

reason to believe that industries of strictly metallurgical character will soon feel the beneficial influence. With abundant and inexpensive power there is no reason why electrolytic refining should not be carried on as economically as at points nearer the market. Highly skilled labor requiring years of training to develop a high efficiency is less essential in electro-metallurgical operations than in the older processes of refining; so that in this respect the industry will be at no great disadvantage.

The perfection of electric processes for the production of iron and steel opens an attractive field in Mexico. Raw material of all kinds, except coking coal, is at hand in abundance, and there is a growing demand for superior grades of steel. With sufficient sources of current and practical methods for converting iron ore into steel, there is no place in the world where the industry would be more likely to flourish than in Mexico.

The Mesabi Strike

Although the representatives of the miners' union are still haranguing and urging the men to stop work, the strike in the iron mines of the Mesabi range is practically at an end. The strikers had no reasonable grievance which might be twisted into an appeal for popular sympathy, and the strike necessarily failed. Although many men have left the field and the work of getting out ore is not yet as systematic as might be, the ore docks at the head of the lakes are working steadily and trainloads of ore are moving regularly.

Mining on the Lake Superior ranges is a high-pressure industry and the records which are the constant aim are achieved only by operating at the highest speed and efficiency. The strike has injured the chances for a record tonnage for a year. It is estimated that the shipments for the month of July were about 3,000,000 tons less than they would have been had no trouble occurred. The Old Ranges have been drawn upon for cargoes as heavily as possible, but it will take some days to restore efficiency in the mines affected by the strike, and even a day lost is a serious matter in the short shipping season. The lake fleet will be obliged to move at top speed to carry the forty million tons which the furnaces will require this season.

Views, Suggestions and Experiences of Readers

Comments on Questions Arising in Technical Practice or Suggested by Articles in the Journal, and Inquiries for Information

CORRESPONDENCE AND DISCUSSION

Disposal of Smelter Smoke

I have read Herbert Lang's article on the disposal of smelter smoke, by conveying it to barren tracts of land in long flues, which appeared in the JOURNAL of June 29, with much interest. Mr. Lang's proposal is a good one under certain conditions, and has many points to recommend it, especially when the topography of the country is favorable to the erection of such flues, and the damage done to surrounding vegetation would warrant the expense. I see no reason why such an installation should not be entirely feasible from an engineering standpoint, as it would be similar to the practice employed where bag-houses are in use, where all furnace gases are handled by mechanical draft.

Although the item of low first cost would be in favor of a wooden flue, of the A section, as suggested by Mr. Lang, upon consideration there appear to be several serious objections to its use, or the use of any form of wooden flue; the least of which would be the danger of fire. Neither would the action of the sulphur gases be a serious draw-back. In the A form suggested, where the ground forms the bottom of the flue, there would be a rapid decay of the side boards where they rested on the ground, due to the moisture from the ground and the continual warm temperature from the gases. This might not be the case in a very dry climate. The principal objection to any form of wooden flue would be its tendency to develop leaks from shrinking, cracking and warping of the boards, as mentioned by Mr. Lang. In an installation of this kind the suppression of all leaks would be of primary importance, as in a short time, with a wooden flue, the combined area of the leaks, would easily equal or surpass the area of the conduit within a mile. If the gases were forced through under pressure by the fans, there would be a constant leakage of sulphurous gases all along the line, close to the ground where they would be most destructive; and on the other hand, if the fans were operated as suction fans, there would be a constant increase in the volume of gases to be handled, and a consequent increase in power consumption.

The sheet-steel tube has the most points to recommend its adoption, as it would be fairly durable and cheaper than brick or concrete, and could be put up very rapidly. Moreover, it has less surface exposed in proportion to the sectional area than a

brick or concrete flue, and the power required for propulsion of the gases would be correspondingly less.

In the example stated by Mr. Lang of conveying 25,000 cu.ft. per minute, of gases three miles through a 5-ft. tube, his estimate of 32 h.p. required is either the theoretical amount or else is much too low. By the general formula

$$p = \frac{k s v^2}{a},$$

in which p = loss of pressure due to friction in lb. per sq.ft.; s = area of rubbing surface in sq.ft.; v = velocity in feet per minute; a = area of section; k = a constant, taken in this case as, 0.000,000,001.9. I find that there would be a theoretical horse-power required of 29.5. Taking into account the mechanical efficiency of the fan, motor and transmission line, and also the gradual reduction of cross section of the flue between clean-ups, due to accumulation of flue dust, which would require the fans to be driven at high speeds, I think that fully 50 to 55 h.p. output would be required at the power-house.

As 25,000 cu.ft. per minute of gases represents a rather small smelting plant, the first cost (using Mr. Lang's estimate of \$15,000 per mile) and operating costs of an installation of this kind would be a rather heavy proportionate amount of the total operating expenses of the smelter; but it would undoubtedly solve the difficulty where the harmless disposal of the smoke is an absolute necessity.

Besides the engineering features there are other points which would present themselves, among the most important of which might be the question of the right-of-way over the property where the flue would have to pass. There would surely be a prejudice against it in the minds of some of the land owners, and the smelting company would not be in a position to obtain a right-of-way at a fair price by condemnation, as in the case of a transportation company.

One point in favor of the general plan is that it could be put into operation at plants at any time subsequent to completion without in any way interfering with the method of smelting in use or rearrangement of plant.

Of course the feasibility of the whole thing depends upon the location, somewhere within reaching distance, of a barren tract of land of sufficient area or elevation to permit the harmless discharge of the gases into the atmosphere, which

would be the exception rather than the rule.

W. M. WEIGEL.

Bannockburn, Ont., July 25, 1907.

Platinum in the Yukon

In looking over some back files of the JOURNAL and clipping out items of interest to me, I found in your issue of Oct. 26, 1906, an article headed "Platinum in the Yukon." Perusal of this recalls to mind a trip which I took in 1900 to the country described in the paragraph, in search of the metal named, and the results of that trip may be of interest to some of your readers even at this late date.

In the year 1898 I was associated with the late Willard B. Roberts, of Chicago, a mining engineer, who, even at that date, foresaw the rise in the price of platinum and was interested in prospecting for platinum and other metals and gem stones, which were apparently out of the beaten track of the average prospector.

Roberts became acquainted with and introduced me to a party who had numerous dredging concessions or leases in the Yukon Territory, and who had organized a huge company to work some of them, and had made some elaborate preparations for working them about the time the Spanish war broke out. The war stopped the sale of the stock and as the preparations made were on a grand scale, the funds in hand were insufficient and the venture was bankrupted. This party showed us a miscellaneous collection of reports, affidavits, statements, letters, and the like, and induced Roberts and me to sift them out and combine the pertinent parts of the mass into a tangible report which would illustrate the main features of his scheme. As I was familiar with gold dredging in this country and, from hearsay, in New Zealand, we were requested to make statements as to what could be done with a dredge and what it would cost to build a small, prospecting, drag-bucket excavator, for working a small portion of the river bed at some favorable spot for demonstrating the feasibility of the scheme when worked with a large dredge. Both Roberts and I were dazzled by the weight of seemingly good evidence that platinum, gold, osmium, iridium, irodosmine, etc., were to be found in the bed of the stream and only required proper machinery for their recovery. I am also going to plead youth, inexperi-

ence in the ways of mining sharks and a glorious optimism, as an excuse for collaborating with this party.

The report (?) was compiled from the evidence at hand and included letters from parties who had supposedly mined on the Hootalinqua river; extracts from such letters; statements of working costs taken from the catalogs of dredge builders and from letters from dredge operators; in some cases the letters, affidavits, etc., were published in full. We also included extracts from both Canadian and United States Government reports, which seemed to bear on the subject. Later Mr. Roberts compiled a prospectus from the matter included in the report; some outsiders were interested and a stock company was formed, some money was subscribed and Roberts and myself were given stock in it to compensate for the work we had done and for work we were to do later. It was arranged that Roberts should go north in the spring and make an examination and report and a payment of \$5000 was made to the party owning the lease to bind the bargain; the balance of the price was to be paid part in cash and part in stock after the machinery was at work. Shortly after this was done, Roberts was taken with pneumonia and died; in the spring the president of the company insisted that I should go and see the property and in accordance with his wishes I secured the company of an old mining friend and we went.

We had been informed that there was a Hudson Bay company store at the junction of the river and Teslin lake; that there was a regular line of steamers going up and down the river all the time, and that miners could be seen working the banks and bars all along the stream; that three men took \$2100 in a week's time with a rocker on the point of a bar about 20 miles from the mouth of the stream, while others had taken as high as \$15 per cu. yd. in platinum—platinum was \$15 per ounce at that time—and that we could reach the property in about 10 days from Chicago by steam and rail all the way. It was also stated the maximum current on the Hootalinqua was a little over five miles per hour.

We outfitted at Victoria, fortunately for us, built a boat at Bennett, freighted our own stuff down to the mouth of the river and camped on the point between the Hootalinqua and Thirty-Mile rivers. Here we made a rocker and prospected such of the bars at the mouth of the river as we could reach with the rocker in a skiff; we merely dug as deep as water would permit, rocked the gravel and panned the concentrate down to a condition of about half black sand and half gray sand, dried it and saved the sample in a tight tin can, each sample separately. Sometimes we sampled a cubic yard of gravel, sometimes we put through 10 cu. yds. before cleaning up, but each sample was marked with its location, amount,

and date. Later I hired a Canadian boatman and guide and kept on up the river to a point about 90 miles from the mouth. The lease our company had purchased was on a tract 80 to 85 miles above the mouth of the river and for about 10 miles below our last camp I prospected on every bar with a pan, shovel and a drill made by the Prospecting Tool Company, of Stamford, Conn. This drill was about 3 in. in diameter, and we made holes with it some 18 to 20 ft. in depth. The samples obtained here, as well as all samples obtained along the river, were carefully panned down and dried, and then placed either in tight cans or in bottles which had been brought for the purpose. After returning to civilization these samples were carefully cleaned from the gray sand and lighter detritus and were examined for the rare metals. They all contained traces of gold, but none of them showed platinum, although they were tested by numerous competent assayers; nor did any of the assayers who examined these samples discover iridium, osmium or any of the kindred metals or combinations. There were no miners working on the river, and but few traces of any prospecting having been done, the gold on the Hootalinqua is very fine—as fine as any found on the Snake river, in Idaho, or finer—and in no case did we find even gold in sufficient quantities for dredging, although on one bar we put down a shaft 27 ft. We prospected all the way, getting colors in every pan, but colors so fine that a cubic yard of this gravel only carried 1.65c. in gold by weight. I brought back and turned over to the company intact some 20 samples of concentrates from the gravels on its property. I also had 10 examined by each of three different assayers, and I examined the balance myself, with the results noted above. While I did not find values sufficient to repay working, I did find that:

1. The paragraphs as to the finding of gold, platinum, osmium, etc., on this river could all be traced back to the party who sold us the lease or to his employees.

2. That the assayer who tested the black sands for him, and who was supposed by us to be a reputable employee of the United States Government, was in truth employed by him as a member of his expedition, and that another man who had made affidavits as to the finding of the metals there, was also a member of his expedition who, as we later found out from his own written statements, had he lived in Scriptural times, would have been so famous that Ananias would have never succeeded in getting his name in print.

3. That this same party who sold the lease to us had sold it or other leases on the same river to three parties before he had approached us, and had in each case gotten a \$5000 to \$10,000 cash payment before they went to look at the property, and that the purchasers had examined the property in each case and found nothing

and had so reported to him, and had tried to get their money back from him. In fact they had, in one case, even threatened his life.

4. That one of the most trusted of the employees of this party had written him a letter which was in his possession at the time he sold us the lease, to the effect that there was no pay on the Hootalinqua river at all either in gold, platinum or anything else. This letter he always insisted was written by the employee at the solicitation and instigation of an Eastern capitalist who desired to get the leases from him cheaply.

Your article states that "a more recent test on 15 oz. of black sand, recovered from 200 lb. of original gravel, yielded 0.7 gram of platinum." From my experience the greatest amount of black sand I found in any place was about ½ oz. from 20 lb. original gravel, and this would mean that at least 300 lb. would be needed to supply 15 oz. of black sand. I am inclined to think that the average would be nearer 500 lb. than 200, to concentrate to 15 oz.

I have known of this party, since the fiasco I relate, endeavoring "to enlist San Francisco and Honolulu capital in his enterprise," and to publish reprints of articles regarding the "Hootalinqua Mining District"—which, as you know, embraces Livingston creek, and in fact all of the paying creeks in the Big Salmon country as well as the Hootalinqua river, and is known as the Hootalinqua district because the recorder's office is at Hootalinqua Post—to further his schemes.

The guide who was with me was a member of the Canadian Government party which surveyed this river, and was therefore familiar with the landmarks all the way. He stated that the survey was made late in the fall, and when the river was exceptionally low, and that the current velocities were taken then. The river rises early in the spring and keeps high all summer, going down only when the sun ceases to thaw the snow on the hills surrounding the Nisutlin river and Teslin lake; at the time I was there, from April to August, it was from 16 to 18 ft. higher than when the current velocities were taken. This means, of course, that the velocities were double those shown on the record, or even more than double. We had difficulty in getting up stream with a 16-ft. light Peterboro canoe. In one or two places we could make only a few miles per day.

If this statement will keep any of your readers from losing his time or money on this Hootalinqua proposition, I will consider my time well spent; and that a partial atonement for my early credulity is made by this warning.

G. L. HOLMES.

San Francisco, June 19, 1907.

In 1906 there were 20 electric furnaces in operation in Europe on the production of iron and steel.

New Publications

THIRTEENTH BIENNIAL REPORT OF THE BUREAU OF LABOR STATISTICS OF THE STATE OF ILLINOIS, 1904. 6x8½ in.; cloth. Springfield, Ill., 1907: Phillips Bros., State Printers.

EFFECT OF SCALE ON THE TRANSMISSION OF HEAT THROUGH LOCOMOTIVE BOILER TUBES. By Edward C. Schmidt and John M. Snodgrass. University of Illinois, Engineering Experiment Station, Bulletin No. 11, April 1, 1907. Pp. 24; illustrated. 6x9 in.; paper. Urbana, Illinois, 1907: Published by the University.

WEST VIRGINIA GEOLOGICAL SURVEY. COUNTY REPORTS AND MAPS. OHIO, BROOKE AND HANCOCK COUNTIES. By G. P. Grimsley. Pp. 378; illustrated, with 8 maps in separate cover. 6x9 in.; cloth. Morgantown, W. Va., 1907: I. C. White, State Geologist.

Contents: The history and physiography of the Pan Handle area. The geology of the Pan Handle area. The economic resources of the Pan Handle area. The climate and soils of the Pan Handle area. Maps showing the areal geology and geological outcrops of formations of Ohio, Brooke and Hancock counties; also soil map of the Pan Handle area.

In writing the present report on the geology of the Pan Handle counties, the preface says, an effort has been made to state the facts in a style intelligible to the people of those counties and of the State, at the same time not losing sight of scientific accuracy. To the trained geologist, many of the discussions may appear old and worn, and from his point of view, perhaps could well be omitted; but most of the people within the borders of these counties are not familiar with these subjects. Technical descriptions clear to the geologist, are often without significance to people following other lines of work. The volume includes information along the lines of local industries which should prove serviceable to the public school teachers in their work of instruction. Scientific agriculture has become a subject of interest and importance to the farmers, and while they do not accept all the theories advanced under this head, they do see the value of many suggestions offered by trained investigators in these lines. The study of the soils, their good and bad characters, the corrective methods and materials, are subjects of such importance that the government has established at Washington a Bureau of Soils. Arrangements have been made for co-operation between this department and the West Virginia Survey, whereby the soils of the counties will be studied, their varieties marked in colors on maps, and the methods of improving the soils investigated. One of the first of these reports is included in this volume, and is the work of two trained men with a number of

years' practical experience in soil study, T. A. Caine and G. W. Tailby, Jr., whose careful report deserves special attention.

GOLD DREDGING. By Captain C. C. Longridge. Second and revised edition. Pp. 339; illustrated. 7x9½ in.; cloth; 20s. net or \$8. London, 1907: *The Mining Journal*.

Contents: Introduction. The dipper, spoon or shovel dredge. The grab or clam-shell dredge. Suction pump dredges. The submerged jet dredge. Centrifugal and hydraulic dredge. The bucket dredge. Details of bucket dredge construction, equipment, etc. Horse-power required in dredging. Separation of the material dredged. Gold recovery appliances. Process of cleaning up. Percentage of gold saved. Quantity of water required for washing, etc. Disposal of the tailings. Working costs. Capacity and cost of dredges. The balance between profit and loss in working. The selection of dredges. Dredge crews. The working of dredges. Difficulties of dredging. Dry and semi-dry placer machines. Selecting, prospecting and valuing ground. The use of dredges. Objections to dredging. Dredging leases. Capital required by dredging companies. The progress of the dredging industry. The future of the dredging industry. Power excavators. Dredging returns. Fields for gold dredging. Dredging regulations.

Captain Longridge has shown considerable industry in collecting from printed sources a large amount of what has appeared since the first edition of "Gold Dredging" was printed; so the second edition is more bulky. He has been indiscriminate in this and excerpts are included from the catalogs of dredge manufacturers, who, having dredges to sell, have painted sometimes with more imagination than accuracy. This results in a rosy optimism that is a predominant tint throughout the book. Reprinting articles written by those who would boom the sale or promotion of dredging enterprises has made for the same result.

The searcher for exact information will flounder somewhat; for a large mass of contradictory opinions is published, and Captain Longridge does not lend a helping hand by commenting in any way or venturing an independent opinion. He treats his readers with subtle flattery, and they must do the culling.

The book is valuable to all those interested in gold dredging, who have not time to keep a scrap-book of their own, and as such is well worth its price. It recommends itself particularly as an example of what industry, scissors and paste-pot can accomplish. There are a number of interesting illustrations borrowed from catalogers (who, in depicting dredges that they never built, in turn had borrowed them from other catalogs). This is somewhat misleading.

Should Captain Longridge publish a

third edition, we recommend that he visit one of the dredging regions, such as New Zealand or California. The same industry he has shown, exerted in this way, would probably have more valuable if less bulky results.

S. C. L.

Power Plant in the Yukon

Vice-Consul G. C. Woodward, of Dawson, reports that an important work, contemplated in the near future, is the construction of a large power plant of approximately 1000 h.p. near the western boundary, on the Yukon river, about 50 miles below Dawson, for the purpose of furnishing electrical power to dredges on the Forty-mile creek and its tributaries in Alaska and the Fortymile and Klondike rivers in Yukon Territory. The company has a power house in Dawson and furnishes this city and Grand Forks with electric light, and Dawson with water for household purposes and a hydrant system for fire purposes. On the completion of the power house at the boundary, the company intends doing away with the works at Dawson, other than to hold it as a reserve in case of accident to the new plant. The fuel used in the present plant is coal taken from the company's mine on Coal creek, at which place the proposed plant is to be situated, the idea being that it is cheaper to convey electricity than coal. The output of the mine last year amounted to about 8000 tons, the entire output being used by the company in Dawson. This coal, landed at Dawson by the company's steamer, cost about \$12 per ton.

Garnet Mining in North Carolina

Mining for garnets has come to be an important industry in Madison county, N. C., quantities of the mineral being shipped each month from Marshall and Hot Springs. Perhaps the richest garnet mine in western North Carolina is located in what is known as the "Little Pine Section." This mine is owned and operated by F. O. Werden, of Philadelphia, Penn., who plans to enlarge operations and increase the output. New machinery with steam drills will be installed, and the mine will be lighted by electricity, so that operation may go on day and night. The garnets taken from the mine are used mainly for commercial purposes, but some handsome and clear stones have been found. It is estimated that 125 tons of garnet are shipped each month. Several clear garnets of two carats and one of five carats have been taken from this mine.

Wear in sand launders may be greatly reduced by the use of cross riffles capped with iron which device makes practically a sand bottom. Such a launder needs a somewhat steeper slope.

Personal

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

P. G. Lidner, of New York, has gone to Cobalt, Ont., on professional business.

Franklin Searle, of New York, has been looking after mining interests near Central City, Colo.

E. S. Wiard, of Denver, is at present in the Silverton, Colo., district on professional business.

H. F. A. Riebling, of Colorado Springs, Colo., has gone to Wyoming and the Pacific Coast on mining business.

Forbes Rickard, of Denver, has been examining mines in Gilpin county, Colo., in the interests of Eastern investors.

Carter Williams has been appointed manager of the Chamberlain-Dillingham sampling works, at Georgetown, Colo.

A. J. McMillan, of London, England, managing director of the Le Roi Mining Company, has arrived in Rossland, B. C.

R. Alvin Weiss, of New York, has returned from a professional trip to mines in Montana, Washington and British Columbia.

L. S. Austin, professor of metallurgy at the Michigan College of Mines, passed through Denver a few days ago on his way West.

B. B. Thayer, representing H. H. Rogers, of New York, is making his quarterly inspection of the Amalgamated mines in Butte, Montana.

Leo Goldsmith, who has been in Canada for the past three months developing molybdenite properties, has returned to New York City.

J. C. Haas is examining copper claims in the Bella Coola mining division, in the British Columbia coast district, for Spokane, Wash., principals.

Edwin Higgins, Jr., of Butte, Mont. is inspecting mines in Idaho for Eastern men. From there he will go to British Columbia on a like mission.

T. L. Livermore, Jr., has resigned as general superintendent of the Cienegueta Copper Company of Sonora, Mexico, and is at present in Boston, Mass.

S. A. Josephi, of Denver, manager of the East Notaway mine, in Gilpin county, Colo., has returned from an Eastern and foreign trip on mining business.

P. Kesten, chief engineer, has been appointed manager of the Central Mining Institute (Zentrale für Bergwesen, G. M. B. H.), Frankfurt-on-the-Main, Germany.

James C. H. Ferguson, Pacific Coast, representative of the Midvale Steel Company, has returned to San Francisco from a visit to the works in Philadelphia, Penn.

William M. Cooper, manager of the

Capitol Prize Mining Company, of Georgetown, Colo., has gone to Pittsburg, Penn., and other Eastern points on a business trip.

R. H. Stewart, manager of the mines of the Consolidated Mining and Smelting Company of Canada, has left Rossland, B. C., for Ottawa, Ont., on a month's vacation.

W. T. Hedges, of London, who has been inspecting the Cobalt and Temagami mining areas, has sailed for England carrying with him extensive options on mining repositions.

P. Davidson Ahier, formerly manager of the Idaho-Alamo silver-lead mines in the Slocan district, B. C., has been appointed manager of the Cariboo-McKinney gold mine in the same province.

H. J. Wolf, formerly with the Camp Bird Mining Company, in San Juan county, Colo., is now superintendent of the Stanley Mining and Milling Company, at Idaho Springs, Colo.

E. Brydon-Jack, late in charge of the department of civil engineering in Dalhousie College, Halifax, N. S., has been appointed professor of civil engineering in the University of Manitoba, Winnipeg.

Charles W. Merrill, of Lead, S. Dak., has returned from a business trip to California and Nevada. The C. W. Merrill reported missing in the "Columbia" disaster, was another person bearing the same name.

George L. Walker, editor of the Boston *Commercial*, after having spent a week visiting copper mines and smelters in the Boundary district of British Columbia, has left Phoenix, B. C., for California and Nevada.

Barney Shearer, superintendent of the stamp mill for the Wolverine and the Mohawk Mining Companies, at Gay, Mich., has tendered his resignation, to take effect Sept. 1. His successor has not yet been named.

H. Tibbetts, formerly superintendent of the Fairview Golden Boulder mine, Fairview, Nev., has joined A. Hamilton, in the firm Hamilton, Tibbetts & Company, mining engineers and brokers, Los Angeles, Cal.

J. Nelson Nevius, of Minas Prietas, Sonora, Mexico, has returned from a professional trip to Copala and Panuco, Sinaloa, and has gone to Central California on a six weeks' trip, with headquarters at Gilroy.

Frank Richards has been appointed managing editor of *Compressed Air*, which will hereafter be published by the Compressed Air Magazine Company of No. 11 Broadway, New York. He succeeds W. R. Hulbert, resigned.

William Woods, formerly superintendent of the Boston-Occidental Mining Company, at Apex, Colo., has been appointed superintendent of the Terrible

mine of the Whiting Mining and Milling Company, at Silver Plume, Colo.

William C. Madge, engineer of mill construction for the American Smelters Securities Company, has resigned, and will open a consulting engineer's office in Salt Lake, where he will make a specialty of ore-dressing plant design and construction.

H. C. Hale, manager of the Mineral Ridge Manufacturing Company, has resigned to join F. B. Duncan, formerly manager of the Akron Electrical Manufacturing Company, in the firm of Hale & Duncan, contracting and designing engineers, Schofield Building, Cleveland, Ohio.

Obituary

Henri-Joseph Forir, general secretary of the Société Géologique de Belgique, died at Liege, on July 15. Funeral services were held on July 17 at the residence, No. 25 Rue Nysten.

J. S. Hamlin, sales agent of the car-equipment department of the Ohio Brass Company, died at his home at Mansfield, Ohio, July 26. He had been actively engaged in railway work for many years.

Societies and Technical Schools

Colorado School of Mines—Beginning with the fall term a course in practical mining will be conducted at a mine situated on the south slope of Mount Zion, a half-mile west of Golden. A force of experienced miners are at work opening the mine.

Hudson Club—This luncheon club in which many men prominent in coal, the machinery trade and engineering are interested, has been formed with quarters in the new West Street Building, New York. The membership will be limited. F. R. Eden, No. 134 Cedar street, is the temporary secretary.

Industrial

The H. W. Johns-Manville Company is issuing a folder entitled, "How to Clean a Boiler," which describes the Magic boiler compound now offered for sale by the company.

The Morgan-Gardner Electric Company, Chicago, Ill., has been awarded the contract for the installation of a complete electric haulage and mining machinery in the Glen coal mines at Peabody, Tenn.

The Northern Engineering Works, Detroit, Mich., recently shipped a 5-ton three-motor electric traveling crane to the South Rocky Mount plant of the Atlantic

Coast Line Railway Company. The span is about 72 feet.

The Atlas Engine Works, Indianapolis, Ind., announces the appointment of Otto Dieckmann, Jr., as manager of the direct sales office of the company in St. Louis, Mo. The office will be in the Chemical Building as heretofore.

The Western Tube Company, of Kewanee, Ill., is distributing an illustrated price-list folder describing the "Kewanee" flange union. A convex malleable iron joint seated upon a brass seat gives a tight joint without the use of a gasket.

The Foundation Company, of New York, has been awarded the contract for sinking a mine shaft on the Swanzy range near Ishpeming, Mich. The dimensions are 21x17 ft., and the shaft will be sunk through about 70 ft. of water-bearing material.

The Vredenburg Company, Monadnock building, Chicago, Ill., has been organized to carry on a consulting practice in engineering and general technical advertising. The manager, Clarence Vredenburg, was editor and manager of the *Engineering World* from its inception until its recent sale.

The Tallerday Manufacturing Company, Los Angeles, Cal., announces that C. B. Johnson has acquired the interests of F. G. Tallerday, in that firm. The officers of the company are now C. B. Johnson, president; H. G. Tallerday, vice-president; W. P. Finnerty, secretary, and S. W. Hudson, treasurer.

The new buildings of Keuffel & Esser Company, at Adams and Third streets, Hoboken, N. J., were formally opened on July 20. The buildings are of reinforced concrete, one being used for offices and the other being devoted to manufacturing. The New York office of the company is at No. 127 Fulton street where it has been for nearly 30 years.

The Green Fuel Economizer Company, Matteawan, N. Y., is installing a mechanical draft plant for the fuel testing laboratory at the Jamestown Exposition. There will be three 300-h.p. boilers, each equipped with an engine-driven 100-in. fan, and a 35-ft. stack. The fans will be so controlled that the draft can be regulated either by hand or automatically.

The Ajax Metal Company, of Philadelphia, Penn., on July 31 obtained a favorable decision in its suit concerning infringement of its patent covering plastic bronze in the Circuit Court of the United States, District of Jersey City, Judge Archibald presiding. The decision sustains all the company's claims in regard to priority and the right to sell its product.

The Detroit Carbuilding and Equipment Company, a new corporation of Detroit, Mich., has acquired a plant consisting of seven acres of land at Dix and Waterman avenues. Detroit, car sheds and shop

buildings equipped with all necessary machinery. The plant is prepared for the immediate resumption of operations, and will be devoted to the manufacture of all kinds of freight and logging cars. About 500 men will be employed.

Trade Catalogs

Receipt is acknowledged of the following trade catalogs and circulars:

Western Tube Company, Kewanee, Ill. The "Kewanee" Flange Union. Pp. 4, illustrated, paper, 5x8 in.

Buffalo Forge Company, Buffalo, N. Y. Buffalo Electric Disk Wheels. Pp. 4, illustrated, paper, 3½x6½ inches.

James Beggs & Company, 109 Liberty St., New York. Feed Water Filtration. Pp. 16, illustrated, paper, 6x9 in.

The Pneumatic Machine Company, Syracuse, N. Y. Electric Coal Puncher. Pp. 23, illustrated, paper, 7½x9½ in.

Sullivan Machinery Company, Chicago, Ill. Bulletin No. 56. Sullivan Mining Hoists. Pp. 24, illustrated, paper, 6x9 in.; 1907.

Barrett Manufacturing Company, New York. Cost of Tarviating Macadam Streets. Pp. 16, illustrated, paper, 4x9 inches.

John A. Traylor Machinery Company, Denver, Colo. Bulletin F. Pumping Machinery. Pp. 23, illustrated, paper, 7x10 inches.

American Locomotive Company, New York City. Six Wheel Type Switching Locomotives. Pp. 62, illustrated, paper, 6x9 in.

The Burt Manufacturing Company, Akron, Ohio. Burt Oil Filters, Exhaust Heads and Ventilators. Pp. 79, illustrated, paper, 6x9 inches.

The Green Fuel Economizer Company, Matteawan, N. Y. Bulletin 107. Drying Materials in Industrial Plants. Pp. 16, illustrated, paper, 6x9 in.

J. Bishop & Company, Malvern, Penn., and Philadelphia, Penn. Refiners of Platinum, Gold and Silver. Pp. 39, illustrated, paper, 5x8 in.; 1907.

Baldwin Locomotive Works, Philadelphia, Pa. Record No. 62. Balanced Compound Locomotives. Pp. 31, illustrated, paper, 6x9 in.; 1907.

Colorado Iron Works Company, Denver, Colo. Catalog No. 6C. Stamp Milling Machinery. Pp. 71, indexed, illustrated, paper, 6x9 in.; 1907.

Baldwin Locomotive Works, Philadelphia, Penn. Record No. 61. The Steam Locomotive of the Future. Pp. 36, illustrated, paper, 6x9 in.; 1907.

Mussens Limited, Montreal, Canada. Catalog No. 15. Railway, Mining, Municipal and Contractors' Supplies. Pp. 639, indexed, illustrated, cloth, 5x8 in.

Allis-Chalmers Company, Milwaukee, Wis. No. 4005. Allis-Chalmers Steam Turbines and Generators Recently Put in Service. Pp. 4, illustrated, paper, 3½x6 in.; May, 1907.

The New Century Contracting Company, 1 Madison Ave., New York. The New Century System of Fire Proof Construction. Pp. 22, illustrated, card board, 5x7 inches.

Fulton Iron Works, San Francisco, Cal. Catalog 106. Machinery for Gold and Silver Mining, Amalgamating and Concentrating. Pp. 94, illustrated, indexed, paper, 8x10 inches.

The Arlington Manufacturing Company, Canton, Ohio. Arlington Technical Paints for Railroad Use. Pp. 8, paper, 4x9 in. Arlington Galvanized Steel Paint. Pp. 4, paper, 3½x6 inches.

Arthur Koppel Company, Machesney Building, Pittsburg, Penn. Bulletin No. 205. Manufacturers and Consulting Engineers of Industrial and Portable Railways. Pp. 12, illustrated, paper, 8x10 in.

Buffalo Steam Pump Company, Buffalo, N. Y. Catalog 187. Buffalo Pumps, Steam, Power, Centrifugal, Turbine; contains also useful tables, diagrams and other information. Pp. 132, illustrated, indexed, paper, 6x9 in.; 1907.

Rockwell Engineering Company, 26 Cortlandt Street, New York. Catalog Nos. 1, 2, 3 and 4. Oil or Gas Furnaces. Pp. 4. Brazing Furnaces. Pp. 4. Catalog F. Rockwell Fuel Oil Burning Appliances. Pp. 18. Pot Furnaces for Lead and Cyanide Hardening, and for Melting Soft Metals. (Oil or Gas Fuel). Pp. 8. All illustrated, paper, 6x9 in.; July, 1907.

Joshua Hendy Iron Works, San Francisco, Cal. Bulletin 104. Hendy "Standard" Ore and Rock Cars. Pp. 3, March, 1907. Bulletin 105. Hendy Water Gates, Reservoir Gates, Ball Joints, Riveted Sheet Steel Pipe, Pipe Line Accessories and Hydraulic Data. Pp. 35, February, 1907. Bulletin 106. Hendy Giants for use in Hydraulic Placer Mining and Earth Excavations and Fills for Railroad and Reservoir Embankments. Pp. 15, April, 1907. Bulletin 107. Rock and Ore Crushers. Pp. 7, May, 1907. All illustrated, paper, 7x10 inches.

Construction News

Goose Creek, Baker County, Oregon—A double-compartment shaft is being sunk on the Only claim and the management is considering the installation of a 10-drill compressor plant and a hoist for sinking 1000 feet.

Carizozo, Lincoln County, New Mexico—The Buster Brown group is to be equipped with a steam hoist and air drills. The Muldoon shaft is to have machinery to sink 500 ft. W. A. McIvers, Carizozo, is manager of both properties.

Special Correspondence from Mining Centers

News of the Industry Reported by Special Representatives
at Denver, Salt Lake City, San Francisco and London

REVIEWS OF IMPORTANT EVENTS

San Francisco

July 31—The question of the value of tailings of a mine, from a county assessor's point of view, was the basis of a case in Mono county. The supervisors, sitting as a board of equalization, sustained the action of the county assessor, in placing a valuation on the tailings of the Standard Consolidated Mining Company, of Bodie. The question before the board was a reduction of the assessment on about 100,000 tons of tailings at the Standard mine. The company refused to place the tailings on the report of the taxable property of the company and Assessor Borland assessed 100,000 tons of tailings at \$1 per ton. This was objected to by Manager A. C. Lassen, who attempted to prove that the tailings were valueless. Supervisor Rickey in making the motion to sustain the assessment roll, said: "Mr. Lassen has appeared before us with his witnesses and his books, and in my opinion has proved that the tailings are of value and of a value above \$1 per ton. Therefore I move that the assessment made by the assessor be sustained." The motion was carried by a unanimous vote.

From Genesee, Plumas county, comes the report that outside capitalists have bonded nearly all of the properties in that camp. One copper company has struck a new 14-ft. ledge at a depth of 127 ft., and plans to commence the shipment of concentrates to the smelters. This company now has 3000 ft. of underground workings. Albert Ball has bonded the Reward, Uncle Sam and Eagle properties for the Boston syndicate that is building a smelter at Bald Mountain, Nev., and has a force of men at work developing each property.

The Southern Tuolumne Miners' Association has recently been organized to promote the mining interests south of the Tuolumne river, in the county of the same name. A. P. Dron is president and H. S. Richardson is secretary. These local miners' associations can accomplish great good in advertising their sections of the State, and also in preventing unscrupulous men from selling stock in worthless mines.

About 40 years ago the Leviathan mine, at Markleeville, Alpine county, was worked to some extent, and 3000 tons of ore averaging 35 per cent. copper, were hauled to the Dayton mill. The low price of copper and the expense of hauling caused the owners to abandon it. Now a San Francisco and French syndicate has

bonded the old mine and will immediately develop the property. This mine is situated at the head of Leviathan creek.

The National Forest Service has issued a circular under date of July 6, 1907, in which it is stated that the only jade mine in the United States is situated in Siskiyou county, on the Klamath river, near Happy Camp, and is in the Klamath National Forest Reserve. The circular further states that samples of the jade were sent to Germany, where they were tested and the mineral pronounced to be of a standard grade and capable of taking on a high polish, and that preparations are now being made to develop the mine and ship the rock to Germany. A permit has been secured from the forest service for building a road to the mine. It is the policy of the service to lend assistance in developing mines situated in any of the reserves.

Horse Mountain, the new copper district in the east central part of Humboldt county, somewhere near the Willow Creek section, has been attracting considerable attention from prospectors and miners since George Henderson opened up his copper deposits there. Several local companies at Eureka have been organized and nearly the entire country has been located.

A deed has been recorded in Santa Cruz county for two tracts of land with limerock deposits deeded by the Holmes Lime Company to Rudolph Spreckels, of San Francisco, the consideration being \$25,000. There is a proviso in the deed that if any of the lime rock is used or sold to be manufactured into commercial lime, the property will revert back to the owners, but it is specifically stated that it can be used for the manufacture of cement or any other purpose except lime. This is one of the methods of the "lime trust" to keep control of the lime business in California.

On July 17 seven tons of pig iron were drawn from the electric furnace at Heroult, Shasta county, where the experimental furnace has been constructed by H. H. Noble, under the Heroult process. Dr. Heroult was present at the first trial. For steady work more electric power is required, and this will shortly be supplied. The essential features of the process seem to have been successful, only a few minor difficulties having been experienced. Near by in the same county is an excellent productive chrome mine owned by C. F. Dougherty and L. H. Brown, and it is expected that if the production of pig iron at Heroult is successful chrome steel can also be manufactured. The mine has re-

cently shipped a large lot of chromite for lining the furnaces of the smelter at Kennett, and another carload is going to the Mammoth smelter.

The Moosehead group of gravel mines in Calaveras county, near the Sheep Ranch mine, has been sold to New York men. The claims cover some hundreds of acres, all of the ground being patented. Numerous prospect holes prove the gravel to be over 100 ft. deep, with an average width of 400 ft. The company owns several options, which will be taken up, together with several dam and reservoir sites. As soon as the dams are constructed water will be stored and furnish adjacent properties at all seasons of the year. Among the great ditches used by the company are the San Antonio, which cost \$100,000. Besides the placer ground the Moosehead contains several large quartz veins. Two giants are being operated at present, with a monthly production of \$3000. The mine is equipped with a 5-stamp mill which is being put in shape for service. A survey recently made shows that the rich vein system of the Sheep Ranch traverses the Moosehead, and the chief attention of the new owners will be concentrated in the development of the ledges.

Bisbee, Arizona

July 30—It does not look like a very large increase of copper production in Arizona for the second half of the year. The troubles at Bisbee early in the year have been well known, and had a more serious effect on future product than they did on the immediate output. Now there is trouble at Clifton and there are very strong signs of difficulties at Globe, while Jerome is always liable to interruptions from bad ground and labor. These four districts produce nearly all the copper made in the territory, the scattering camps in Yavapai, Pima and Cochise counties having but a small total as yet. During the progress of the fight between the producers of Bisbee and the Western Federation of Miners one of the main objects of the mine operators was to prove that they were not dependent on the federation, and they maintained production and perhaps, increased it a trifle. But this was, of course, at the expense of deadwork, for it was impossible to place enough men underground to maintain production and carry forward the important developments necessary to open such properties, as, in particular, the Superior & Pittsburg. While the number of men

working at Bisbee has been steadily gaining for some months, and is now practically normal, the development of the mines still suffers to some extent and the increase in production that had been expected during the latter part of 1907 has not been accomplished, and cannot be. In this way Bisbee camp, the chief producer of the territory, will continue to drag somewhat for a considerable period. With the remaining chief camps of the territory the difficulty is more immediate. Clifton has a strike at the smelter of the Arizona Copper Company and is due for another of its periodic floods pretty soon—it has not had one for months.

At the Superior & Pittsburg mine the management is centralizing surface equipment at the Junction shaft, which is 150 ft. lower at the collar than some of its other shafts. All pumping will be done at this shaft, and with this end in view the company is now cutting, at the 1200-ft. level, a large station to hold 4500-gal. pumping engines that will hoist water to the 1000- and 900-ft. levels, where are large engines for throwing to surface. The mine is now making about 4500 gal. per min. from its Briggs, Hoatson and Junction shafts, and all of it is to be diverted to the Junction when the new station is ready. Some magnificent carbonates of copper are being mined at Junction, but the main production is still from the Cole shaft, which is serving a considerable part of the company's opened ground. In the part of the mine formerly belonging to the Pittsburg & Duluth company the largest stopes opened in Bisbee for a year or two have been developed and fine oxides and sulphides of copper are coming out. In the Hoatson shaft a station has been cut on the 1200-ft. level and drifting is beginning to reach a large area of ground which was leached very thoroughly on the 1000- and 1100-ft. levels, and where copper is reasonably looked for. Production is running about 400 to 450 tons of ore per day.

Salt Lake City

Aug. 2—The Uintah Treasure Hill Mining Company has been organized and has absorbed the Treasure Hill Mining Company, operating at Park City. In addition to the latter the Kentuck group of claims has been acquired and a deal is pending for the acquisition of the Creole mine. Jesse Knight, of Provo, is at the head of the new organization and development work upon an elaborate scale is about to be inaugurated.

The new slimes plant built by the Consolidated Mercur Gold Mines Company, at Mercur at a cost of \$25,000, is a demonstrated success and President John Dern says it will be possible to save 50c. a ton more from the ore treated than has been possible heretofore. The plant, when run up to its capacity, will handle 400 tons a day and another unit of 200 tons capac-

ity is to be added. The company owns a large tailings dump, containing about \$1 a ton in gold, which will be re-treated.

The management of the Ontario mine at Park City is working heroically to bring about normal conditions in the Ontario drain tunnel adit, which was closed by caves about 2½ years ago. The avenue has been cleared to a point between shafts Nos. 2 and 3. Recently, owing to difficulty in getting men to work at the face, pumps were installed and an effort is being made to unwater the mine by that method and with very encouraging results. During the past week, however, the management succeeded in getting men to go back into the tunnel and work is progressing there while pumping operations are in progress. As a precautionary measure, the ground ahead is being prospected by means of diamond drills.

Advices have been received by Salt Lake shareholders of the Lost Packer mine in the Loon Creek, Ida., district to the effect that the new smelter has been placed in commission and is producing a matte of the value of about \$400 a ton in gold, silver and copper. It is expected that 1500 tons of matte will be produced before heavy snowfall closes the roads for the winter. James Ives, of Salt Lake, is president of the company.

The compilation of the annual report of the Utah Copper Company is in progress and Manager R. C. Gemmill in his statement will say that there are 15 miles of underground workings and that an area covering fully 40 acres of the porphyry ores had been opened. It is estimated that the company has blocked out 40,000,000 tons of 2 per cent. copper ore and 60,000,000 tons of a slightly lower grade. The actual cost of mining and milling is estimated at 45c. a ton, with administrative, taxes and other costs added, not to exceed 68c. a ton.

The ore and bullion settlements reported by Salt Lake banks during the month of July amounted to about \$2,250,000.

Denver

August 3—The output of the Cripple Creek district for the month of July, amounted to \$1,160,000, 51,000 tons, a slight decrease, compared with the previous month, caused by several large producers being temporarily closed down for various reasons.

At a meeting of the mine owners, held yesterday, it was decided to advertise again for bids for the construction of the drainage tunnel. Lately, since the firm which had contracted for its completion, threw up the contract, operations have been carried on in company account. The advertisement will call for bids for a tunnel 5 x 8 ft. as well as 7 x 10 ft., which is the present size.

A meeting of the Cripple Creek Mine Owners' Association was held at that place

yesterday, and it is understood that the association will demand a rigid enforcement of the card system. The meeting adjourned until 2 o'clock, August 5, at Colorado Springs.

A jury, consisting of prominent business men was chosen in the Federal Court yesterday to try the case of the Government against the promoters of the Lost Bullion Mining Company, charged with fraudulently obtaining funds through the use of the mails.

The lately organized Tri-Bullion Smelting Company of New York will at once commence the construction of a 50-ton smelting plant at Cañon-City to be gradually increased to a capacity of 200 tons.

Cloudbursts in different parts of the State, together with labor troubles, especially among the switchmen of the Colorado & Southern system, have contributed to more or less stagnation in the transportation of ores to the smelters. From present appearances, a general strike of trainmen on the different systems is a possibility.

Duluth

Aug. 3—Ore docks at the head of the lakes are working steadily, ore trains are running and though the members of the Western Federation of Labor are still holding meetings and endeavoring to induce men to stop work, they are the only people on the Mesabi range who do not know the strike is over. The strike has made a direct difference in shipments for July of about 3,000,000 tons, and will make a slight loss for some time to come, as it is impossible to resume at full swing immediately. Some men have left the region, and the dissarrangement of marine schedules will be felt more or less seriously. Tonnage has been turned as much as possible to the old ranges and shipments from them have been increased to the limit, while coal shippers and the grain trade have taken advantage of the situation and moved as much of their product forward as they could, in the anticipation of a sharper demand from the cre men later. The amount of coal to be brought up in the later months has been curtailed to the capacity of the docks. The lake fleet will be obliged to move at utmost speed to make a total of forty million tons of ore for the year, and that much will be required by the present melting of Lake ores.

Two mines will be opened adjoining the Kinney, in section 14-58-19, both by independent concerns, and both small. One will be by shaft, the other by stripping, and a contract will be let in a few days for this work. The stripping pit of the Kinney is being enlarged as fast as possible. It has been a milling property heretofore, but should have been opened for stripping in the first place, and for-

mer managements have suffered materially by reason of the error made.

The Spring mine, formerly the Mallman property, is being made ready for the shipment this year of about 25,000 tons, and the Duluth & Iron Range road is being extended to the mine.

No ore can be shipped from the Coleraine district this season, unless it be a small tonnage from the Holman mine, late in the year. The district will be a very large producer during 1908, however, and should make a most important addition for many years to come. The stripping and other preparations under way are tremendous.

At Negaunee the new Empire mine, which has been under development for a year or more, is beginning shipments and will try to produce 50,000 tons this year. It is owned by Oglebay, Norton & Company, and produces a silicious ore. Also at Negaunee the Regent group of the Oliver company, is carrying out an extensive building program. This will include a change in hoisting, etc. New dries, machine shops, engine houses, etc., are being provided. The Blue mine shaft will be sunk 160 ft. to the 900-ft. level and will be opened on that level. At the Prince of Wales the shaft will be deepened 460 ft. to a depth of 1070 ft. In both these mines long rock drifts have been started on the present bottom levels to reach ore. In one case these drifts will be more than 700 ft. long and the other will be nearly as long.

At Ishpeming the Oliver company is carrying on extensive improvements at its Section 21 mine, consisting of new standard dry and boiler houses, boiler plant, etc. The mine is idle underground, but shipments from its old stocks are under way steadily. These stocks are large, covering about all the ground available about the shaft. In time a complete electric plant for tramping, lighting, etc., will be installed for this and adjacent mines of the company, and foundations for the power house are now in place.

Scranton

Aug. 5—James E. Roderick, chief of the State department of mines, last week, made public his report for the year 1906, the chief feature in which is the admission that the increase in the number of inspectors has not brought about the expected decrease in the number of accidents. Comparing the United States with Great Britain he points out that the latter has 38 inspectors with 103 mines in charge of each inspector, in addition to a number of quarries with a total of 18,642 employees under the inspectors' jurisdiction and a total output of 6,663,870 tons for each inspector. Pennsylvania has 20 bituminous inspectors with 69 mines each with a total of 7,093 employees, and a production of 6,476,649 tons per inspector. Pennsylvania has also 20 anthracite inspectors for 32 mines each, with 5,818

employees and 3,511,028 tons per inspector.

Dealing with these comparisons Inspector Roderick says: "In the anthracite fields of Pennsylvania the number of inspectors has been increased since 1900 from 8 to 20 and in the bituminous field from 10 to 20 in the hope that the augmented number might result in bringing about a decrease in the number of accidents. The records show, however, that the reverse has been the case, and it will be necessary therefore, to resort to some other method to bring about this greatly desired result."

Toronto

August 2—Dr. A. P. Coleman, who has been exploring the iron ranges east of Lake Nipigon in the Thunder Bay district, reports to the Ontario Bureau of Mines that the deposits in the vicinity of Red Paint river are of fair promise. R. H. Flaherty is prospecting with a diamond drill with satisfactory results. A small body of good hematite ore has been found near the Eastern end of the range.

The strike situation at Cobalt continues practically unchanged. Several of the mines which adhere to the mine-owners' schedule have shut down, including the University, Drummond and Silver Leaf. A few men are retained at the La Rose though operations are practically suspended. The Nipissing has about 300 men at work. Other mines are working with reduced staffs, which in some cases are gradually being increased. Many of the strikers have found work in the Larder Lake district.

One of the first shipments of good ore from James township on the Montreal river was received in Toronto. It consists of about 30 lb. from a newly discovered vein $\frac{1}{4}$ in. wide on a claim located about $\frac{1}{8}$ mile from the Montreal river by the late Charles E. Turner and was forwarded by James Gifford. The samples are similar to the Cobalt silver ore.

Owing to the backwardness of the season and the interference with mining operations by swarms of black flies, the Provincial Government has extended the time for initial work on Larder Lake claims until Sept. 30. According to regulations 30 days' work must be done on a claim within 90 days after registration, which has been found impossible in many cases.

The members of the American Institute of Mining Engineers who left on July 24 for a trip to the mining regions of Northern Ontario, were accompanied by Hon. Frank Cochrane, minister of mines, Hon. Dr. Pyne, minister of education and other officials. The party spent nearly three days at Cobalt visiting the leading mines and the two following days were occupied in visiting Lake Temagami and the neighborhood. The Sudbury nickel mines, the Moose Mountain iron mine and the Vermilion gold placer mines were also inspected.

London

An unexpected difficulty has been experienced by the Ooregum Gold Mining Company of India in connection with the proposed issue of new capital required for new developments and new plants. It was proposed to issue 137,000 new shares at 10s. each in order to raise further capital. It appears that applications for only 38,544 shares have been received. It has always been the practice of John Taylor & Son's companies to charge as much expenditure as possible to capital account instead of meeting expenses for extensions out of revenue. The question of the wisdom of the two methods need not be discussed again. It is sufficient to record the fact that the shareholders in one of this group of companies have objected to the issue of new capital at present. The Ooregum is a paying concern and is well able to provide the money for these extensions out of revenue, and the directors have had no reason to do otherwise than to suspend dividends until the additional expenditure has been met.

The directors of the Zinc Corporation own up to the fact that the administration and finances of the company are in somewhat of a muddle. The corporation bought up large stocks of Broken Hill tailings which were to be treated by some flotation process for the production of concentrates that could be smelted for zinc. First the Potter process was tried and more recently the process which is at work at the Sulphide Corporation's mine was heralded as the triumphant solver of the situation. It appears now that this process also has given less satisfaction than was expected and I understand that trials are being made with the Elmore vacuum process. The company has come to the end of its financial resources and it is proposed to issue new capital in the shape of £182,000 preference shares. The new shares are to take the whole of the profits of the company until they have received 100 per cent. in dividends and they are then to become 20 per cent. preference sharing afterward equally with the ordinary shares. These are onerous terms and make the ordinary shares of rather doubtful value. The prospects of the company are by no means pleasant. Even supposing the zinc concentrates can be obtained by a flotation process, it is by no means certain that zinc sulphides containing 8 to 9 per cent. of lead will be a desirable material for smelting.

A new company called El Progreso Mexican Mines, Ltd., has been brought to the notice of the public this week. The mines are in the State of Sinaloa, and appear to be promising gold producers. Ralph Nichols has made an examination and written a report for the vendors and the directors also have a confirmatory report by W. J. A. Palmer.

Mining News from All Parts of the World

New Enterprises, Installations of New Machinery, Development of Mines and Transfers of Property Reported by Special Correspondents

THE CURRENT HISTORY OF MINING

Alaska

Copper River Railway—It is announced that the Guggenheim interests have given instructions that construction work is to be rushed on the Copper River & Northern railway with three shifts of men working night and day. A hydro-electric generating plant is being installed at the mouth of Copper river, near the new town of Katalla, and another at Abercrombie rapids 50 miles above Katalla. The intention is to complete the railroad as far as Abercrombie rapids before winter shall set in.

Arizona

YAVAPAI COUNTY

Crown King—This company is pushing work in the old mines at Crown King, and it is reported that good ore is being opened up.

United Verde—The smelter at Jerome has been shut down most of the last week for repairs. Rapid progress is being made in driving the tunnel; 9 feet per 24 hours was driven by hand and it is expected that this record will be excelled upon the installation of machines. The bore is 9x7 ft. and the ground is hard. It will cut the United Verde vein at a depth of 1000 feet.

California

BUTTE COUNTY

Butte Mining and Development Company—This company has commenced active development work on the Butte mine, near Sky High. The tunnel will be extended 200 ft. to reach the Mammoth channel.

Diamond Mining—"Tex" Rickard and associates have bought several hundred acres of land from T. L. Vinton, of Cherokee, supposed to contain diamonds, and have organized a company to prospect the property. The corporation is called the Cherokee Diamond Mining Company, of America.

CALAVERAS COUNTY

Moosehead—New York men have purchased this placer property adjoining the Sheep Ranch mine.

Stanislaus Power Company—This company has commenced active operations at the San Domingo gravel mine, using the waste water coming from the Utica mine.

EL DORADO COUNTY

Roundout—Superintendent G. S. Estey has abandoned the old works of this mine

in Blair's district, and is sinking a new shaft. The water is being taken out by a siphon.

HUMBOLDT COUNTY

Markusen—The new owners of this mine, near Orleans, J. H. Fehely, superintendent, are to build a new flume, which with the ditch, will be three miles long. A derrick is being put in to handle the large boulders.

KERN COUNTY

Atolia Mining Company—De Golia & Atkins, managers of this company, state that the Papoose and Churchill tungsten properties in the Randsburg district, are not owned by George G. Blackwell, Sons & Company, London, England, as reported in the JOURNAL of July 20. The properties are owned exclusively by the Atolia Mining Company, of San Francisco.

MARIPOSA COUNTY

Jumbo—A 6-ft. ledge has been struck in this mine on the South Fork, above the Hite mine. The property is under bond to the John Bunting Company, of Oakland, California.

NEVADA COUNTY

Gaston—It is understood that arrangements have been made to resume operations at this mine which closed down last February. The lower tunnel is to be continued 2800 ft. further to reach the ledge.

Standard Mining Company—This company, which recently purchased the Norambagua mine, at Grass Valley, has begun work. The main tunnel has been re-timbered.

PLACER COUNTY

Bath—The old channel in this mine has been found by F. M. Browne and the Hoffman Bros. The main tunnel is to be repaired.

Rio Vista—The mine near Forest, better known as the Cash Rock, is about to be reopened.

Colorado

CLEAR CREEK COUNTY

Denver—Idaho Springs and Georgetown business men will operate this property near Silver Plume.

Gold Coin—A one-fourth interest in this property located on Griffith mountain,

near Georgetown, has been transferred to Homer Davenport.

Mount Sneffels—This group in Argentine district has been purchased by Messrs. Farrager, Sylvester and Gileen, of Georgetown, Colo.

GILPIN COUNTY

After two weeks' tie-up due to wash-outs, regular traffic on the railroads has been resumed. Some coal is being brought in, sufficient to relieve the present scarcity.

Aduddell—A controlling interest in this property in South Willis gulch has been secured by Franklin Searle, of New York, who has also recently purchased the Forfar mine in Russell district and the Barnes mine in Quartz Hill district

LAKE COUNTY—LEADVILLE

Alhambra—This shaft which is being sunk by the Ovens Leasing Company has reached contact and drifting has begun. Several other enterprises are also under way, among them being the old Shadbolt shaft on the Nisi Prius ground.

Casey—The lessees on Crown Point are shipping from 600 to 800 tons of ore a month.

Crescentia—The Rebate Mining Company, is shipping from 20 to 30 tons of lead sulphide daily. The Reindeer, another of this company's enterprises, is also producing considerable mineral.

Elva Emma—This property on Ball mountain has been placed on a steady shipping basis, the silicious ore carrying gold. The Sunday is also making regular shipments.

Forest City—Shipments of low-grade semi-silicious ore are being made from the dump on Yankee hill. This material finds a ready market.

Indiana

KNOX COUNTY

Vincennes Coöperative Coal Company—This company has filed articles of incorporation, the object being to do a general mining business and to open coal mines in Indiana, with home offices in Vincennes.

MARION COUNTY

Linton Bituminous Coal Company—The creditors of this company, recently declared a bankrupt, have selected the German-American Trust Company, of Indianapolis, trustee to administer the assets. The company was organized in 1903

by Indiana and Ohio stockholders. After an expenditure of \$127,000 in the purchase of 700 acres of coal land, in the equipment and initiatory operation, the company was forced into bankruptcy with an indebtedness of \$40,000. The holdings are valuable and there is a fair prospect that all claims will be met in full. The company's mines and land will be sold some time in September.

Michigan

EATON COUNTY

North American Portland Cement Company—A. F. Gerstell, vice-president of this company has bought 400 acres of cement land, near Bellevue, a site for a plant having a capacity of 3000 bbl. of cement per day. Plans have been perfected for the location of four new plants in different parts of the country which are expected to be ready for operation in the summer of 1908.

HOUGHTON COUNTY—COPPER

Atlantic—The shaft on section 16 is down approximately 650 ft. and within 200 ft. of the 10th level of the Baltic mine. A drift from this level is within 150 ft. of the Atlantic boundary line and shows good value.

Calumet & Hecla—Diamond drilling is being carried on to ascertain the location of No. 18 shaft which is to be sunk this summer. This shaft will be located at the north end of the property, and will strike the *Osceola amygdaloid*. With this shaft in commission the company will have a stretch of about 11,000 ft. on the lode.

Tamarack—This company is considering the advisability of installing electrically operated sub-boosts in the deep working shaft, to eliminate the great strain in hoisting from the lower levels.

Montana

BUTTE DISTRICT

Boston & Montana—The West Colusa mine is still closed on account of gas from the Minnie Healey permeating the workings. No attempt will be made to operate this property until the source of the fumes is reduced. The Badger State shaft is 480 ft. deep, 80 ft. having been made this month. Through this shaft the Badger State and Auraria will be developed.

Coalition—The crosscut south of the 1800-ft. station of the Rarus, has tapped the vein, one of the large ones in the property. The company is mining ore on the 1100-ft. level of the Minnie Healey, and will open the 1300 and 1400 in a few days. Gas from the fire is passing through openings on the 1000, which prevents the prosecution of work there. *Boston & Montana* will hoist the ore through the Leonard shaft. The company is min-

ing about 1100 tons of ore, and receiving about 200 tons as its share from other companies.

North Butte—The face of the crosscut going north of the 1600-ft. level of the Jessie is supposed to be within 100 or 200 ft. of the Berlin vein. The company is mining its usual quantity of ore, about 1250 tons a day, and drifting on most of its principal veins.

Nevada

NYE COUNTY—BULLFROG

Monte Cristo Zinc—J. R. McDonald, Guy Fruit and W. E. Higman, Jr., of Rhyolite, have sold the Monte Cristo claims in the Good Springs district to P. Clark for \$250,000. The property embraces three zinc claims. The ledge carries, it is stated, a width of 49 ft. and the small amount of work performed has disclosed at least 2000 tons of high-grade shipping zinc ore. A force of 20 men is employed, and teams are hauling the ore to the Clark railroad, a distance of six miles.

WHITE PINE COUNTY—ELY

Ely National Copper—Through the consolidation of the interests of G. L. Rickard in the Ely Jumbo Copper Company, controlling seven claims, and the holdings of Max Strauss, of Denver, consisting of the Anaconda-Verde-Mizpah group of twenty claims and the Cowan group of four claims, this company, with a capitalization of \$5,000,000 owning 620 acres, has been organized in Denver, Colo. The following officers have been elected: Max Strauss, of Denver, president; James B. Grant, of Denver, ex-governor of Colorado, vice-president; Thomas Keeley, president of the First National Bank of Denver, treasurer; Edward B. Morgan, of Denver, secretary; G. L. Rickard, of Ely, assistant secretary and resident manager. The holdings of the Ely National lie directly south of the possessions of the Giroux and Nevada Consolidated and are surrounded on two sides by the claims of the Ely Bonanza and Manhattan Ely Copper companies.

STOREY COUNTY—VIRGINIA CITY

Best & Belcher—Dr. Ferdinand Butterfield, owner of the controlling interest, states that work in this famous old mine will be resumed immediately. The work will begin near the level of the Sutro tunnel.

Brunswick—Messrs. Bawden and Tredinnick have resumed mining operations on what was formerly known as the Brunswick lode territory of the Hale & Norcross, abandoned several years ago by that company, and subsequently located by Bawden and Pearce. The work will be performed on the 300-ft. level of the incline shaft.

Gould & Curry—It is reported that this company will undertake exploratory

work on the Sutro tunnel level, making a total of six companies operating from that base and covering a length of 1½ miles of territory.

New Mexico

GRANT COUNTY

Apache—This range is eight miles long by two miles wide, and its ore showings lie along a great fault, called the McKinley. The Hachita Copper Development Company owns 4000 ft. along this fault and its openings show copper ore of good grade. The most active mine is the Copper Crown recently sold to capitalists for \$100,000. The Apache group is explored by shafts to 60 ft. depth and some copper ore has been found. The Choppo group has developed several thousand tons of 3 to 10 per cent. copper sulphides, while the owner of the Antia group have found some likely copper-bearing gossan.

Monarch Mining and Development Company—The vein in the new zinc-lead district in the Black range, is said to be 30 to 40 ft. wide, and of good grade. A road has been built 20 miles to the railroad at Lake Valley, and a 100-ton mill for separating zinc and lead minerals, has been built.

Santa Rita—Powers & Company have begun steam pumping on their lease; J. Totretz is developing his lease on the Oxide claim, and the shaft of Worthington & Head is below the 200-ft. mark.

New York

ST. LAWRENCE COUNTY

St. Lawrence Pyrites Company—The first cargo shipment of pyrites concentrates was made from Ogdensburg to Wisconsin the second week in July. The concentrates were forwarded to Ogdensburg from the company's Stella and America mills.

Oregon

BAKER COUNTY

Peacock—William Henry Harris, President of the Eagle Mountain Copper Mining Company, and George W. Boggs, have acquired a 10-year lease of a two-third interest in this mine in the Seven Devils' district. They propose shipping ore to the Sumpter smelter via Council, Ida., at once.

Poorman—The crosscut disclosed sulphide ore 56 ft. wide and the vertical depth gives 125 ft. of backs above the tunnels. The management completed a wagon road preparatory to putting in a large compressor. The property is under bond to W. B. Gladding, of New York, for \$250,000. This bond includes also the Sovereign mine in the same camp, Goose Creek. Clark M. Knight is manager.

Sovereign—A tunnel is now in about

700 ft. on Coin creek. On the Only claim a double-compartment shaft is being sunk.

LANE COUNTY

Combination—R. H. Clark and Sherman Clark, of New York, are developing this silver mine. The whole face of the tunnel is in ore and has been for some distance.

Hiawatha—The miners drifting in on the ledge broke into rich ore recently.

Mineral Point—Salem business men bought 62 acres of the color-bearing soil on the Willamette river and formed a company for the purpose of manufacturing sienna paint. A factory site has been selected and machinery purchased.

West Coast Mines Company—This company, successor to the Oregon Securities Company, will drive a tunnel from 2200 to 2500 ft. long to open up the property at Bohemia at a depth of about 1500 ft. Hitherto only the free-milling orebodies nearer the surface have been developed. J. A. Cade is superintendent.

Pennsylvania

ANTHRACITE COAL

Pardee & Company—The new breaker built at Cranberry for the purpose of recovering coal from the culm banks began operations on July 27.

South Dakota

CUSTER COUNTY

Continental Copper and Smelting Company—A two-drum hoist and other machinery has been ordered for further development of this property at Keystone.

J. R.—Superintendent Crocker has resumed work after unwatering the mine, which was flooded by a cloudburst.

Madill—George Madill, the owner of this group, has bonded his ground to Eastern men who expect shortly to begin work on a large scale.

Peerless—The Western Chemical Company has started operations on this amblygonite property in Keystone.

Westinghouse Mica—The company has voluntarily granted the 8-hour day to all its employees with 10 hours' pay, and is developing with an increased force of miners.

LAWRENCE COUNTY

Ama Queen—The Sherman Bros. have just recovered in a crosscut a vein of gold-bearing quartz rock that was lost some years ago. The vein is increasing in size with development. A plant is to be installed on the property located on Box Elder creek, near Custer peak.

Burlington—One shift of miners is developing the property located three miles from Redfern. A shaft is being sunk on a vertical and is down 140 ft.

Golden Reward—A test of considerable interest is being made at the mill,

which resumed in June after changing from the dry to the wet crushing process and increasing the capacity to 300 tons daily. The first cleanup since resumption proved satisfactory and the full 300 tons are now being treated daily.

Homestake—The water is below the 700-ft. level and the big pumps on the 800-ft. level should be working in a couple of weeks. The Star shaft has been straightened and the hoist raised and is again in plumb and ready for operations.

Imperial—Arrangements have been made to supply the mine with electricity by running a pole line 7 miles from Black-tail to Bald Mountain.

Mogul—Over 300 tons of ore per day are being treated in the new cyanide mill. The Mogul shaft workings are unwatered. Two new triplex pumps have been installed in the Ben Hur claim to lift water from the tunnel.

Puritan—The property in Strawberry is being cleaned up and put in shape to resume operations with the new 200-ton cyanide mill.

Victoria—Preparations are being made to reopen the 200-ton cyanide mill of the company on Squaw creek, near Deadwood. Development during the past few months has disclosed two new shoots of good-grade ore which will be treated with ore from the Victoria Extension property adjoining.

Tennessee

MAURY COUNTY

Akin Phosphate Company—This new company of Columbia is said to own 300 acres of phosphate lands which have been thoroughly prospected, and which will be developed at once. The officers are: J. D. Dobbins, president; M. C. Akin, vice-president; and R. C. Ewing, secretary and general manager.

Texas

JEFFERSON COUNTY

Sulphur Shipments—Shipments through Sabine for June and July are reported to amount to 36,700 tons, of which 4500 tons went to foreign ports and the remainder to points along the Atlantic coast.

MILAN COUNTY

Rockdale Lignite Company—This company has purchased the Wallace lignite mines, near Rockdale. San Antonio firms which consume lignite are interested.

Utah

BEAVER COUNTY

Hecla—This property, in the Bradshaw district, east of Milford, has reached the producing stage. J. M. Reynolds, of Salt Lake, is manager.

Lulu Mining—This company is installing steam-hoisting equipment to take the

place of the gasolene plant, which cannot be used to greater depth than 500 ft., the present lowest level of the mine.

Newhouse Mines and Smelters Company—The management has let a contract to sink the main shaft below the sixth level.

IRON COUNTY

Jennie Gold Mining—This company marketed a bar of gold bullion in July of the value of about \$1000. Some extensive orebodies of milling grade have been developed on the 150- and 175-ft. levels.

JUAB COUNTY

Tintic Ore Shipments—Shipments for the week ending Aug. 3 amounted to 144 carloads, the contributing mines and amounts being: Ajax, 3; Beck Tunnel, 11; Bullion Beck, 4; Carisa, 8; Centennial Eureka, 42; Colorado, 7; Eagle & Blue Bell, 11; Gemini, 5; Godiva, 1; Lower Mammoth, 10; Mammoth, 12; Grand Central, 8; Ridge & Valley, 2; Scranton, 6; Tesora, 1; Uncle Sam Consolidated, 5; May Day, 5; Yankee Consolidated, 3.

Beck Tunnel Consolidated—The new equipment for the shaft house has been installed and will be in operation within a week.

Crown Point—This company has arranged to get power from the Colorado mine compressor.

Eagle & Blue Bell—At a point 600 ft. north of the shaft and in hitherto unprospected territory has been developed a large body of high-grade shipping ore.

May Day—Ore is being taken out through the Uncle Sam mine, which was recently acquired by the May Day company.

Star Consolidated—The operation of this mine, which was recently consolidated with the Black Jack, will be resumed.

SALT LAKE COUNTY

City Rocks Mining—This company has finished re-timbering the old City Rocks tunnel, which had not been used for a number of years, and has begun taking out ore for shipment. A total of 630 tons was shipped from other portions of the mine in June and July. W. S. Zehring, of Salt Lake, is manager.

TOOELE COUNTY

Honerine Extension—Ore shipments have been inaugurated from this property at Stockton.

West Virginia

MARION COUNTY

Lowe Coal Company—This company has been organized at Fairmont to open a coal mine, near the Monongalia county line, the output to be shipped by river. E. Trickett is secretary.

Wisconsin

CRAWFORD COUNTY

St. Louis Iron Company—This company has begun the development of iron mines near Prairie du Chien. The deposit is estimated to contain 75,000,000 tons of ore.

Canada

BRITISH COLUMBIA

Increased Wages—At Rossland the Le Roi and Le Roi No. 2 mining companies have advanced miners' wages in order to retain sufficient men. The advances are substantially as follows: Machine men, from \$3.50 to \$4 per day; muckers, \$3 to \$3.25; shaft men, \$4 to \$4.50; timber men, \$3.50 to \$4.

BRITISH COLUMBIA—BOUNDARY DISTRICT

Snowshoe Gold and Copper Mines, Ltd.—An official report of this company of London, England, shows that during seven months ending April 30 the mine at Phoenix produced about 31,000 tons of ore. Shipments prior to September 30 averaged approximately 0.08 oz. gold and 0.3 oz. silver per ton, and 1.4 per cent. copper. Preparations are being made to maintain an output of more than 10,000 tons per month.

Consolidated Mining and Smelting Company of Canada—This company, which owns the Trail smelter and large mines at Rossland and in East Kootenay, is extending its holdings in the Boundary district where for a year it has operated under lease and bond the Snowshoe mine at Phoenix. Recently it secured between 20 and 30 claims situated in Phoenix camp, near the Granby Company's mines.

BRITISH COLUMBIA—QUEEN CHARLOTTE ISLANDS

Ikeda Bay Mining Company—Japanese fishermen fishing off Moresby island of the Queen Charlotte group last year found float copper ore. Prospecting back from what is now Ikeda bay they discovered a copper-bearing ledge. A company was formed in Japan and mining operations undertaken. An old stern-wheel steamer has been beached and converted into a camp. Beside sleeping quarters for the company's 86 men (including officials and resident physician) there are on the steamer an assay office and a small hospital. There are 13 mineral claims in the group, each named after a Japanese flower, commencing with the Chrysanthemum claim. There is a paystreak of high-grade copper ore in the ledge and about 1200 tons of roughly sorted ore are waiting shipment to a Vancouver Island smelter. A wharf 160 ft. long has been built and construction of a tramway to the mine is in progress. The success of the Japanese has attracted attention to Moresby island which is being extensively prospected.

BRITISH COLUMBIA—SLOCAN DISTRICT

Rambler-Cariboo Mines, Ltd.—At the annual meeting held recently at Kaslo, the old officers were re-elected. Shipment of ore from the mine has been resumed after nearly three years of practically no production.

BRITISH COLUMBIA—TEXADA ISLAND

Marble Bay—Labor troubles at the mine having been adjusted, shipment of ore to the smelter at Tacoma, Wash., has been resumed. The output runs from 1000 to 1200 tons per month. The mine is owned by the Tacoma Steel Company.

BRITISH COLUMBIA—WEST KOOTENAY..

Receipts of Ore—Shipments of ore received by Kootenay smelters during five months ending May 31 amounted to 108,072 tons.

NOVA SCOTIA

Dominion Iron and Steel Company—The suit of this company to recover damages for breach of agreement to furnish coal against the Dominion Coal Company is now before the court at Sydney, all endeavors for an amicable settlement having failed. The amount involved is probably larger than in any case ever tried in a Canadian Court.

ONTARIO—COBALT DISTRICT

Ore shipments—Shipments of ore from Cobalt for the week ending July 27 were as follows: Buffalo, 60,000 lb.; Coniagas, 312,000; Hudson Bay, 45,170; La Rose, 80,000; Nipissing, 60,975; Trethewey 50,300; total 563,275 pounds.

Cobalt Lake—No. 5 shaft has been timbered and the work of sinking is proceeding. Drifting will commence at the 93-ft. level. On No. 4 shaft there is a drift of 38 ft. along the vein and 20 ft. under the lake, no trouble being caused by water.

Foster—About 80 men are working. Shaft No. 5 is down 100 ft. and No. 6, 67 ft. These shafts 405 ft. apart on the surface are now connected and altogether 600 ft. of underground work has been done. It is reported that a new orebody has been found.

ONTARIO—HASTINGS COUNTY

Richardson Gold—This mine, Eldorado, has been purchased by G. S. Lockwood, who will pump out the old shaft and proceed with development work. Reduction works will be erected if the showing of ore warrants it.

ONTARIO—MOOSE MOUNTAIN RANGE

Moose Mountain Iron Mines—The Canadian Northern Railway has been completed to Moose mountain, in Hutton township, about 30 miles north of Sudbury, Ont. It is expected that shipments of iron ore to Canadian blast furnaces will shortly be made. The mines are controlled by the Canadian Northern inter-

ests. About 30 miles further to the north there is another rich deposit.

ONTARIO—PORT ARTHUR DISTRICT

Hanson Consolidated Silver Mines, Ltd.—Active operations have been carried on for some time at the East End and West End Silver Mountain property, comprising about 1360 acres, by this company. The main shaft at the East End is down about 800 ft. and at the West End mine a depth of 185 ft. has been reached, at which level a tunnel is being run to connect the shafts, which are about 3000 ft. apart. Good ore has been encountered all along and stope pockets have been placed at convenient points which now contain about 100,000 tons of ore. The ore crusher has four batteries of five stamps each and its capacity is 52 tons per day. The plant is in full operation and additional machinery has been contracted for, the present plant being inadequate to deal with the ore produced. Captain Pritchard, superintendent, is in charge of operations.

QUEBEC

International Portland Cement Company—A record output was made in July, 62,946 bbl. being shipped as compared with 60,502 bbl. in June. A half-yearly dividend of 6 per cent. has been declared.

Cuba

Spanish-American Iron Company—This new corporation of West Virginia, the \$2,400,000 stock of which is all owned by the Pennsylvania Steel Company, has been formed to develop 27,870 acres of iron-ore lands at Mayari, near Nipe bay in the province of Oriente. The property is located on the north coast of Cuba and is estimated to contain 600,000,000 tons of iron ore. The company is constructing a standard-gage railroad which will connect the harbor terminals with the mines. Electrically operated drying and storage plants, and loading and discharging docks will be provided. The ore is at the surface and is to be mined by steam shovels, and is said to be low in phosphorus. The Pennsylvania Steel Company and the Maryland Steel Company have contracted to take a minimum of 1,000,000 tons of ore per year.

Mexico

DURANGÓ

Boca de Cobre—This property, located at San Luis de Cordero, Partido de Nazas, is making daily shipments of 10 tons of ore to the Torreón smelter. The ore contains silver and about 5 per cent. copper.

CHIHUAHUA

Greene Gold-Silver Company—The general offices of this company have been removed from Temosachic to Concheno, where the principal mining operations are carried on.

Metal, Mineral, Coal and Stock Markets

Current Prices, Market Conditions and Commercial Statistics of the Metals, Minerals and Mining Stocks

QUOTATIONS FROM IMPORTANT CENTERS

Coal Trade Review

New York, Aug. 7—The outlook in the eastern coal trade is encouraging especially in the far East and other points of the Atlantic seaboard. Most contractors are calling for winter supplies and some of the shoalwater port consumers are making strenuous efforts to get coal into their bins. This condition is about a month ahead of the usual time for stocking and producers were not entirely prepared for the extraordinary demand upon their shipping facilities. The higher grades of coal are in greatest demand, although even the lower grades are sharing the general condition. Perfect weather has to some extent relieved the situation in the East and vessels have been enabled to make quick trips with no time lost in loading or discharging. This has put considerable coal into the hands of consumers but the demand is still strong in the far East.

Lake traffic has become congested at the upper ports, with the result that at Lake Erie ports coal has accumulated and is moving slowly. With the ore strike settled the boats will come down and relieve the congestion on their up-trip.

In the South the Alabama railroads are taking considerable coal for winter use, which keeps the Southern market in an active condition. When the demand starts among consumers, the railroads will be in a position to furnish plenty of cars.

The threatened strike in the coalfields in the Pittsburg district is discussed in the Pittsburg letter.

Chicago trade is active in bituminous coal, especially for the better grades used in the harvester trade. Some September business is being booked and prices continue firm but not high.

The anthracite trade is dull for new business except in small steam sizes which are a little scarce and in good demand.

COAL-TRAFFIC NOTES

Shipments of coal and coke originating on the Pennsylvania Railroad Company's lines east of Pittsburg for the year to July 27, were as follows in short tons:

	1906.	1907.	Changes.
Anthracite.....	2,434,666	3,218,472	I. 783,806
Bituminous.....	17,807,632	21,627,845	I. 3,820,213
Coke.....	7,218,488	7,994,094	I. 775,606
Total.....	27,460,786	32,840,411	I. 5,379,625

The total increase this year was 19.6 per cent.

Coal tonnage originating on the lines of

the Southern Railway for the five months ending May 31 is reported as follows: Tennessee district, 595,980; Alabama district, 948,761; total, 1,544,741 short tons.

Shipments of Broad Top coal over the Huntingdon & Broad Top Railroad for the year to Aug. 3 were 592,185 tons.

New York

ANTHRACITE

August 7—The market for prepared sizes shows no activity and little interest is displayed. However, small steam sizes are in good demand and while at present the supply is sufficient to take care of the wants of consumers, this condition is not expected to last when the fall and winter demand sets in, and it is predicted that small steam sizes will sell at a premium. Vessels in the anthracite trade are scarce along the Atlantic seaboard and especially so on the Great Lakes. At Buffalo there is considerable congestion, but now that the ore boats are coming down the lake with ore it is expected that the lower ports will be relieved. Prices are as follows: Broken, \$4.65; egg, stove and chestnut, \$4.90; small sizes remain at \$3 for pea; \$2.50 for buckwheat; \$1.90@2 for rice and buckwheat No. 2; \$1.50@1.60 for barley; all f.o.b. New York harbor.

BITUMINOUS

Along the Atlantic Seaboard considerable strength is shown and the fall demand has apparently commenced and is expected to continue. There are considerably more vessels available for this trade, and since shippers are well supplied with orders they have a fairly good choice of points to which to charter. The far East is calling for more coal than any other consuming territory. This condition is due to the shortage of vessels earlier in the season, and to the fact that consumers are recognizing prevailing conditions.

Trade along the Sound is active and the demand seems to be growing. Discharging facilities in this territory are improving which helps conditions materially. New York harbor shows a better demand although prices have not been affected; good grades of steam coal still bring \$2.60 f.o.b. New York harbor shipping ports.

All-rail trade is slightly better; producers are having so many demands made upon them from other points that they are not urging this trade to take on coal. Transportation from mines to tide is up to schedule and car supply meets all demand. In the coastwise vessel market,

vessels are in better supply and although they are asking slightly higher rates, the freight schedule remains the same. We quote current rates from Philadelphia to Boston, Salem and Portland, \$1.10; to Lynn, Newburyport, Bath, Gardiner and Bangor, \$1.25; to Portsmouth, \$1.15; to the Sound 90c.; with towages where usual.

Birmingham

Aug. 5—Alabama coal producers are shipping coal to large railroad systems and other consumers, who are preparing themselves for the winter. The Central of Georgia, the Seaboard Air Line, the Atlantic Coast Line and other railroads have been stocking coal in great quantities lately. As a consequence, Alabama mines are working on full time. Every miner applying for work is employed. In the southeastern and in the western part of Jefferson county and in Walker county, to which points railroads do not yet reach, coal is being stored near the line of the railroad mapped out, and when the tracks have been laid, traffic can be started at once. The railroad will reach this district about Aug. 20.

While much coal is being shipped from this State to New Orleans and into Louisiana, it is not believed that the proposed Pennsylvania shipments of independent coal can do any more harm than has been done heretofore. The Monongahela company has been shipping large quantities of coal for the past few years into New Orleans. Much coal goes from this section into Louisiana by rail. A good demand for coke prevails, but no further business for this product is being sought by the manufacturers in this district.

Chicago

Aug. 5—The wholesale coal market continues strong in comparison with previous summers and it is the general opinion of the trade that it will continue so to the end of August. Already September demands are being anticipated by some dealers and consumers. General consumption of all grades of bituminous coals is heavy, the harvester trade, though starting late because of the backwardness of the season, being very large. For industrial and railroad uses the demand is also heavy. Chicago continues to be less troubled by demurrage coal than for many years. Prices are not high, but continue firm and have not sagged appreciably since the beginning of the summer.

Fine coals are still leading for steam purposes. In the harvester trade the better grades of lump are chiefly in demand.

Illinois and Indiana run-of-mine brings \$1.65@2, lump and egg, \$2@2.75 and screenings \$1.25@1.65. Brazil block is in demand at \$2.80.

Eastern coals are firmer, there being but little sagging in prices from demurrage. Smokeless is steady though not in heavy demand at \$3.15@3.25 for run-of-mine, and \$3.65 for lump. Hocking Valley brings \$3.15. Pittsburg No. 8 and Youghiogheny are in light demand but not over-supply, the former bringing \$2.90 for 1¼-in. and the latter \$3.20 for ¾-in.

Anthracite is selling well though most orders now being filled are at July prices.

Cleveland

Aug. 6—The coal market shows no sign of improvement. Conditions at the docks govern the situation. At Lorain the tracks are loaded with coal, which boats are not moving fast enough to clear. The mines are producing heavily, and while the season rate of 50c. on slack is well maintained, heavy arrivals here are necessitating sacrifices in prices.

The following rates are quoted: No. 8 slack 50@60c. at mine; f.o.b., Cleveland, \$1.45@1.50; Cambridge, 50c. at mine, or \$1.40 Cleveland. Goshen slack is quoted at \$1.75@1.80 on track here. Demurrage coal is bringing any price from \$1.20 to \$1.40. No. 8 mine-run is quoted 95c. at mine; ¾-in. lump, \$1.05 at mine.

Despite recent talk of a coal famine in the Northwest, it is stated by local shippers that the vessel movement has been so heavy up-lake that railroads are unable to remove congestion at the upper lake docks. A number of local shippers are under embargo on account of the condition of their yards in Cleveland, railroads refusing to deliver more coal until stocks on hand are diminished. Dealers in general have taken advantage of present prices, which are much less than last year, to load up consumers under contract, and the result is that the market is very much congested. A prominent local dealer stated today that there is enough coal in the city to last a full month and more for all local use, should the supply at the mines be shut off.

Conditions at the upper lake docks are such that if a clearance is not effected soon, the local market may be swamped with return shipments.

Pittsburg

Aug. 6—The curtailment of production of the Pittsburg Coal Company due to the strike of miners in the Youghiogheny field of the Pittsburg district, is interfering to a certain extent with shipments to the lake ports for the northwestern markets. As told last week the trouble is over an alleged violation of the wage agreement. Although the company denies

that it has not complied with the provisions of the scale, it has agreed to correct any evils that are shown to exist. Despite this offer the officials of the United Mine Workers refused to call off the strike but threatened to extend it to all the mines of the company. Finally they agreed to meet the representatives of the company in conference yesterday and file a list of grievances. Owing to the illness of President Feehan, of the miners' organization, the conference was postponed and may be held some day this week. The Pittsburg-Buffalo Company continues to increase its production and all of its mines are breaking records. More miners are being employed and the outlook is for a banner year. Railroad cars are being furnished to meet all requirements and there is no indication of a shortage. Prices remain firm on the basis of \$1.20 a ton for mine-run at the mine. Outside of the trouble at the Youghiogheny mines of the Pittsburg Coal Company all the mines in the district, both river and rail, are in full operation.

Connellsville Coke—There is but little coke available for any delivery this year and none at all for spot shipment. Prices have advanced and strictly Connellsville furnace coke is quoted at \$2.75@3 and foundry at \$3.25@3.50 a ton. The *Courier* in its summary for the week gives the production in both fields at 404,997 tons. The shipments amounted to 14,098 cars distributed as follows: To Pittsburg, 4666 cars; to points west of Connellsville, 8468 cars; to points east of Connellsville, 964 cars.

Foreign Coal Trade

Exports of coal and coke from the United States for the six months ending June 30, are reported as below by the Bureau of Statistics of the Department of Commerce and Labor:

	1906.	1907.	Changes.
Anthracite.....	948,403	1,213,354	I. 264,951
Bituminous.....	3,347,406	4,454,888	I. 1,107,482
Total coal.....	4,295,809	5,668,242	I. 1,372,433
Coke.....	376,786	434,636	I. 57,850
Total.....	4,672,595	6,102,878	I. 1,430,283

These figures do not include coal bunkered, or sold to steamships engaged in foreign trade. The coke exported went chiefly to Mexico and eastern Canada; the distribution of the coal was as follows:

	1906.	1907.	Changes.
Canada.....	3,054,889	4,133,817	I. 1,078,928
Mexico.....	512,531	585,528	I. 72,997
Cuba.....	368,798	400,669	I. 31,871
Other W. Indies.....	170,804	229,530	I. 58,726
Europe.....	48,701	54,496	I. 5,795
Other countries.....	110,086	264,202	I. 154,116
Total.....	4,295,809	5,668,242	I. 1,372,433

The exports to Europe were chiefly to Italy; those to other countries, to South America. The exports to Canada—72.9 per cent. of the total in 1907—were, in detail, as follows:

	1906.	1907.	Changes.
Anthracite	923,277	1,194,429	I. 271,152
Bituminous.....	2,131,612	2,939,388	I. 807,776
Total.....	3,054,889	4,133,817	I. 1,078,928

There was a large increase this year, in both anthracite and bituminous coals.

Imports of coal and coke into the United States for the six months ending June 30, were, in long tons, as follows:

	1906.	1907.	Changes.
Great Britain.....	66,564	20,378	D. 46,186
Canada.....	805,838	679,583	D. 126,255
Japan.....	11,726	81,354	I. 69,628
Australia.....	94,714	168,865	I. 74,151
Other countries.....	4,150	1,287	D. 2,863
Total coal.....	982,992	951,467	D. 31,525
Coke.....	62,171	72,873	I. 10,702
Total.....	1,045,163	1,024,340	D. 20,823

Some Nova Scotia coal comes to New England ports, but the bulk of the imports of coal is on the Pacific coast. The coke is chiefly from British Columbia, though a little comes from Germany.

Iron Trade Review

New York, Aug. 7—With the settlement of the strike in the Minnesota ore regions and at the ore docks the shortness of ore will not be as serious as was feared at first. Laborers are returning to work and ore is being sent down the Lakes as rapidly as possible. The furnaces in the Pittsburg district are now going off basic and are making bessemer iron, for which there is a good demand. The leading independent interest is in the market for bessemer iron instead of being a seller.

In the South the demand is not particularly strong and furnaces are not booking much future business. Western trade is also quiet, and while prices are not suffering a material decline, still there seems to be a tendency to slightly cheapen iron. Foundry iron is quiet at present, but it is believed that consumers will soon be in the market for fall and winter iron, which will strengthen the market for this class of iron.

Steel in billets, structural shapes and rails continues in good demand.

July orders for structural steel taken by the American Bridge Company aggregated 46,000 tons. With the exception of July, 1905, when orders for 53,000 tons were recorded, this is the largest business in that month in the history of the trade. Orders taken by others than the United States Steel Corporation, which controls the American Bridge Company, brought the total July business in structural shapes up to about 100,000 tons.

Iron and Steel Exports—Exports of iron and steel, including machinery, from the United States for June, and the six months ended June 30, are valued as below by the Bureau of Statistics of the Department of Commerce and Labor:

	1906.	1907.	Changes.
June.....	\$14,085,003	\$17,226,259	I. \$3,141,256
Six months.....	\$4,723,766	\$4,191,359	I. 9,467,598

The total increase for the six months

was 10.1 per cent. The leading items of export for the five months were, in long tons:

	1906.	1907.	Changes.
Pig iron.....	34,850	41,645	I. 6,795
Billets, ingots & blooms	129,433	50,648	D. 78,785
Bars.....	43,437	49,406	I. 5,969
Rails.....	179,726	142,808	D. 36,918
Sheets and plates.....	50,092	67,136	I. 17,044
Structural steel.....	52,410	65,323	I. 12,913
Wire.....	88,677	75,456	D. 13,221
Nails and spikes.....	34,440	29,245	D. 5,195

Billets, rails and wire continue to lose ground while structural steel, sheets and plates made substantial gains.

Iron and Steel Imports—Imports of iron and steel, including machinery, in the United States for June and the six months ending June 30, are valued by the Bureau of Statistics as follows:

	1906.	1907.	Changes.
June.....	\$2,897,622	\$3,272,259	I. \$ 374,637
Six months.....	15,633,095	21,534,646	I. 5,901,551

The increase for the six months was 27.4 per cent. The chief items of the iron and steel imports for the six months were, in long tons:

	1906.	1907.	Changes.
Pig iron.....	147,550	331,144	I. 183,594
Scrap.....	9,848	12,155	I. 2,307
Ingots, blooms, etc.....	10,699	7,890	D. 2,809
Bars.....	16,281	16,957	I. 676
Wire-rods.....	9,038	9,042	I. 4
Tin-plates.....	24,225	30,980	I. 6,655

The imports increased considerably during June, especially in pig iron.

Iron Ore Movement—Exports and imports of iron ore in the United States for the six months ended June 30 are reported as follows, in long tons:

	1906.	1907.	Changes.
Exports.....	74,784	47,669	D. 27,115
Imports.....	568,211	609,275	I. 41,064

Most of the exports were to Canada. Imports were from Cuba, Spain and Algeria.

Imports of manganese ore for the six months ending June 30 were 110,041 long tons in 1906 and 95,841 tons in 1907; a decrease of 14,200 tons. Most of the ore received comes from Brazil and India.

Birmingham

Aug. 5—The Alabama pig-iron market is quiet and the make is not as brisk as manufacturers would like to see it, both as to quantity and quality. The Sloss-Sheffield Steel and Iron Company has its Philadelphia furnace at Florence, Ala., in blast at last. This furnace, having a capacity of 200 to 250 tons per day, has been thoroughly repaired and a skip hoist added. There are five furnaces still under repair in this district, but it will be some time before these furnaces will all be ready for blowing in.

There is very little spot iron being sold except silvery gray, for which \$23.50 per ton is being paid by the consumers. As to raw material, no improvement is yet noted in this section. The strike in the Mesabi district did not have any effect on the Alabama iron market. Railroad transportation is sufficient for pig iron, cast-iron pipe and similar products, and no complaints are heard from that source.

Ground has been broken for two addi-

tional open-hearth furnaces to be constructed at the Ensley steel plant by the Tennessee Coal, Iron and Railroad Company. This addition to the new steel plant will be completed about the time that the new mills are ready for operation. When all improvements are completed the present capacity will be increased three-fold. There is a strong demand for steel in all shapes and good prices prevail. It is admitted that a strong inquiry has been received as to the probable make next year.

Chicago

Aug. 5—The pig-iron trade continues quiet, sales being chiefly of small lots for delivery within the next five months, with occasional orders for 1908 delivery, but the disposition of the melter is still to hold off from large contracts. There is no pronounced weakening of prices, though iron can be bought now for 50c. less than it brought two weeks ago. Meantime the needs of the melter continue large and it seems only a question of time as to his buying again heavily.

For fourth-quarter delivery Southern No. 2 iron brings \$20@20.50, Birmingham (\$24.35@24.85 Chicago); for the third quarter the price runs 50c@\$1 more, according to the urgency of the shipment. Northern No. 2 iron is quoted at \$24@24.50 for the fourth quarter, with a like premium on early shipments. Lake Superior charcoal iron is firm at \$27@27.25 For first quarter of 1908 delivery, Southern runs \$18@18.50 Birmingham, and Northern \$23.50@24.

Coke is holding well at \$5.75 for 72-hour Connellsville with southern cokes 25@50c. less.

Cleveland

Aug. 6—Reports from the various iron-ore mines up the lakes show shipments during the month of July of 4,849,117 tons, as against 5,762,772 for the July last year; a decrease of 913,665 tons. The shipments for the present season were 17,534,741 tons up to Aug. 1, an increase of 530,373 tons over last year.

Heavy sales of spot delivery pig iron have been recorded during the week past, future delivery sales being light. The following prices are quoted: Bessemer, \$23.90@24.25; No. 1 foundry Northern, \$23.50@24; No. 2, \$23@23.50; No. 3, \$22.50@23; No. 2 Southern, \$23.85@24.85; gray forge, \$22@22.25.

Quotations on coke remain stationary, but a slight improvement in demand for spot shipments is noted.

Philadelphia

Aug. 7—No large business has been reported and even the small order business has fallen off. There are a few inquiries for steel-making pig. The decline in prices on fourth-quarter shipments has not been sufficient to stimulate inquiries to any ex-

tent. Some concerns have reason to look for foundry orders for delivery late this year. The mill people are at work but only here and there are buyers for forge. A few mills have followed the rule all along of not buying far ahead and their managers now believe they will soon be able to buy at still lower prices. The present outlook is not calculated to make consumers hurry. Basic pig is perhaps the strongest on the list. Fair quotations for No. 2 are \$22.50; Forge, \$20; Basic, \$21.50.

Scrap—Some scrap dealers have attracted buyers but only by making prices right from their point of view. Other dealers will not come down from June prices, believing that a fall demand will take all the scrap they can get at good prices. No. 1 steel scrap is bringing \$17. There is very little choice railroad scrap to be had for immediate delivery; old iron rails are offered at \$22.50.

Pittsburg

Aug. 6—The strike in the ore regions is practically over, operations having been resumed at most of the mines in full and at others a few miners have delayed returning, but all are expected to be back at work before the close of the week. All the dock laborers returned to work last week, and the same wages and conditions prevail as before the trouble began. It is variously estimated that the suspension of shipments due to the strike will amount to from 3,000,000 to 4,000,000 tons.

New business in finished iron and steel products is confined to small orders. No contracts of any importance have been placed for over a week. All the mills in the district continue busy on old contracts, and specifications are regarded as unusually good for the dull midsummer season. The merchant pipe and the plate mills have about all the business they can turn out this year. The structural, the steel bars and sheet mills also are well filled, but will have some open capacity later in the year. The Carnegie company has not taken on any new contracts for standard steel rails, but it has about booked its capacity for the year, as its Ohio rail mill is exclusively on billets. This company has been a buyer of billets for some time. During the past 10 days it bought 1000 tons of bessemer billets from the Lackawanna Steel Company, 3000 tons of bessemer billets from the Pennsylvania Steel Company and 1500 tons of open-hearth billets from an eastern producer.

Pig Iron—The United States Steel Corporation succeeded in getting 10,000 tons of bessemer pig iron for August delivery at \$22, Valley furnaces. It had asked for 15,000 tons, but the iron was not available, although it is likely that it may be later, as a number of furnaces have gone off basic iron and are making bessemer. The tonnage will be furnished by the Bessemer Pig Iron Association, as the leading independent producing interest has been a

buyer lately, instead of a seller, and has been inquiring for 5000 tons for August delivery. As the price to the Steel Corporation is regarded as 50c. under the market, the minimum price for third-quarter may be considered as firm at \$22.50, Valley furnaces. The Westinghouse Electric and Manufacturing Company this week bought 200 tons of bessemer for prompt shipment, for which it paid \$22.75. The sale to the Steel Corporation has brought down the average for July, the negotiations having been practically concluded in that month. The average is \$22.41, Valley furnaces, or 84c. below the June average. A reaction is expected in the bessemer pig-iron market and there is not likely to be a decline, at least not during the third quarter. The market for foundry and gray forge is extremely dull and prices are nominal. No. 2 foundry is quoted at \$23.40 and forge at \$22.40, Pittsburg.

Steel—There is an improvement in deliveries of steel billets, but prices remain about the same, bessemer billets being quoted at around \$30 and open hearth at \$31.50@32. Plates remain at 1.70c. and bars at 1.60c.

Sheets—The sheet market is unchanged, black sheets being quoted at 2.60c. and galvanized at 3.75c. for No. 28 gage.

Ferro-Manganese — Prices for prompt shipment continue around \$65 and for late delivery \$61@62 is quoted.

London

July 13—Exports of iron and steel, and of machinery, from Great Britain for the six months ended June 30, are valued by the Board of Trade returns as follows:

	1906.	1907.	Changes
Iron and Steel...	£18,418,116	£23,658,945	I. £5,240,829
Machinery	12,751,219	14,931,703	I. 2,180,484
New Ships.....	5,811,192	5,571,847	D. 239,345

Total..... £36,980,527 £44,162,495 I. £7,181,968

The total increase was 19.4 per cent. The leading items of the iron and steel exports were, in long tons:

	1906.	1907.	Changes.
Pig iron.....	706,466	1,061,275	I. 354,807
Wrought iron.....	94,706	109,003	I. 14,297
Rails.....	191,909	220,461	I. 28,552
Plates.....	119,899	162,273	I. 42,374
Sheets.....	217,354	244,038	I. 26,684
Steel shapes, etc.....	143,031	174,845	I. 31,814
Tin-plates.....	177,288	208,273	I. 27,985

The total quantities of iron and steel were 2,107,435 tons in 1906, and 2,692,682 tons in 1907; an increase of 585,247 tons. Exports of pig iron to the United States this year were 329,552 tons, an increase of 115,178 tons over the same period in 1906; of tin plates, 33,197 tons, an increase of 8423 tons.

Imports of iron and steel and of machinery into Great Britain for the six months were valued as follows:

	1906.	1907.	Changes.
Iron and steel...	£4,722,453	£3,249,435	D. £1,473,018
Machinery.....	2,639,228	2,742,872	I. 103,645

Total..... £7,361,681 £5,992,308 D. £1,369,373

The total decrease was 18.6 per cent. The chief items of the imports were, in long tons:

	1906.	1907.	Changes.
Pig iron.....	41,530	39,628	D. 1,902
Wrought iron.....	61,348	30,201	D. 31,147
Steel billets, etc.....	307,153	149,614	D. 157,539
Bars and shapes.....	32,679	7,168	D. 25,511
Structural steel.....	84,881	42,197	D. 42,684

The total quantities of iron and steel were 721,199 in 1906, and 415,222 tons in 1907; a decrease of 305,977 tons.

Imports of iron ores into Great Britain for the six months were, in long tons:

	1906.	1907.	Changes.
Manganiferous ores.	175,989	183,731	I. 7,742
Iron ores.....	3,885,879	3,716,162	D. 169,717

Total..... 4,061,863 3,899,893 D. 161,970

Of the ores imported this year 183,731 tons of manganiferous, and 2,874,176 tons of iron ores came from Spain.

Cartagena, Spain

July 15—Messrs. Barrington & Holt report a weaker market, owing to light demand for early shipment. Mines are busy, however, on contracts.

For iron ores prices are, f.o.b. shipping port: Ordinary 50 per cent. ore, 9s. 9d. @ 10s. 3d.; special low phosphorus, 10s. 9d.; specular ore, 55 per cent., 12s. 6d. For manganiferous ores, same delivery, No. 3 ore, 35 per cent. iron and 12 manganese is 14s. 6d.; No higher grades on the market.

Pyrites—The price of iron pyrites, 40 per cent. iron and 43 sulphur, is 11s. 6d. per ton, f.o.b. shipping port.

Metal Market

NEW YORK, Aug. 7.

Gold and Silver Exports and Imports

At all United States Ports in June and year.

Metal.	Exports.	Imports.	Excess.
Gold:			
June 1907..	\$23,872,140	\$ 2,140,769	Exp. \$21,731,371
" 1906..	3,256,392	2,369,080	" 887,312
Year 1907..	36,300,732	21,444,074	" 14,856,658
" 1906..	31,610,714	62,537,778	Imp. 30,927,064
Silver:			
June 1907..	5,360,599	3,448,712	Exp. 1,911,887
" 1906..	4,518,386	3,760,012	" 758,374
Year 1907..	33,437,227	22,367,777	" 11,069,450
" 1906..	29,219,209	23,676,828	" 5,542,381

These statements cover the total movement of gold and silver to and from the United States. These figures are furnished by the Bureau of Statistics of the Department of Commerce and Labor.

Gold and Silver Movement, New York

For week ending Aug. 3 and years from Jan. 1.

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week.....	\$513,630	\$ 103,100	\$ 1,413,412	\$ 59,551
1907.....	29,377,755	6,589,130	28,066,469	1,178,559
1906.....	5,925,003	48,121,932	36,577,318	1,290,796
1905.....	63,733,202	942,558	19,051,714	2,317,316

Exports of gold for the week were chiefly to Paris; of silver to London. Imports for the week, both gold and silver, were from the West Indies and South America.

The joint statement of all the banks in the New York Clearing House for the week ending Aug. 3 shows loans \$1,126,950,700, a decrease of \$3,787,000; deposits,

\$1,090,302,400, a decrease of \$3,529,500, as compared with the previous week. Reserve accounts show.

	1906.	1907.
Specie.....	\$195,547,200	\$210,339,700
Legal tenders.....	87,725,300	71,959,100
Total cash.....	\$283,272,500	\$282,298,800
Surplus.....	\$14,122,675	\$ 7,473,200

The surplus over legal requirements this year shows a decrease of \$1,785,475, as compared with the previous week.

Specie holdings of the leading banks of the world, Aug. 3, are reported as below, in dollars:

	Gold.	Silver.	Total.
Ass'd New York.....	.....	.....	\$210,339,700
England.....	\$179,198,410	.....	179,198,410
France.....	560,146,975	\$195,116,175	755,263,150
Germany.....	162,835,000	45,125,000	207,960,000
Spain.....	77,955,000	128,900,000	206,855,000
Netherlands.....	28,848,500	28,721,500	57,570,000
Belgium.....	15,600,000	7,800,000	23,400,000
Italy.....	168,410,000	22,582,000	190,992,000
Russia.....	584,480,000	33,540,000	618,020,000
Aust.-Hungary.....	128,100,000	61,930,000	190,030,000
Sweden.....	20,695,000	.....	20,695,000

The banks of England and Sweden report gold only. The New York banks do not separate gold and silver in their reports. The European statements are from the cables to the *Commercial and Financial Chronicle* of New York.

The Treasury Department estimate of the money in the United States on Aug. 1 is as follows:

	In Treasury.	In Circul'n.
Gold coin (inc. bullion in Treasury).....	\$ 213,201,144	\$ 566,036,725
Gold certificates.....	80,469,480	614,461,389
Silver dollars.....	7,036,863	81,255,667
Silver certificates.....	10,251,563	463,816,437
Subsidiary silver.....	8,587,949	122,248,618
Treasury notes of 1890..	9,950	5,881,050
U. S. notes.....	5,576,546	341,104,470
Nat. Bank notes.....	16,876,682	586,519,204
Total.....	\$342,010,177	\$2,781,323,560

Population of the United States, Aug. 1, 1907, estimated at 86,193,000; circulation per capita, \$32.27. For redemption of outstanding certificates an exact equivalent in amount of the appropriate kinds of money is held in the treasury, and is not included in the account of money held as assets of the Government. This statement of money held in the treasury as assets of the Government does not include deposits of public money in national-bank depositaries to the credit of the treasurer of the United States, amounting to \$145,709,521. The amount in circulation Aug. 1 was \$133,018,696 less than on July 1, but \$23,974,122 more than on Aug. 1 of last year.

Shipments of silver from London to the East are reported by Messrs. Pixley & Abell as follows, for the year to July 25:

	1906.	1907.	Changes.
India.....	£ 10,415,963	£7,087,574	D. £ 3,328,389
China.....	213,700	.....	D. 213,700
Straits.....	1,750	544,012	I. 542,262
Total.....	£ 10,631,413	£7,631,586	D. £ 2,999,827

Receipts for the week were £7000 from the West Indies and £141,000 from New York, a total of £148,000. Exports were £351,400, all to India.

The movement of gold and silver in France for the six months ended June 30 is reported as follows:

	1906.	1907.
Gold:		
Imports....	Fr. 328,222,000	Fr. 171,016,000
Exports.....	85,790,000	73,963,000
Excess, imports....	Fr. 242,432,000	Fr. 97,053,000
Silver:		
Imports.....	82,186,000	83,424,000
Exports.....	74,600,000	80,598,000
Excess, imports....	Fr. 7,586,000	Fr. 2,826,000

Imports of copper and nickel coins were 52,000 fr., face value in 1906, and 48,000 fr. in 1907. Exports were 137,000 fr. in 1906, and 184,000 fr. this year.

Prices of Foreign Coins

	Bid.	Asked.
Mexican dollars.....	\$0.54 1/2	\$0.56
Peruvian soles and Chilean.....	0.49 1/2	0.50 1/2
Victoria sovereigns.....	4.85	4.87
Twenty francs.....	3.80	3.86
Spanish 25 pesetas.....	4.78 1/2	4.80

SILVER AND STERLING EXCHANGE.

AUG.	Sterling Exchange.	Silver.		AUG.	Sterling Exchange.	Silver.	
		New York, Cents.	London, Pence.			New York, Cents.	London, Pence.
1	4.8700	69 1/2	32 1/2	5	4.8660	69 1/2	....
2	4.8665	69 1/2	32 1/2	6	4.8670	69 1/2	32 1/2
3	4.8670	69 1/2	32 1/2	7	4.8660	69 1/2	32 1/2

New York quotations are for fine silver, per ounce Troy. London prices are for sterling silver, 0.925 fine.

Other Metals

AUG.	Copper.			Tin.	Lead.	Spelter.	
	Lake, Cts. per lb.	Electrolytic, Cts. per lb.	London, £ per ton.			Cts. per lb.	Cts. per lb.
1	20 1/2 @21	19 1/2 @20	86 1/2	40	5.25	5.80 @5.90	5.65 @5.75
2	20 1/2 @21	19 1/2 @20	85 1/2	39 1/2	5.25	5.80 @5.90	5.65 @5.75
3	20 @20 1/2	19 1/2 @19 1/2	.....	39 1/2	5.25	5.80 @5.90	5.65 @5.75
5	20 @20 1/2	19 1/2 @19 1/2	.....	39 1/2	5.25	5.80 @5.90	5.65 @5.75
6	20 @20 1/2	19 @19 1/2	84	39 1/2	5.25	5.80 @5.90	5.65 @5.75
7	20 @20 1/2	19 @19 1/2	83	38 1/2	5.25	5.80 @5.90	5.65 @5.75

London quotations are per long ton (2240 lb.) standard copper, which is now the equivalent of the former g.m.b.'s. The New York quotations for electrolytic copper are for cakes, ingots or wirebars, and represent the bulk of the transactions as made with consumers, basis, New York, cash. The price of cathodes is 0.125c. below that of electrolytic. The lead prices are those quoted by the American Smelting and Refining Company for near-by shipments of desilverized lead in 50-ton lots, or larger. The quotations on spelter are for ordinary western brands; special brands command a premium.

Copper—The market continues dull, and without appreciable change in condition. Sales have been small, and prices are largely nominal. The expectation of an early revival in business at the present level of prices is being abandoned. There

does not seem to be any figure in sight at which consumers can be interested, and this is perhaps the only reason why relatively high nominal quotations are still the rule. While exact figures for consumption cannot be obtained, there seems to be no reason to doubt that it has recently shown a decided falling off; and it is reported that good sized quantities of copper are accumulating at the different producing centers. The market closed flat at 20@20 1/2c. for lake; 19@19 1/2c. for electrolytic in cakes, wirebars or ingots, and 19@19 1/4c. for casting copper.

Reports which have been published in some of the New York papers as to "conferences" of copper producers are absolutely without foundation.

In London, the standard market shows the activity of speculators, who are discounting a more severe drop in refined sorts, and the close is almost at the lowest, being cabled as £83 for spot and £80 15s. for three months.

Refined and manufactured sorts are quoted: English tough, £85; best selected, £89; strong sheets, £95.

Statistics for the second half of July show an increase of 200 tons.

Exports of copper from New York for the week were 1271 tons. Our special correspondent reports the shipments from Baltimore for the week at 775 long tons.

Copper Sheets—The base price of copper sheets is now 28c. per pound.

Copper Wire—The base price for sizes from No. 0000 to No. 8 is now 24 1/4@25 1/4c. per pound.

Tin—Prices here are now on about a parity with foreign quotations, the market on the other side having declined from day to day. Quotations from London are cabled at the close at £174 15s. for spot and £174 5s. for three months.

Business in the domestic market is of small volume, the metal being quoted at 38.50c. at the close today.

Exports of tin from the Federated Malay States for the four months ended April 30 were: Perak, 8187; Selangor, 5067; Negri-Sembilan, 1386; Pahang, 623; total, 15,263 long tons. This is a decrease of 204 tons, or 1.3 per cent.

Lead—The quotation for desilverized lead remains unchanged at 5.25c. New York. Brands outside of the control of the American Smelting and Refining Company can be bought at a considerable discount, both in this and the St. Louis markets, the quotation for Missouri lead in St. Louis having been as low as 5 cents.

The close from London is cabled as £19 2s. 6d. for Spanish lead and £19 5s. for English lead; but, considering the weakness in all other metals, lead is holding its own astonishingly well.

St. Louis Lead Market—The John Wahl Commission Company reports as follows: Lead is dull. Missouri brands

are obtainable at 4.97 1/2@5c., and are salable only in very limited quantities.

Spanish Lead Market—Messrs. Barrington & Holt report from Cartagena, Spain, under date of July 22: The price of pig lead has been 97 reales per quintal; silver, 14 reales per ounce; exchange, 28.20 pesetas to £1. The price of lead, on current exchange, is equal to £19 12s. 11d. per long ton, f.o.b. Cartagena. Exports for the week were 33 tons desilverized to Marseilles and 312 tons argentiferous lead to London.

Spelter—Consumers, being well supplied, are holding off, and on this account the market has a very dull appearance. Prices are slightly lower, and the close is quoted at 5.80 to 5.90c. New York and 5.65@5.75c. St. Louis.

A severe break occurred in the London market, where the quotation declined daily throughout the week, closing at the lowest, the quotations being cabled at £22 for good ordinaries and £22 5s. for specials.

Zinc Sheets—The base price has again been reduced 25c., and is now \$8.10 per 100 lb.—less discount of 8 per cent.—f.o.b. cars at Lasalle and Peru, in 60-lb. cases for gages No. 9 to 22, both inclusive; widths from 32 to 60 in., both inclusive; lengths from 84 to 96 in., both inclusive. The freight rate to New York is 27.50c. per 100 lb.

Spanish Zinc Ore Market—Messrs. Barrington & Holt report from Cartagena, Spain, under date of July 22, that the market is quiet. Exports for the week were 900 tons blende to Antwerp.

Silesian Spelter Market—Paul Speier writes from Breslau under date of July 27 that the zinc market is in uncertain state on account of a marked tendency on the part of consumers, especially galvanizers, to hold aloof from the market. Prices at points in Upper Silesia vary from 47.50@49.50 marks per 100 kg. (5.14@5.36c. per lb.) Zinc dust 47.85@48.50 marks per 100 kg. (5.16@5.24c. per lb.) f.o.b. Stettin.

Exports and imports of zinc and zinc products from Germany for the first six months of 1906 and 1907 were as follows in metric tons.

	Imports.		Exports.	
	1906.	1907.	1906.	1907.
Spelter.....	16,560	14,515	28,928	31,269
Zinc sheets.....	38	71	7,397	9,049
Zinc scrap.....	1,065	604	2,485	3,358
Zinc ore.....	93,215	88,205	21,498	14,670
Zinc dust.....	.....	498	.....	1,163
Zinc oxide.....	.....	3,174	.....	8,708
Lithophone.....	800	1,035	3,671	4,401

There was a decrease in imports, but a gain in exports.

Antimony—The market shows no signs of life either here or abroad. There seems to be no buying even at the prevailing low prices. Quotations are 11@11 1/4c. for Cookson's; 9c. for Hallett's; and 9 3/4@10c. for ordinary brands.

Nickel—For large lots, New York or other parallel delivery, the chief producer quotes 45@50c. per lb., according to size

and terms of order. For small quantities prices are 50@65c., same delivery.

Quicksilver—Current prices in New York are lower, at \$40 per flask of 75 lb. for large quantities and \$41 for smaller orders. San Francisco orders are \$37.50@38.50 per flask, according to quantities. for domestic orders, and \$36.50@37 for export. The London price is £7 per flask, but £6 16s. 3d. is quoted by jobbers.

Platinum—There was no change in the platinum market during the past week. The demand continues good and there seems to be no shortage of supplies. Owing to a typographical error, the price of hard platinum was reported last week at \$29.50 per oz.; this should have been \$30.50. Prices are quoted as follows: Ordinary metal, \$28; hard metal, \$30.50; scrap is quoted at \$22@23 per ounce.

Cadmium—Paul Speier reports from Breslau, Germany, that the cadmium market is quiet; first quality cadmium guaranteed 99.5 per cent. is quoted at 1175@1250 marks per 100 kg., equal to \$1.27@1.35 per pound.

Minor Metals—For minor metals and their alloys, wholesale prices are, f.o.b. works:

	Per Lb.
Cadmium, 99.5% f. o. b. Hamburg....	\$1.27@1.35
Chromium, pure (N. Y.).....	80c.
Copper, red oxide.....	50c.
Ferro-Chrome (60).....	9c.
Ferro-Chrome (7-9% carbon, per lb. Cr.)	10½c.
Ferro-Chrome (66-71% Cr., 6% C.)....	12c.
Ferro-Chrome (66-71% Cr., 6.5% C.)....	11½c.
Ferro-Chrome (60-70% Cr., 1% C. or less)	38c.
Ferro-Molybdenum (50%).....	\$1.00
Ferro-Titanium (20%).....	80c.
Ferro-Tungsten (37%).....	50c.
Ferro-Vanadium (25-50%, per lb. vanadium contents).....	\$5.50
Magnesium, pure (N. Y.).....	1.50
Manganese, pure 98@99% N. Y.....	75c.
Manganese-Copper (30@70%) N. Y.....	45c.
Molybdenum (98@99%, N. Y.).....	\$1.60
Phosphorus, foreign red (f. o. b. N. Y.)	90c.
Phosphorus, American yellow (f. o. b. Niagara Falls).....	42c.
Tungsten (best) pound lots.....	\$1.32
Ferro-Silicon (50%) spot. Ex. ship Atlantic ports.....	\$110 ton.

Variations in price depend chiefly on size and condition of orders.

Imports and Exports of Metals

Copper—Exports of copper from the United States for the six months ended June 30 are reported as below by the Bureau of Statistics of the Department of Commerce and Labor, in long tons, of 2240 lb. each:

	1906.	1907.	Changes.
Great Britain.....	11,491	8,590	D. 2,901
Belgium.....	1,208	557	D. 651
France.....	17,891	13,971	D. 3,920
Italy.....	3,480	4,244	I. 764
Germany and Holland....	56,151	46,240	D. 9,911
Russia.....	1,039	1,495	I. 456
Other Europe.....	5,930	5,060	D. 870
Canada.....	627	803	I. 176
China.....	1,402	.....	D. 1,402
Other countries.....	62	54	D. 8
Total metal.....	99,281	81,014	D. 18,267
In ores and matte.....	3,453	2,549	D. 904
Total.....	102,734	83,563	D. 19,171

The total decrease was 18.7 per cent. The actual quantity of ore and matte exported this year was 40,755 tons, of which 33,276 tons went to Canada, 7239 tons to

Mexico, the balance to Great Britain and Germany.

Imports into the United States of copper and copper material for the six months ended June 30, with re-exports of foreign metal, are reported as follows; the figures give the contents of all material in long tons of fine copper:

	Metal.	In ore, etc.	Total.
Mexico.....	19,109	9,053	28,162
Canada.....	6,175	2,913	9,088
Great Britain.....	9,429	.....	9,429
Japan.....	2,139	.....	2,139
South America.....	.....	1,853	1,853
Other countries.....	11,084	735	11,769
Total imports.....	47,886	14,534	62,440
Re-exports.....	153	.....	153
Net imports.....	47,733	14,534	62,287
Net imports, 1906.....	37,981	11,423	49,404

The total increase in the net imports was 12,883 tons, or 26.1 per cent. The actual tonnage of ores and matte imported from Mexico this year was 52,771 tons; from Canada and Newfoundland, 58,369 tons; from South America, 14,831 tons.

The exports and net imports compare as follows for the five months:

	1906.	1907.	Changes.
Exports.....	102,734	83,563	D. 19,171
Net imports.....	49,404	62,287	I. 12,883
Excess, exports.....	53,330	21,276	D. 32,054

This shows a decrease this year of 60.1 per cent. in the excess of exports.

Tin—Imports of tin into the United States for the six months ending June 30 were as follows, in long tons:

	1906.	1907.	Changes.
Straits.....	7,206	7,311	I. 105
Australia.....	508	508	.....
Great Britain.....	13,919	11,400	D. 2,519
Holland.....	249	708	I. 459
Other Europe.....	867	618	D. 249
Other countries.....	33	56	I. 23
Total.....	22,782	20,601	D. 2,181

The total decrease of imports for the half-year was 9.6 per cent., as compared with last year.

Lead—Imports of lead into the United States in all forms, with re-exports of imported metal, are reported as below for the six months ended June 30, in short tons of 2000 lb. each:

	1906.	1907.	Changes.
Lead, metallic.....	7,057	7,037	D. 20
Lead in ores and base bullion.....	39,350	30,632	D. 8,718
Total imports.....	46,407	37,669	D. 8,738
Re-exports.....	24,263	16,306	D. 7,957
Net imports.....	22,144	21,363	D. 781

Of the imports this year 25,953 tons were from Mexico and 4420 tons from Canada. Exports of domestic lead were 112 tons in 1906 and 251 tons in 1907; an increase of 39 tons.

Spelter—Exports of spelter, zinc dross and zinc ores from the United States for the six months ending June 30 are reported as below, zinc ore being in long tons, the others in short tons:

	1906.	1907.	Changes.
Spelter.....	2,561	357	D. 2,204
Zinc dross.....	6,781	5,497	D. 1,284
Zinc ores.....	16,108	8,270	D. 7,838

Imports of spelter for the six months were 2025 tons in 1906 and 487 tons in 1907; a decrease of 1538 tons.

Antimony—Imports of antimony into the United States for the six months ended June 30 were as follows, in pounds:

	1906.	1907.	Changes.
Metal and regulus.....	3,860,619	4,772,622	I. 912,003
Antimony ore.....	882,958	1,874,032	I. 991,074

The imports of ore have continued to increase but the imports of metal and regulus for June were less than for the same month in 1906.

Nickel—Imports of nickel ore and matte into the United States for the six months ended June 30 were 7090 tons in 1906, and 7860 tons, containing 9,489,398 lb. metal in 1907. The metal contents were not reported last year.

Exports of nickel, nickel oxide and nickel matte for the six months were 5,970,541 lb. in 1906, and 5,239,990 lb. in 1907; a decrease of 730,551 lb. this year.

Platinum—Imports of platinum into the United States for the six months ended June 30 were 5902 lb. in 1906, and 3751 lb. in 1907; a decrease of 2151 lb. this year.

Quicksilver—Exports of quicksilver from the United States for the six months ended June 30 were 263,147 lb. in 1906, and 275,386 lb. in 1907; an increase of 12,239 lb. this year.

Aluminum—Exports of aluminum from the United States for the six months ended June 30 were valued at \$108,493 in 1906, and \$181,229 in 1907; an increase of \$72,736 this year.

Wisconsin Ore Market

Plattsville, Wis., Aug. 3—There are several new prospects in the district that are ready for mills, having proved sufficient ore available to make them paying propositions, while others are just nearing completion. The present outlook is very encouraging throughout the entire district.

The zinc ore, for the week ending August 3, held at \$47. There is no surplus zinc ore in the bins, being sold as soon as it is ready for the market, while the lead ore is piling up, due to the falling off of the market price.

Lead still sells at \$29 per 1000 lb., while sulphur and dry-bone sell at the usual prices.

Following is the shipment of the district, by camps, for the week ending Aug. 3, 1907:

Camps.	Zinc ore, lb.	Lead ore, lb.	Sulphur ore, lb.
Platteville....	401,737	.....	.....
Hazel Green—	.....	.....	.....
Buncombe..	632,450	.....	.....
Benton....	381,610	.....	.....
Highland..	355,750	.....	.....
Linden....	200,400	41,400	.....
Harker....	187,500	.....	.....
Cuba City..	190,300	.....	.....
Livingston.	145,000	.....	.....
Mineral Point	143,600	.....	.....
Rewey.....	127,000	.....	.....
Galena....	76,700	.....	.....
Kodatz....	60,000	.....	.....
Shullsburg..	.....	62,000	.....
Total for week	2,902,047	103,400	.....
Year to Aug. 3	62,107,622	2,433,120	835,060

It will be noticed that there is a new camp, Kodatz, in this week's report.

With weather conditions as they have

been in the past weeks and with proper supply of cars the tonnage has held up very well, aggregating between 2,000,000 and 3,000,000 lb.

Missouri Ore Market

Joplin, Mo., Aug. 3—The highest price paid for zinc was \$50 per ton, the assay base price ranging from \$44@47.50 per ton, and the average price was \$44.78.

The highest price paid for lead was \$64 per ton, medium grades selling at \$56@62 per ton, and an average of \$60.04 per ton.

Price reductions on zinc ore have been carried on very conservatively for several weeks, by shifting ore down the scale from one base price to an offering of 50c. per ton lower. This week it came the turn of the higher grades to get a cut, and a number of producers declined to accept the reduction. As a consequence outlying camps were visited and the holdings taken up. The shipment is nearly 1000 tons below the average, and the output is low, so the stock increase will be very light.

Following are the shipments of zinc and of lead from the various camps of the district for the week ending Aug. 3:

	Zinc, lb.	Lead, lb.	Value.
Webb City-Carterville.....	2,936,000	729,240	\$ 90,873
Joplin.....	1,851,490	276,310	52,724
Galena.....	873,050	129,380	24,397
Duenweg.....	736,270	116,500	20,787
Prosperity.....	669,820	102,660	18,819
Oronoga.....	626,230	55,470	16,139
Aurora.....	798,050	11,480	15,072
Alba-Neck City.....	561,510	.....	13,756
Granby.....	630,000	46,500	9,600
Baxter Springs.....	237,030	127,430	8,758
Spurgeon.....	168,910	72,800	4,577
Zincite.....	121,100	.....	2,725
Springfield.....	.....	85,330	2,559
Sarcoxie.....	78,690	.....	1,809
Carl Junction.....	45,450	24,610	1,806
Badger.....	64,310	.....	1,608
Carthage.....	63,370	.....	1,552
Sherwood.....	39,960	14,800	1,363
Stott City.....	48,230	.....	1,109
Totals.....	10,549,470	1,792,510	\$290,033

31 weeks.....373,622,830 56,644,810\$10,893,349
 Zinc value, the week, \$236,217; 31 weeks, \$8,689,742
 Lead value, the week, 53,816; 31 weeks, 2,203,607

Average prices for ore in the district, by months, are shown in the following table:

ZINC ORE AT JOPLIN.			LEAD ORE AT JOPLIN.		
Month.	1906.	1907.	Month.	1906.	1907.
January ..	47.38	45.84	January ..	75.20	83.53
February ..	47.37	47.11	February ..	72.83	84.58
March	42.68	48.66	March	73.73	82.75
April	44.63	48.24	April	75.13	79.76
May	40.51	45.98	May	78.40	79.56
June.....	43.83	44.82	June.....	80.96	73.66
July.....	43.25	45.79	July.....	74.31	58.18
August.....	43.56	.....	August.....	75.36	.....
September.....	42.58	.....	September.....	79.64	.....
October.....	41.55	.....	October.....	79.84	.....
November.....	44.13	.....	November.....	81.98	.....
December.....	43.68	.....	December.....	81.89	.....
Year.....	43.24	.....	Year.....	77.40	.....

Chemicals

New York, Aug. 7—The general market shows little life and activity is not expected until fall. Imports of heavy chemicals into the United States for the six

months ended June 30 are reported as follows, in pounds:

	1906.	1907.	Changes.
Bleaching powder	55,978,740	56,993,913	I. 1,015,173
Potash salts.....	108,162,277	112,041,764	I. 3,879,487
Soda salts.....	10,688,920	11,004,544	I. 315,624

Exports of acetate of lime for the six months were 31,134,472 lb. in 1906 and 43,224,061 lb. in 1907; an increase of 2,089,589 lb. during 1907.

Copper Sulphate—The market has shown no change either in price fluctuation or in activity. Large producing interests continue to quote \$7 per 100 lb. for carloads and \$7.25 for smaller lots, but certain independent jobbers claim to be selling at \$6.87½ per 100 lb.

Exports of copper sulphate from the United States for the six months ending June 30 were 17,713,771 lb. in 1906 and 5,973,804 lb. in 1907, a decrease of 11,739,967 lb. during 1907.

Nitrate of Soda—The local market maintains its strong tone and prices advanced 2½c. on all grades. The demand is active and the strength displayed on the South American coast still continues. Prices are quoted as follows: For 96 per cent., spot delivery, 2.52½c.; 95 per cent., 2.50c.; for 1908 delivery, 2.50c. and 2.45c., respectively, for these grades.

Shipments from South American ports for the six months ending June 30 were 743,000 tons, as compared to 710,000 tons in the same period in 1906, according to W. Montgomery & Co., London. Consumption in the United States during the same periods was 354,000 and 338,000 tons, respectively.

Phosphates—Little or no new business is reported and deliveries are mostly on old contracts and in small lots. Quotations are not frequent and prices remain at about \$6 for 75 per cent. Florida land pebble.

Messrs. J. M. Lang & Co. report shipments of phosphate rock through the port of Savannah during the month of June as follows: Germany, 12,779 tons; Great Britain, 3135; Belgium, 2640; Italy, 530; total, 19,084 long tons.

Exports of phosphates from the United States for the six months ended June 30 were, in long tons:

	1906.	1907.	Changes.
Crude.....	502,969	500,008	D. 2,961
All other.....	10,861	14,249	I. 3,388

The chief exports this year were 149,235 tons to Germany; 92,326 tons to Great Britain; 75,599 tons to France; 36,688 tons to Italy.

Sulphur—Imports of sulphur and pyrites into the United States for the six months ended June 30, were, in long tons:

	1906.	1907.	Changes.
Sulphur.....	46,945	18,622	D. 28,323
Pyrites.....	272,071	290,992	I. 18,921

The decrease in sulphur imports is due to the utilization of Louisiana sulphur in place of the Sicilian product. Estimating sulphur contents of pyrites, the total imports of sulphur were 155,773 tons in 1906

and 133,019 tons in 1907, a decrease of 22,754 tons.

Mining Stocks

New York, Aug. 7—Mining stocks suffered during the week, the losses being more than for any single week for some time. The decision, handed down by Judge Landis, imposing a fine of \$29,000,000 on the Standard Oil Company had a depressing effect upon stocks largely owned or controlled by the Standard people. Amalgamated Copper, which is in close sympathy with Standard Oil, was heavily sold and fell off from \$88, the close last week, to \$80¾, closing at \$80¾. American Smelting common also weakened and closed at \$107, showing a loss of \$7.75 for the week. U. S. Steel common was weak, closing at \$33½; the preferred closed at par.

The weakness on the Exchange was reflected on the curb and the Cobalt stocks and coppers were noticeably dull and showed a downward tendency. Standard Oil closed at \$49¾ per share.

Boston

Aug. 6—There have been heavy losses among the active mining securities following announcement of the fine imposed upon the Standard Oil Company. Amalgamated suffered a loss of \$5.62½, closing at \$82.25 on considerable selling. Copper Range dropped \$3.75 to \$74.25 and North Butte closed low at \$73.50, a loss of \$6.25 for the week. Utah Consolidated fell off \$1 to \$43.50 and Mohawk was weak, closing at \$74. Trinity was lightly supported and closed down \$3 at \$18.

Calumet & Hecla was not largely traded in but the bid and asked price receded with the rest of the list. Tonight, at the close, \$785 was asked for the stock. Arizona Commercial and Shannon lost several points, closing at \$18 and \$14.75 respectively. In fact nearly the whole list of stocks is selling much lower than a week ago. Calumet & Arizona lost \$6, closing at \$159. A few of the older dividend-paying stocks have barely held their own but the general tendency has been weak and support has been lacking. The uncertainty of the copper metal market, and the shrinkage in prices of stocks in close sympathy with Standard Oil is responsible for the depreciation in values. Strange to say the stock of the company directly affected by the decision of Judge Landis has not been hammered down as much as some of the other securities.

The curb stocks followed the lead of those on the Exchange and fell off sharply. Corbin closed at \$13.75, showing a loss of \$4.12½ for the week. Nipissing held its own, after the sharp decline last week, and closed at \$7.87½, the same as a week ago.

Other closing prices were: Old Domin-

ion, \$37.75; Rhode Island, \$4.25; Quincy, \$109; Winona, \$6; Centennial, \$26; Osceola, \$120; Tamarack, \$93; Franklin, 12; and Butte Coalition, \$22.37 1/2.

Colorado Springs

Aug. 3—The local mining stock market has been quiet and featureless the past week. The entire mines list has declined a few points, except Isabella, which was noticeably stronger; however it had but few sales.

The July output of the Cripple Creek mines was 47,886 tons with a value of \$1,171,572. The recent rainy weather in the district has had a tendency to interfere with the operation of some of the mines and to this is attributed the cause of the dull market.

STOCK QUOTATIONS

Table with columns for NEW YORK and BOSTON, listing various mining companies and their stock prices as of August 6 and August 7, 1907.

Table titled 'N. Y. INDUSTRIAL' listing various industrial companies and their stock prices, including Am. Agri. Chem., Am. Smelt. & Ref., etc.

Table with columns for S. FRANCISCO and NEVADA, listing various mining companies and their stock prices as of August 1 and August 7, 1907.

Table titled 'New Dividends' listing various companies and their dividend payments, rates, and amounts.

Table titled 'Assessments' listing various companies and their assessment details, including delinquent and sale amounts.

Monthly Average Prices of Metals AVERAGE PRICE OF SILVER

Table showing monthly average prices of silver in New York and London from 1906 to 1907.

AVERAGE PRICES OF COPPER

Table showing average prices of copper in New York and London, including electrolytic and lake grades, from 1906 to 1907.

New York, cents per pound. Electrolytic is for cakes, ingots or wirebars. London, pounds sterling, per long ton, standard copper.

AVERAGE PRICE OF TIN AT NEW YORK

Table showing monthly average prices of tin in New York from 1906 to 1907.

Prices are in cents per pound.

AVERAGE PRICE OF LEAD

Table showing monthly average prices of lead in New York and London from 1906 to 1907.

New York, cents per pound. London, pounds sterling per long ton.

AVERAGE PRICE OF SVELTER

Table showing monthly average prices of spelter in New York, St. Louis, and London from 1906 to 1907.

New York and St. Louis, cents per pound. London in pounds sterling per long ton.