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The Essential Data of Placer Investigations

Points to Be Ascertained and Precautions to Be Taken in the Examination and Valuation of Placer Ground before Exploitation

BY J. P. HUTCHINS*

An examination of gold or other placers, to be of value, must embody certain fundamental information and, in addition, other data will be found to be of the utmost importance. In a previous article the nomenclature, relating to placer deposits and mining, was described in detail. The scope of this article lies along economic lines

environments; peculiarities of locus, climate, meteorology, topography, geology, fauna, flora, labor, etc., in detail should be mastered for they have an important bearing on the design, construction and operation of placer mining machinery.

The features to be ascertained are as follows: (1) The existence of a sufficient

and characteristics of bedrock; (17) Occurrence and characteristics of frozen material; (18) Water supply; (19) Power; (20) Labor; (21) Mining and labor laws and regulations, import and export duties; (22) Governmental stability; (23) Cost of supplies, etc.; (25) Operation, cost; (25) By-products.



TOPOGRAPHY UNFAVORABLE TO DREDGING IN BRITISH COLUMBIA

and deals with the conditions which exist in the field.

MAIN POINTS FOR INVESTIGATION

The salient points of placer investigation may be ascertained largely by drill prospecting alone or by shaft sinking alone or by shaft sinking with drifting, and cross-cutting, or by using test holes of both large and small diameter. The drill and shaft methods of course each have respective preëminent advantages.

Placer mining is extremely sensitive to

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volume of material and the ratio of its volume to its richness; (2) The geology of the deposit and its environs; (3) Transportation facilities and accessibility; (4) Climate; (5) Meteorology; (6) Fauna and flora; (7) Topography; (8) Dumping ground; (9) Superficial conditions; (10) The occurrence, distribution, average value and peculiarities of the metallic content; (11) Degree of induration; (12) Depths and average depth of the deposit; (13) Occurrence and characteristics of boulders; (14) Occurrence and characteristics of clay; (15) Occurrence and characteristics of buried timber; (16) Occurrence

WORKABLE VOLUMES

The existence of a sufficient volume of material to warrant the installation of machinery can only be proved by such extended investigation as delineates the deposit laterally and vertically. It is difficult to state exactly how large a volume of material and what value of metallic content are essential, but as a general proposition, when there is a small metallic content in a deposit, there must be a large volume of material so that large capacity and consequent low working cost can be had.

The largest dredges now operating ex-

cavate about 2,500,000 cu. yd. per year which is about 50 acres of ground 30 ft. deep or 100 acres 15 ft. deep, therefore about 500 acres of 30 ft. ground and 1000 acres of 15 ft. ground would be needed for a dredge of such capacity allowing a life of 10 years. Such a dredge can work easy material containing a content of 5c. per cu.yd. at considerable profit.

Some small areas of dredging ground have been proven to contain over \$1 per cu. yd. Assume that a dredge's life is 10 years; then about 60 acres of 15 ft. ground or 30 acres of 30 ft. ground would be worked. Much less than the areas noted above would be ample to justify the installation of a dredge on ground containing such rich content, unless environment

draulic mining is a distinct art. To my mind the laying out of an hydraulic mine is a greater test of capacity than the opening of a quartz mine."

It is merely necessary to note that such mines, in often using 100 second-feet under a pressure of 200 lb. per sq. in., generally must have large reservoirs and long ditches over rugged topography to conserve and carry water respectively. Therefore, any investigation must include consideration of all matters affecting these phases. To ascertain the average value of the metallic content of the large deposits of gravel worked by the hydraulic method is the most difficult work that the mining engineer and mining valuer has to do. Such deposits may cover hundreds of acres

miles along the course of a channel being mined are sometimes made in this work. Cross-sectioning from this data, to locate the probable depth of the channel is thus accomplished. Test holes of small diameter are also used to cross-section channels.

The ratio of volume to richness is generally one of prime import. The richer the gravel the smaller the volume necessary for profitable exploitation. Inasmuch as placer mining is usually the exploitation of large volumes of low grade material, yielding an inconsiderable amount of profit per unit of volume, this ratio is an all important consideration.

TRANSPORTATION

This is a most important feature for it



DIFFICULTIES RESULTING FROM INSUFFICIENT DUMPING GROUND

were very hostile and consequent cost high. The above examples illustrate what are ample for a large and a small dredge respectively, but what is sufficient in any particular instance is determined by the particular circumstances.

The largest hydraulic mines each work over 10,000 cu. yd. per 24 hours. Such a tremendous volume of material often having a gross value of only a few cents per cubic yard must be worked on this large scale to reduce working cost. To open, equip, and operate hydraulic mines require engineering and managerial skill of the highest type. J. H. Curle says:¹ "Hy-

¹"The Gold Mines of the World." Second edition, p. 252.

with an average depth of several hundred feet and contain materials which in their physical characteristics and content are varied in a remarkable degree.

EXPLOITATION BY DRIFTING

The problems of investigating deposits thought suitable for exploitation by the drift method are often extremely intricate. Many of them have their valuable content distributed in an entirely irregular way through a plexus of ancient channels either of contemporaneous or of different geologic ages and at the same or at different depths, beneath a mass of débris many hundred feet deep. Long lines of underground levels, sometimes extending for

affects the design, construction and operation of machinery. Thus the difficulties of transport may make it essential to sectionalize machinery to a great degree and to use particular materials of great strength or lightness or peculiar devices easily transported and repaired; operation is governed largely by considerations of transport. Many features have a direct bearing upon transport; so any circumstances that may affect this important feature in any way should have great weight in any consideration. Accessibility, in directly affecting transport, is also very important. The accessibility of a property and its distance from an important commercial center are essential data.

CLIMATIC CONDITIONS

Climate affects the design, construction and operation of placer-mining machinery, besides governing the length of the working season. Thus, for dredging in frigid climate, particular design is needed to permit operation in cold weather. Hulls for dredges operating in the tropics should be of steel on account of the rapid decay of wood. Bad climate usually means poor fuel; in the tropics there is always trouble with the boilers through rapid scale formation, excessive losses by radiation into a humid atmosphere, etc. Rubber stacker belts are not suitable for the tropics.

largely from unsuitable food; good, nourishing, well-cooked food is very difficult to get in the tropic mining district. Draft animals and beasts of burden do not thrive in the tropics.

METEOROLOGY

Meteorologic conditions are of prime importance. A few of the most important features are rainfall, which may affect the water-transportation of supplies, fuel, etc., where streams may be almost dry in dry seasons or torrential in wet seasons, or hauling on land where roads may become impassable in wet seasons. Floods prevent

water, or even wreck dredges that lose the water of their ponds and go high and dry. Extremes of temperature either of heat or cold, humidity or dryness are generally harmful to parts of the ordinary type of dredge used in temperate zones.

FAUNA AND FLORA

The fauna and flora of a region have an important bearing on any investigation. For instance monkeys and sloths may climb poles and short circuit two phases of a high-tension electric transmission system. Wood-boring insects, ants and others, attack wooden dredges, houses, flumes,



DREDGING GROUND IN THE TROPICS

Tropic climate often has abnormal seasonal changes and durations; therefore the investigation of alluvion in tropic countries must be conducted with this important circumstance in mind.

Tropical climate at low altitudes, where dredging ground usually exists, is notably unhealthful, so much so that there must be several extra men of the executive force, to allow for frequent vacations and sickness. Malarial and other fevers, dysentery and other derangements of the alimentary tract, beri beri, pneumonia, rheumatism, leprosy and elephantiasis are a few of the common ailments. These result

operation and endanger dredges that may be working in rivers that became torrential and carry large quantities of floating logs, trees and other debris. Such material, in accumulating on the lines of a dredge, may break them and set the dredge adrift. The total annual rainfall and its distribution must be ascertained if hydroelectric power is to be considered. Severe wind and electrical disturbances may affect operations and damage electric power equipment. Floating ice and ice jams endanger dredges. Forest fires are menaces or worse. Drouths may prevent operation or cause losses in sluicing with muddy

dams, bridges, poles, etc., and also honeycomb wood cut for fuel unless it is used within a few months after cutting. An installation was made in South America and in such a way that it necessitated the laborers working in about 6 to 10 in. of water; stingrays were so numerous and vicious that considerable difficulty was experienced, it being inexpedient to drain the pit.

The flora of a region may have considerable bearing upon exploitation. Clearing a dense growth of large hard trees of twisted grain, hence unfit for fuel, may cost several hundred dollars per acre. Cut-

ting a dense swamp jungle bristling with thorns and teeming with wasps, scorpions, spiders, and snakes is consequently costly. Large deep roots and stumps are a drawback to all kinds of open-cut mining. The presence of a large amount of decaying vegetable matter and humic acid in water has a direct effect in causing scale in boilers to a most troublesome degree. It is often impossible to get any other water in the tropics.

The quality and quantity of fuel per acre, if steam power should be used, must be investigated very carefully. It is generally assumed that trees for fuel are very numerous in the tropics. This is a gross error. Many of the trees can not be cut up into cord-wood except at prohibitive cost by reason of their hardness and twisted grain. It has been found that, in some instances, less than 20 per cent. of the estimated number of cords of wood that an acre should produce, if judged by temperate zone standards, has actually been cut. The rest was too hard or otherwise unsuitable. This is a most serious circumstance.

The investigation must include the consideration of trees fit for timbering or for lumber to build.

TOPOGRAPHY

Topographic features of not only the deposit actually under investigation but of the neighboring country as well, must be ascertained under usual circumstances. These may influence the design, construction and operation of a dredge, as, for instance, where dredging ground is very rough and more or less rolling.

The feature of possible hydro-electric power installation must include the consideration of topography and orography for ditch and reservoir possibilities respectively. Hydraulic and drift mining often demand careful topographic investigations of extended areas.

Dumping ground for the disposal of tailing from hydraulic and drift mines is an extremely important feature. Certain kinds of material, in expanding largely on the dump, or in having a part transported to great or small distances, influence consideration of tailing disposal. Meteorological conditions in causing heavy freshets that transport tailing bear on this circumstance.

Superficial frost, marsh, etc. are among the more important superficial conditions; others, such as drift accumulations and water marks also indicate occasional floods, etc., that must be noted as possibilities.

The degree of induration is an important characteristic of any deposit, for it has a potent and direct bearing upon the design, construction and operation of placer mining machinery. Where alluvion is much indurated, heavy, powerful and costly machinery is essential and operating cost is high. To determine this feature exactly requires care and experience. A

large per cent. of the failures in dredging, hydraulicking and drifting have been due to encountering material so indurated as to be unworkable at a profit with the apparatus installed. It has also occurred in some of these instances that subsequent installations of heavier and more powerful machinery have resulted in surprisingly profitable exploitation.

THE DEPTH OF THE DEPOSIT

The depth of bedrock or to bottom (if a false bedrock) or to the limits of profitable dredging depth are features of easy or difficult solution as the conditions encountered vary. Ordinarily it is not difficult to ascertain the depth to bedrock, although the occurrence of large boulders of the same rock as that of the country on or near bedrock may lead to incorrect assumptions unless care is used. False bedrock as tuff or hard-pan may puzzle during the early stages of an investigation in unfamiliar area. Where alluvion is deep and continues to a great depth with low metallic content it is a difficult matter, particularly if the alluvion is hard to excavate, to determine the profitable dredging limit.

The depths to bedrock are of great importance in hydraulic and drift mining but particularly as influencing opening, equipment and operation.

The occurrence and size of boulders are difficult to determine for a similar reason as that in determining the lateral distribution of valuable content. Many big boulders may be fatal to operation and they may occur in an altogether irregular way. Their existence in a stratum of indurated material is a serious obstacle to dredge operation and is also a difficult matter of definition. There are parts of deposits in which the occurrence of big boulders may be anticipated; there are in former channels, margins, particularly where steep hills bound the area, where streams of heavier gradient discharge into it and at confluences in general.

Big boulders may be fatal to hydraulic and drift mining though they are obstacles in a less degree than in dredging.

(To be continued)

The present digging equipment on the Panama Canal consists of 63 steam shovels, 32 of 95 tons, 28 of 70 tons and 3 of 45 tons each, while 15 more 95-ton and seven 45-ton steam shovels are to be delivered this year (*Iron Age* August 8.) There are also 184 locomotives in service, 228 steam or pneumatic drills and 73 machine or well drills. While there was a falling off in the rate of digging in May and June, due to the rainy season, it is expected that 1,000,000 cu.yd. a month will be reached later in the year. The total excavation necessary to dig the canal was figured at 111,280,000 cu.yd. To July the amount taken out was 8,651,802 cu.yd. At 1,000,000 cu.yd. a month the channeling would be completed in 1915.

Inspection of International Boundary Monuments

SPECIAL CORRESPONDENCE

O. H. Tittman, superintendent of the United States Coast and Geodetic Survey; Chas. D. Walcott, secretary of the Smithsonian Institute; L. D. Burling, assistant curator of the national museum at Washington, D. C.; and Wm. F. King, chief astronomer in the astronomical branch of the Canadian department of the interior, are examining the boundary monuments placed along the international boundary line between the State of Washington, and British Columbia, from the Similkameen district east to the crest of the Rocky mountains. These gentlemen represent the international commission which has in charge the work of delimiting the boundary between United States and Canada, and their duty includes the examination of the boundary monuments and determining whether these have been properly placed.

The new monuments have replaced old ones and where necessary additional ones have been erected. They are of aluminum bronze and bear two brass plates marked "Canada" and "U. S.," respectively. They are placed at all important points, at intervals varying from 1/2 to 2 1/2 miles. Each is about 4 ft. 8 in. high, and is a miniature replica of the Washington monument.

Mining in Turkey

The British Consul at Uskub, which is a town in Turkey, not far from the Servian border, writes glowingly of the mineral riches of his section of the country. He says: "There are mines of every description in the province, and the mineral wealth of the country is said to be comparable with that of the Transvaal, but owing to the great difficulties of transport and the insecurity of the country, few mines have been exploited up to the present but concessions are now being more eagerly sought after. Gold, silver, copper, iron, chrome, lead, antimony and manganese, besides coal (lignite), have all been found, and fresh discoveries of lodes are continually being made. A British company will this year start working a silver and lead mine near Kratoava, which is believed to have very good prospects; it was worked by the ancient Greeks and is one of the mines mentioned by Herodotus. The chrome mines near Kalkandelen cannot yet enter into competition with the New Caledonian chrome mines owing to the costly transport of the mineral to the coast. Coal mines are plentiful, as at Kalkandelen, Prisen, Yeniky, etc., but the quality does not appear to be very satisfactory. There are quarries of excellent building stone on every side. Further, a small slate quarry is situated at Papadia, and supplies local needs."

Negative Results in Pyritic Smelting

An Attempt at Pyritic Smelting of Copper-Nickel Ores. Furnaces Used and Their Construction. Tests Made and Results Obtained

BY G. F. BEARDSLEY*

In January and February of 1906 an attempt was made to treat, by pyrite smelting, the copper-nickel ores of the Sudbury district, Ontario, Canada. Although the results of the various test runs were of a negative character, a brief description of the experiment as a whole may prove interesting.

The furnaces were of modern design, 50x204 in., with an available height of column of 10 ft. 9 in. above the tuyeres. The blast, supplied by blowing engines, was plentiful and all other conditions were good except perhaps the method of feeding which consisted in dumping the side-tipping cars directly into the furnace. This adverse condition so far as pyrite smelting is concerned was met by hand feeding the coke and silica.

Each test was carefully planned before it was begun; all necessary slag and matte fall calculations were made and the construction of the charge and the method of feeding established. In every case the furnace was prepared for the test by feeding several slag charges for the purpose of smelting out any tuyere accretions that might have existed.

On the regular running the furnaces were fed on heap roasted ore using silica as a flux to take up the excess of oxide of iron. The coke consumed was about 13 per cent. of the charge. A furnace matte was made carrying from 30 to 35 per cent. copper and nickel. This product was blown up, in ordinary copper converters, to 80 per cent. metallic content and shipped to a refinery for parting.

Eight test-runs were made on the unroasted or green ore and one was made on the low-grade matte resulting from these tests for the purpose of determining the amount of concentration that could be effected. With the exception of the seventh run the duration of the tests was extremely short, lasting from two to four hours only and the amount of charge fed varying from 18 to 60 tons. The seventh run was of seven and one-half hours' duration and the amount of charge fed was 145 tons. The coke used varied from 3½ to 6 per cent. on the charge.

The furnace difficulties in the first six trials commenced within an hour after adding the first green ore charge. In the last two trials four hours and two hours respectively elapsed before trouble began. The first noticeable change was the quick and large increase in the quantity of matte flowing from the furnace spout

and the decrease in the quantity of slag made. The grade of matte also immediately fell from the usual 30 to 35 per cent. to a 12 to 15 per cent. copper and nickel. The above condition would last from half an hour to one hour. The matte would then slack off in quantity and the slag stream grow colder and smaller until all the symptoms of a freeze-up were at hand. On the feed floor the surface of the charge would look well for about an hour, then the blue flame of the sulphur would die out and bright spots of fire or chimneys would show in three or four places. When the danger of a complete stoppage became pronounced the furnace would be returned to its normal charge and, although no furnace was lost during the test, some careful nursing had to be practised at times.

The failure of the furnace to oxidize was at once recognized and all conditions, which suggested themselves as possibly interfering, were eliminated in the first four runs. It then became evident that there was some other interfering cause. The action of the furnace and the results of the smelting pointed to a liquation or separation of a more fusible portion of the ore, that is, a separation and removal of the sulphides from the least fusible portion of the gangue. It had been observed that the copper-nickel matte seemed to run and be more liquid at a lower temperature than a corresponding grade of copper matte. There were no actual data of temperature measurements at hand to corroborate this, however.

A determination of the construction of the less fusible portion of the ore and gangue was made by calculation.

As a basis for figuring the average analysis of the green or unroasted ore was taken; this was, in percentage, as follows:

SiO₂, 10.10; Fe, 44.68; Al₂O₃, 6.85; CaO, 1.19; MgO, 1.14; S, 27.48; Cu, 1.77; Ni, 5.62; total, 98.83.

Resolving this into the component minerals so far as the sulphides were concerned gave the following:

Chalcopyrite (CuFeS), 5.11; pentlandite (NiFeS), 16.05; pyrrhotite (Fe₇S₈), 51.28; residue (iron as FeO), 9.10; SiO₂, 10.10; Al₂O₃, 6.85; CaO, 1.19; MgO, 1.14; total residue, 28.38. Bringing the sum of the constituents of the residue to 100 gave the following result: SiO₂, 35.58 per cent.; FeO, 32.06; Al₂O₃, 24.13; CaO, 4.18; MgO, 4.

A consideration of this result helped very materially in arriving at the probable

cause of failure; for, as it stands, the residue is simply unsmeltable. Further, as pyritic slags as a rule will only carry about 7 per cent. of alumina, although they may at times be forced up to 8 or 10 per cent. for short periods, this aspect of the difficulty stood out with increased boldness.

If the copper-nickel mineral liquates as assumed, and carries with it sufficient pyrrhotite to make a 14 per cent. copper-nickel matte, then there would be removed by such liquation, assuming the same relation of copper to nickel as obtains in the ore, 28 per cent. of iron, leaving a remainder of 16 per cent. Deducting from this again the 7 per cent. of iron in combination with the silicate minerals of the gangue, there would be left but 9 per cent. iron for the production of matte, a quantity totally inadequate for the purpose.

If the quantity of iron necessary to bring the matte to a 35 to 40 per cent. grade could have been oxidized, the heat generated by the iron and the accompanying sulphur, plus that obtained from the addition of 2 to 4 per cent. coke to the charge, would have been sufficient to carry on the smelting. The silica required to take up this iron plus the oxide of iron formed would have diluted the alumina to a point within the amount that a pyritic slag would carry.

Theoretically an ore of the analysis given should have made no trouble in pyritic smelting. From experience, with the nickel left out, it is certain that an ore of this construction would have given no trouble.

The liquation of the pentlandite or nickel-bearing mineral and the carrying with it rapidly out of the furnace a certain amount of the pyrrhotite seems to offer the only explanation of the cause of failure in keeping with the facts observed. After the above consideration four attempts were made to run the ore by adding to it up to one-third of its weight in slag and one-tenth its weight in limestone for the purpose of diluting and slagging the aluminous residue of the ore. The increase of flux necessitated the raising of the coke to 6 per cent. One of these tests, while successful to some extent as an experiment, was, as a method of treatment neither practically nor commercially so. They all served, however, to demonstrate further the fact that the trouble was undoubtedly due to the copper-nickel mineral smelting at a comparatively low heat, forming a low-grade matte, which quickly

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left the furnace without suffering much oxidation. Further, that there was left behind an infusible residue or skeleton of mineral with insufficient iron and sulphur to supply either heat or flux.

From all these experiments there was accumulated quite a quantity of low-grade matte; too low, in fact, to blow up in the converters. The last experimental run was made for the purpose of concentrating this matte by an oxidizing smelting. This was successful inasmuch as the grade of the matte was raised from about 14 to 39 per cent. copper and nickel in less than three hours. At the end of that time the furnace showed signs on top of coming trouble, but the run was not continued long enough to develop its nature or extent. As usual in concentrating-smelting, the matte at the furnace spout was very hot and there was a small breakaway at the breast. The following morning there was a violent explosion in the sump and an examination of the "connection jacket" showed that it had been burned through by the extra hot matte the day previous.

It may be noted here that copper-nickel matte is a most active agent in cutting iron, steel or copper jackets in any position around the furnace and the utmost care must be taken to protect them. Matte leaks or breakaways between jackets have to be stopped immediately or they will cut through the metal and an explosion will result. The ordinary water-jacket spout of the copper furnace could not be used at all, its place being filled by a chrome brick sump.

A final word as to the liquation of sulphides from the gangue of the ore in this class of work. I have been unable to hear of another case like this and I believe that it is peculiar to this ore. If any other metallurgist has observed this phenomenon, I would be pleased to hear of it either through the JOURNAL or privately.

Talc in Austria

A report in *Rev. des Prod. Chim.* (July 15, 1907) says that beds of talc of demonstrated purity and thickness have been located in the province of Styria, in the commune of Floing, at 1280 m. above sea level. The deposits have already been acquired by M. Elbogen of Vienna who owns the concession of all the talc mines in Austria. In order to insure the proper grinding of the product of all his mines when in full operation, M. Elbogen is already arranging to extend his grinding and refining plant very considerably.

An expedition equipped by the Russo-Persian Mining Company, which has received mining concessions in the province of Karadagh from the Persian Government, has gone to Persia, to investigate the mineral resources there, and to inspect the River Araxes with a view to opening navigation on it.

A Recognition of Miners' Bravery

The visit of King Edward to Cardiff, on July 13, was made the occasion of the announcement that a decoration is shortly to be established and awarded for courage displayed by miners in times of calamity. The decoration will rank with the Victoria Cross, and will place the miners' valor and self-sacrifice on a level with the heroism met with on the battlefield. The announcement was made in the course of one of the king's speeches. He said:

"I trust that the report which has recently been submitted by the commission in regard to the use of rescue apparatus will lead to the adoption in this and the other colliery districts of measures for facilitating the work of rescue in the event of those disasters, which still, unhappily, occur from time to time. I have often read, with a feeling of admiration and pride, how, on such occasions, when numbers of miners are cut off by falls of debris or other obstruction from the outer world, their fellow-workers, undeterred by their perfect knowledge of the danger of the attempt, eagerly volunteer to assist in the work of rescue. The whole country applauds, and is grateful for the courage and devotion of such heroes. But I have for some time felt that insufficient means exist of giving a worthy and lasting public recognition of these brave deeds. I propose very shortly to establish a decoration, bearing my own name, to be awarded to the courageous men who in the mines and quarries of this country endanger their lives in order to save the lives of others."

The Italian Petroleum Industry

A brief review of the petroleum industry in Italy is given by the *Chem. Zeit.* (July 27, 1907). There are three producing districts in the country; the Emilia in the provinces of Parma and Piacenza, the Abruzzi district, and in Sicily. The Emilia district is the only one of the three in which exploration has been carried out in a modern and rational manner. The first well was bored in 1860. It was 70 m. deep and yielded about 50 liters of naphtha per day. In 1870 a French company was formed which bored several wells and succeeded in obtaining a very good product. A refinery with a capacity of 600 metric tons per day was established in 1880 in Borgo St. Dounino. Later two other refinery plants were built in Fiorenzuola and in Mailano, and boring was carried on by the Caucasian system with the best results.

The greatest part of the Italian petroleum comes from Montechino and Velleia, in the province of Piacenza. A French company was organized in 1903 with a capital of 1,200,000 fr. and this concern

was the first to apply modern and systematic methods to the exploration of Montechino. As a result of the efforts made, the yearly output increased from 800 in 1903 to 2000 tons in 1905. This company in 1905 had 28 wells in operation and had exploited only about one-ninth of its concession.

The region about Velleia is exploited by the Société Française du Pétrole, which in 1905 had an output of 1870 metric tons. This company operates a refinery at Montechino. Both of these companies are in good financial condition, having paid 40 per cent. dividends in 1905. In 1906 the Società Petrolia d'Italia was formed in Genoa. It not only purchased both of the above companies, but also set itself energetically about the task of exploring all the petroleum deposits of the country. Italian petroleum is especially adapted to the extraction of benzine, which is of considerable importance to the country on account of the increasing value of the petroleum industry; it is less suitable for yielding lubricating oil. In 1906 the output of naphtha amounted to 20,000 metric tons.

Diamond Digging in the Vaal River

A South African mining company has recently equipped a barge on the Vaal river with a complete driving outfit for half a dozen drivers, and has engaged in the work of seeking diamonds in the river bed. The barge is moored at a point about 3½ miles below Klerksdorp. A wire rope is stretched across the river from the Transvaal to the Orange River Colony side, to enable the barge to be kept in position in mid-stream, and from this the divers descend and work in from 48 ft. to 52 ft. of water. At present the divers have no light to enable them to see and are working for three or four hours at a stretch in icy cold water and intense darkness. All they are able to do at present is to grope around, move the big boulders with the crowbar, and scrape up the smaller stuff from the bed of the river, emptying it into a large iron-bound wire drum which takes about half-an-hour to fill. When full, this is hoisted on to the barge, dumped into tubs and roughly sorted to throw away large stones and to retain the gravel and pebbles among which the diamonds are found. The deposit is far too heavy to gravitate and is sorted wholly after having been roughly screened through coarse sieves. The returns for the first month's operations are reported to be satisfactory and arrangements are being taken to secure an electric lighting plant which will simplify the miners' work and increase their efficiency.

Accuracy of construction of centrifugal pumps with regard to packing rings to prevent leakage of air into the suction end of the pump is of importance.

The Wood-stave Pipe Line of the Madison River Power Company

By W. E. BELCHER*

The Madison River Power Company operates a power plant in western Montana, which supplies electric power to the city of Butte and the vicinity. A heavy crib-work dam is built across the Madison river, 14 miles from Norris, Mont., from which the water is led through a wood-stave pipe along a grade at the side of the cañon a distance of 7635 ft. to the power house. The original pipe-line is 10

and found that the actual quantity of water delivered under the conditions given was 580 cu.ft. per sec. in excess of that shown by the formula. This amount corresponds closely with the formula if N be used as 0.12.

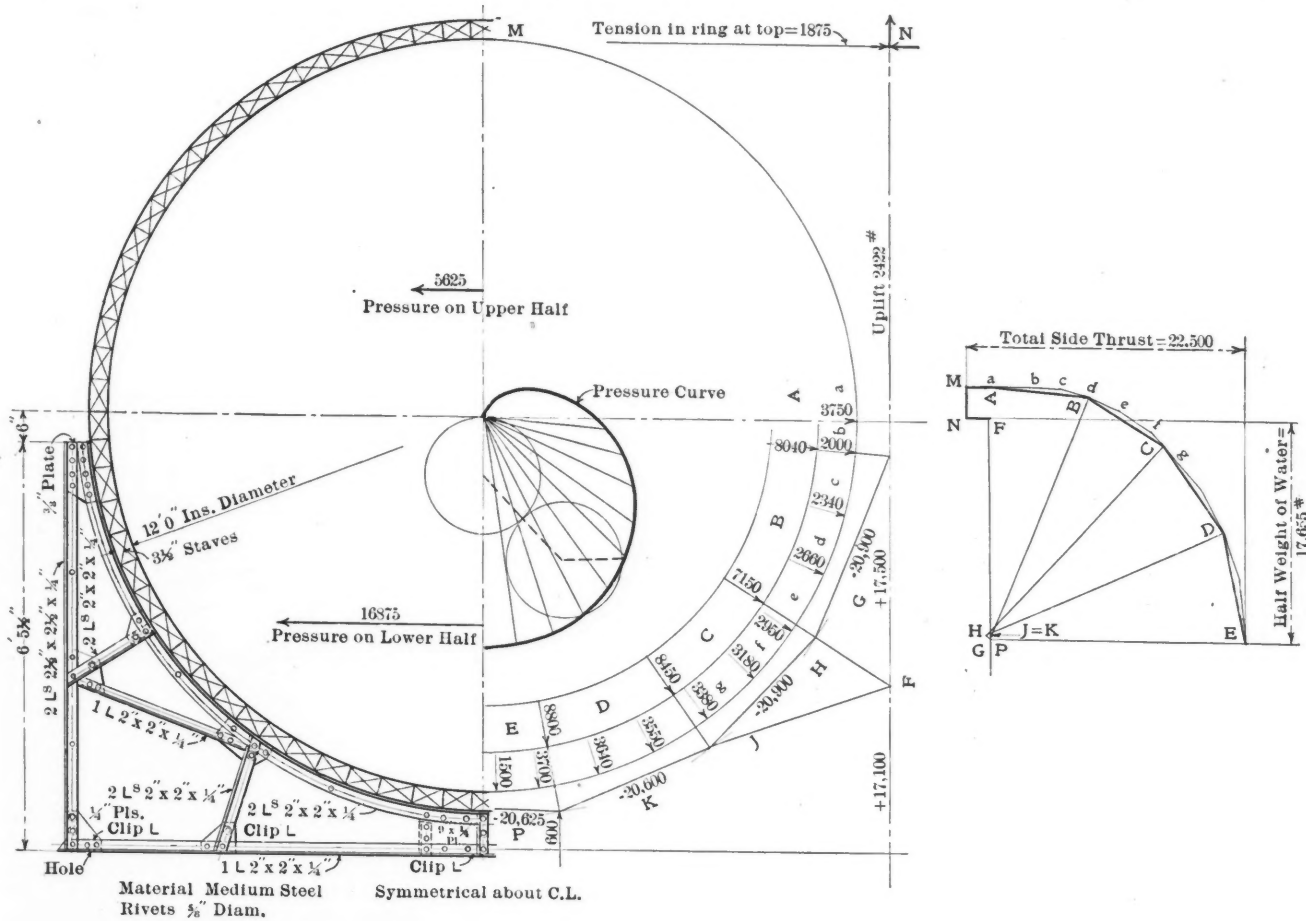
The grade upon which the first pen-stock was built was made of sufficient width for a second pipe to be laid parallel with it, and it was recently found necessary to provide a 12-ft. pen-stock for the additional water supply desired. Using Kutter's formula with N equal to 0.12, this pen-stock is capable of delivering about 950 cu.ft. per second.

SUPPORTING THE PIPE

One of the interesting problems in con-

the staves being made 4 in. thick to carry the weight between these points, and to get sufficient arch action to prevent the top of the empty pipe from collapsing. These staves were of Oregon fir, 12 in. wide, and from 12 to 24 ft. long.

The pipe is banded with $\frac{7}{8}$ -in. round rods, with adjusting nuts, spaced 12 in. apart at the upper end, where the head will be 20 ft., and 7 in. apart at the lower end where the head will be 30 ft. The accompanying diagram shows the design for the steel frame and the stresses which were used in working it out. Taking the pipe as simply full of water with no pressure at the top, the radial pressure on any part of the inside of the pipe is propor-



SUPPORT FOR 12-FT. WOOD-STAVE PIPE LINE, MADISON, MONTANA

ft. in diameter, carrying water at a maximum velocity of 8 ft. per sec. The total fall from the level of the water above the dam to the tail race is 123 ft., of which 115 ft. are utilized by the power house.

Using this loss of head of 8 ft., the volume of water available at the power house, figured from Kutter's formula in which N equals 0.13, gives a discharge of 506 cu.ft. per sec., or an average velocity of about $6\frac{1}{2}$ ft. per sec. After the plant was put in operation M. Hebgren, the general superintendent of the company, made a series of tests by the Pitot tube method,

in connection with the design of this exceptionally large wood-stave pipe was that of supporting its weight and of strengthening it against collapse during filling and emptying. At these times the water exerts no upward pressure against the top of the pipe, and there is almost no tension in the circumferential bands. To assist in maintaining the circular cross-section the 10-ft. pipe is supported at intervals of 4 ft. by a steel frame, which bears continuously against the lower half of the circumference of the pipe. This general scheme has proved satisfactory, and was adopted for the new line. It was decided to support the pipe at intervals of 5 ft.,

tional to its vertical distance below the top. Working out this pressure on the right half of the pipe, and plotting from the center of the pipe, gave the epicycloidal curve shown. It was found that this curve is that generated by a point in the circumference of a circle of diameter equal to the pressure at the center of the pipe, revolved on a similar circle drawn with the center of the pipe as its top point. To use this curve in finding the pressure per sq.ft. at any point on the inside of the pipe, draw a radius to the point in question, and scale on this radius the distance from the center to its intersection with the curve. The lateral pres-

*Engineer with J. G. White & Co., 43 Exchange place, New York.

sure on the upper half of the pipe is 5625 lb., one-third of which was considered as taken by the top band and two-thirds as concentrated at the top of the steel frame. The total lateral pressure is 22,500 lb. Subtract the small amount of stress allowed in the top band, and the horizontal stress on the frame at the bottom of the pipe is found to be 20,625 pounds.

DISTRIBUTION OF THE FORCES

The forces *a b*, *b c*, etc., given around the circumference at 1 ft. spacing, represent the total pressure for 5 ft. lineal, considered as acting radially against the pipe. The force diagram is represented by the lines *a b*, *c d*, etc., and the working lines of the frame are shown under the right side of the pipe. Resultants of the smaller forces were found that can be considered as acting at the intersection points of the frame. These are the forces *A B*, *B C*, etc. The force polygon is the line *A B C D E P J F N M A*. This shows little stress on the web members, and a stress on the ring that is nearly uniform between 20,000 and 21,000 lb., which was the object desired in designing the outline of the frame. The maximum stress on the web members comes when the pipe is half full, or when the supports are not at the same level, and these sections were made larger than the stresses shown would require in order to accommodate such irregular conditions.

The ring angles are two $2 \times 2 \times \frac{1}{4}$ in., with a gross area of 1.88, or a net area of 1.50 sq.in., which at 15,000 lb. per sq.in. tension are good for 22,500 lb. The side posts are designed with two $2\frac{1}{2} \times 2\frac{1}{2} \times \frac{1}{4}$ -in. angles, which are good for 22,000 lb. in compression, using the formula

$$P = \frac{15,000}{1 + \frac{l^2}{13,500 r^2}}$$

in which *l* equals 6 ft. The ring thus designed weighs about 420 lb. or 84 lb. per linear foot, showing a slight saving in weight over the old 10-ft. frame.

Clay and Shale in Clarion County, Penn.

The clays and the shales of Clarion county, Penn., are reported upon in *Bull.* 315 of the United States Geological Survey. Both clays and shales are abundant within the quadrangle, the shales being suitable for the manufacture of brick and tile and are well scattered over the entire region. The workable deposits of flint clays are confined to the northern part of the area. Recently there has been a revival of interest in these deposits, as a result of the beginning of construction of a new railroad that will pass near some of the best deposits. The clay makes a fair quality of firebrick and the coal and natural gas that are available in all parts of the region, afford cheap and efficient fuels.

Gasolene Locomotives for Mine Use

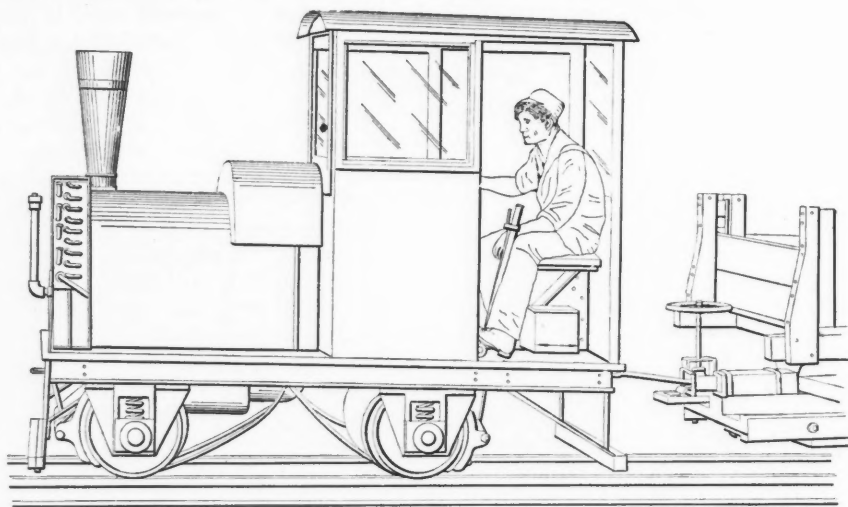
One of the latest developments in the line of mechanical haulage is the gasolene locomotive. These machines are now made small and compact, so as to be suitable for mine haulage. The manufacturers, Fairbanks, Morse & Co., Chicago, Ill., first designed these locomotives to suit the requirements of contractors, industrial plants, etc., but the increasing demand for a machine that would handle coal cheaper than rope haulage or an electric system, led them to modify this type to meet the exacting conditions of mine haulage.

The gasolene locomotives as built at present, may be operated on either gasolene or denatured alcohol. In gaseous mines, the use of alcohol is most desirable since it gives absolutely no odor. One of the main features of this machine is its weight which will allow its being readily transported from place to place.

SPEED AND CONTROL

The speeds range from 4 to 16 miles per hour, subject to change if the conditions demand, and it is possible to run the machine at any speed for any length of time without damaging the engine. The frame is of heavy steel construction well braced, and suitable provision will be made for the carrying of ballast to increase the traction. The brakes are of the standard railway type, and the wheels are made from heavy special white iron with heavy chilled tread and flange. The wheels are 18 in. in diameter, complying with the M. C. B. standard as to tread and flange.

Each locomotive is equipped with a sand box and snow brushes in winter. Suitable spring drawbars of specified height are attached at both ends. Gasolene and water tanks of ample capacity are supplied. The burnt gases are carried through a muffler to the stack, which causes the air to rush through the radiator, having a tendency to keep the radiator much cooler.



SHEFFIELD GASOLENE LOCOMOTIVE FOR MINES

The locomotives are built in two sizes, handling 10 and 25 tons respectively at a load.

DETAILED DESCRIPTION OF LOCOMOTIVE

The engine used is a four-cylinder, 25-h.p. water-cooled, improved automobile type, of heavier construction than the ordinary automobile engine, and is equipped with a governor, which operates on the carbureter, thus insuring the operator against any possible danger from racing the engine or tearing it to pieces through inattention or careless handling. The transmission is of the planetary type, and has three equal speeds in either direction. All gears run in oil and are inclosed in an oil-tight case, which is easily accessible for inspection. The gears are always in mesh and it is impossible to strip the teeth by bringing the various speeds into play. All gears are exceptionally large and made of special steel to withstand the constant and severe service.

The control of the machine is all that can be desired. The operator has a full vision in all directions, and all the levers are within easy reach. Taking all things into consideration, it is probable that the introduction of gasolene locomotives for mine haulage will prove satisfactory. The main item of expense in the present system of mechanical haulage, is the installation of the initial plant, and this cost will be practically eliminated when gasolene locomotives are used.

A stock company has been formed to develop the rich asbestos deposits of the Minoussinsky district in Siberia, says *L'Echo des Mines* (June 17, 1907). The deposits are easy to operate, and are located in an inhabited region, and only about 12 km. from the Yenissei river. This will be the first exploitation of asbestos in Siberia, although Russia exported about 225,000 poods in 1904, 266,000 poods in 1905, and 405,000 poods in 1906.

Charging a Modern Iron Blast Furnace

How the Ores, Flux and Fuel Charged in a Blast Furnace Can Be Adjusted to Produce Definite Results in the Output

BY BRADLEY STOUGHTON*

In the previous articles of this series¹ the construction of the blast furnace, the chemical reactions which occur in the furnace, and some points in its operation have been described. In the present one the variations required in the charge of the furnace, to produce the required results in pig iron, are considered.

DIMENSIONS OF BLAST FURNACE

The size of a modern blast furnace is limited by the conditions of its work. The hearth may not be much more than 15 ft. in diameter, or the blast from the tuyeres will not be distributed evenly to the center. The batter of the bosh walls cannot be much more nor less than a certain amount, because they must give support to the charge above them, and yet allow the solid coke to slip down them. The height of bosh is limited because its top must be practically the same as the top of the smelting zone, that is, no solid material except coke should descend into the bosh. These conditions therefore limit the diameter of the top of the bosh to not much more than 22 ft. From the bosh the stack walls must decrease in diameter upward in order that the descending charge, which swells in the reactions that take place from the throat downward, shall not become wedged in the stack, as the throat must have a sufficiently large diameter properly to charge the materials; this limits the height of the stack. Modern furnaces are therefore usually built about 90 ft. in height, and an increase above that limit has resulted in some cases in a decrease rather than an increase of fuel economy.

CALCULATING A BLAST-FURNACE CHARGE

Let us assume that we desire to produce a slag containing 55 per cent. lime, 15 per cent. alumina and 30 per cent. silica, and that the materials, from which the charge is to be made, analyze accord-

TABLE I.

Material.	CaO, Per Cent.	MgO, Per Cent.	Al ₂ O ₃ , Per Cent.	SiO ₂ , Per Cent.	Fe ₂ O ₃ , Per Cent.	Fe, Per Cent.
Ore, A.....	5	3	2	11	..	60
Ore, B.....	2	..	12	16	..	50
Coke ash....	20	..	18	50	..	10
Limestone..	46	3	2	4	..	2

*Adjunct professor of metallurgy, School of Mines, Columbia University, New York.

¹This JOURNAL, July 27, Aug. 3 and Aug. 17, 1907.

ing to Table I. Assume furthermore that the coke ash is equal to 10 per cent. of the coke, and that the iron we are going to make will contain about 1 per cent. silicon.

Silicon in the Iron—This last assumption necessitates allowing a corresponding amount of silica, because the silica reduced and absorbed by the iron will not be available for slag-making purposes. One per cent. of silicon is roughly equal to 2 per cent. of silica; we may therefore make the requisite allowance by subtracting from the silica in each material an amount equivalent to 2 per cent. of its iron content. Thus we begin to make up Table II.

TABLE II.

Material.	CaO, Per Cent.	MgO, Per Cent.	Al ₂ O ₃ , Per Cent.	SiO ₂ , Per Cent.	Fe ₂ O ₃ , Per Cent.	Fe, Per Cent.
Ore, A.....	5	3	2	11	..	60
Ore, B.....	2	..	12	16	..	50
Coke ash....	20	..	18	50	..	10
Limestone..	46	3	2	4	..	2

Magnesia—In considering slags magnesia is classified under the head of lime. We cannot do this, however, by a simple addition of the figures of the percentages, because 1 per cent. of magnesia will do the chemical work of 1.4 per cent. of lime, on account of the difference in molecular weight (CaO = 56; MgO = 40). Consequently, we multiply each percentage of magnesia by 1.4 and add the sum thus obtained to the percentage of lime in each material, thus obtaining column two in Table III.

TABLE III.

Material.	CaO.	Al ₂ O ₃ .	SiO ₂ .
Ore, A.....	9	2	10
Ore, B.....	2	12	15
Coke ash....	20	18	50
Limestone....	50	2	4

Self-fluxing of Materials—It is evident that in so far as each of the materials in Table III contains all the components of the slag they will partially flux themselves. For example, the 2 per cent. of alumina in ore A will theoretically combine with 4 per cent. of the silica (2 per cent. × (30 ÷ 15) = 4 per cent.) and 7 per cent. of the lime (2 per cent. × (55 ÷ 15) = 7.3 per cent.) to make a slag of the desired proportions, and leaving unfluxed percentages as in the first line of Table IV.

In the same manner we may use up all of the lime in ore B by uniting it with weights of alumina and silica in proportion to the percentages of these components in the slag. Similar simplifications in the analysis of coke ash and limestone may then be calculated, and Table IV will be completed.

TABLE IV.

Material.	CaO.	Al ₂ O ₃ .	SiO ₂ .
Ore, A.....	2	..	6
Ore, B.....	..	11.5	14
Coke ash....	..	13.0	39
Limestone....	43	..	..

Weight of Charge—Let us assume that we are going to make one ton of pig iron for every ton of coke used in the charge, and that the coke will be put in charges weighing 11,000 lb. each. This weight includes about 10 per cent. of moisture, dust, etc., so we calculate with it as if it weighed only 10,000 lb. Now let us determine how much ore will be put in each charge. The ores average 55 per cent. of iron; therefore, 10,000 ÷ 0.55 = 18,000 lb. ore must be in each charge.

Adjusting the Alumina and Silica—Next adjust the different materials so that the weight of alumina shall be 15/30 of the weight of silica. In the first rough approximation of this we may neglect the coke ash because the weight of this ash is so small in relation to the other materials. Therefore only the two ores need be apportioned and we quickly find by trying a few mixtures at random² that 60 per cent. of ore A mixed with 40 per cent. of ore B will give the desired relation²: 60 per cent. × 6 + 40 per cent. × 14 = 920 parts of silica; 60 per cent. × 0 + 40 per cent. × 11.5 = 460 parts alumina; $\frac{460}{920} = \frac{15}{30}$. Now draw Table V and enter 10,800 lb. of ore A (= 60 per cent. of 18,000), 7200 lb. of ore B, 1000 lb. of coke ash (= 10 per cent. of 10,000), and the percentages from Table IV. All the squares in this table may then be filled in except those marked A, B and C.

Adjusting for Lime—It is now only necessary to determine the amount of total lime that shall bear the correct relation to the alumina and silica calculated. This we do by means of the method shown in the figures next to

²Try first 50 per cent. of each and we see that there is too much alumina; therefore try less than 50 per cent. of the ore having the most alumina, and correspondingly more of the other, and we have it.

TABLE V.

Material.	Weight	CaO.		Al ₂ O ₃ .		SiO ₂ .	
		%	Lb.	%	Lb.	%	Lb.
Ore, A.....	10,800	2	216	.....	.....	6	648
Ore, B.....	7,200	..	.....	11.5	828	14	1008
Coke ash.....	1,000	..	.....	13.0	130	39	390
Limestone....	C 8,050	43	B3466	.....	.....	..	.....
Total lb.....			A 3682		958		2046

To obtain the total pounds of lime:
 Al₂O₃ - 958 × 55 ÷ 15 = 3513 lb.
 SiO₂ - 2046 × 55 ÷ 30 = 3751 lb.
 Average of 3513 and 3751 = 3682 lb.

Table V. We enter this in the square *A* of Table V. The figures at the square *B* are then obtained (3682 - 216 = 3466), and thence the weight of limestone to be used (3466 ÷ 0.43 = 8050).

Checking the Calculations—We now check up all the calculations by making up Table VI, in which we go back to the original percentages found by chemical analysis and given in Table I. In making up this final table, however, we use our experience in making slag calculations and estimate slight changes. For example, Table V shows us that the alumina comes a little low in relation to silica; therefore

TABLE VI.

Material.	Weight, lb.	CaO + MgO.		Al ₂ O ₃ .		SiO ₂ .		Fe.	
		%	Lb.	%	Lb.	%	Lb.	%	Lb.
Ore, A.....	10,400	9	936	2	208	11	1144	60	6,240
Ore, B.....	7,600	2	152	12	912	16	1216	50	3,800
Coke ash.....	1,000	20	200	18	180	50	500	10	100
Limestone.....	8,200	50	4100	2	164	4	328	2	164
Total weights..			5383		1464		3188 (a) 206		10,304
			=54.8%		=14.9%		2982 =30.3%		

(a) 2 per cent. of 10,304.

we increase ore B, say, by 400 lb., and decrease ore A correspondingly. But ore A is high in lime; therefore we use a little more limestone to offset this reduction.

These figures are much closer to those desired than the limit of accuracy in furnace operation. The chief difference is that we are making a little more iron with 10,000 lb. of coke than we intended. If any change seems necessary, it is then well to reduce the weight of ore A to 10,000 lb., leaving everything else the same. This will lighten the burden and bring the calculated lime, alumina and silica even closer to the desired figures.

Phosphorus and Manganese—No account has been taken in the calculation above of the phosphorus. This is necessary sometimes. For example, if ore A happened to be very high in phosphorus we could not use so large a proportion of it. It would then be necessary either to secure another ore low in both phosphorus and alumina, or else to make a slag with less alumina. The same line of reasoning applies to manganese.

Power Transmission by Belt

In transmitting power by belts, the resistance of the belts to slipping is independent of their breadth, therefore there is no advantage to be derived from increasing this dimension beyond what is necessary to enable the belt to resist the strain it is subject to. The ratio of friction to pressure for belts over wooden drums is, for leather belts when worn, 0.47, when new 0.5, and when working over a turned cast-iron pulley, 0.24 and 0.27.

A leather belt will safely and continuously resist a strain of 350 lb. per sq.in. of cross-section, and a section 0.2 sq.in. will transmit the equivalent of a horse-power at a speed of 1000 ft. per min. over a wooden drum; a section 0.4 sq.in. will transmit equal power over a turned cast-iron pulley. In high-speed belting, the tension or the breadth of the belt should be increased so as to prevent slipping. Long belts are in general more effective than short ones. The upper side of a pulley should always carry the slack belt.

In order to throw a belt upon its pulley, it should always first be laid over the pul-

ways be kept free from grease and animal oils. When they slip, apply a little boiled linseed oil to the inside of the belt and sprinkle fine chalk powder over the oil.

FINDING THE LENGTH OF A BELT

In order to find the length of belt required, add the diameter of the two pulleys, multiply the sum by 3½, take one-half of the product and add it to twice the distance between the centers of the two shafts. In calculating the power of belting, it has been found that a 1-in. single belt, running at a speed of 1000 ft. per min. will transmit one horse-power, while a double belt of the same dimensions, running at 700 ft. per min., has an equal capacity. In general the horse-power of any belt is equal to its speed in feet per minute multiplied by its width and divided by 1000 for single and by 700 for double belts.

Rescue Work in Scottish Collieries

Now that the question of the use of breathing apparatus for coal mines in case of explosions and underground fires is receiving so much attention in Great Britain, as evinced by the recent report of the Royal Commission on Safety in Mines, it is of interest to note what is being proposed in some of the Scottish coalfields.

About a year ago a serious accident occurred at Lumphinnan's colliery in Fife. An old fire that had been bricked off years before began to show signs of revival, and suddenly some of the men delegated to repair the brick stopping were overpowered. The coal owners in Fife met together subsequently and with the assistance of the inspector of mines made a thorough examination of the various apparatus on the market.

Eventually it was decided to adopt Garforth's instrument, that known as the Weg apparatus, described in the report of the royal commission. A central station is to be built at Cowdenbeath, which is a central point for all the Fife collieries, and equipped with 20 such apparatus. It is to be in telephonic communication with all the collieries. About five sets of apparatus are to be kept at each colliery, and all the officials and 20 men at each colliery are to be instructed on the construction and use of the instruments. The Fife district is, more than any other coalfield, in need of these breathing machines, owing to the liability of the coal to spontaneous combustion. Even when the burning section is dammed off, quantities of carbonic oxide appear.

It is stated that the Russo-Chinese Bank is closing its assay offices in Blagoveschtchensk and Nikolaieffsk, on the Amur, in Siberia, because of the losses incurred in connection with these establishments.

ley which is not in motion, and then it should be thrown over the edge of the moving pulley upon its face.

Years of experience have shown that a belt will transmit about 30 per cent. more power, with a given tension, when the grain (the smooth side of the leather) is in contact with the pulley than when the flesh side is turned inward. The leather is also less liable to crack as the structure on the flesh side is less dense and the fibers yield more easily. Also belts adhere better to smooth than to rough pulleys. The adhesion is about 50 per cent. greater on a pulley covered with leather than on a smooth iron pulley. Large pulleys or drums may be covered with narrow strips of leather or with longer strips wound spirally. Pulley covers are manufactured in strips of any required width and of uniform thickness.

All leather belts should be kept soft and pliable by using tallow occasionally and neatsfoot or liver oil, with a little resin when they show signs of hardness and dryness.

In using rubber belts, they should al-

The Nordberg Compound Steam Stamp

Steeple-compound Steam Stamps in the Lake Superior Copper District. Relative Economy of Simple and Compound Types

SPECIAL CORRESPONDENCE

The use of the steam stamp has been general for a long time in the mills of the Lake Superior copper district, owing to its large capacity and rapid work on the great quantities of rock which must be crushed.

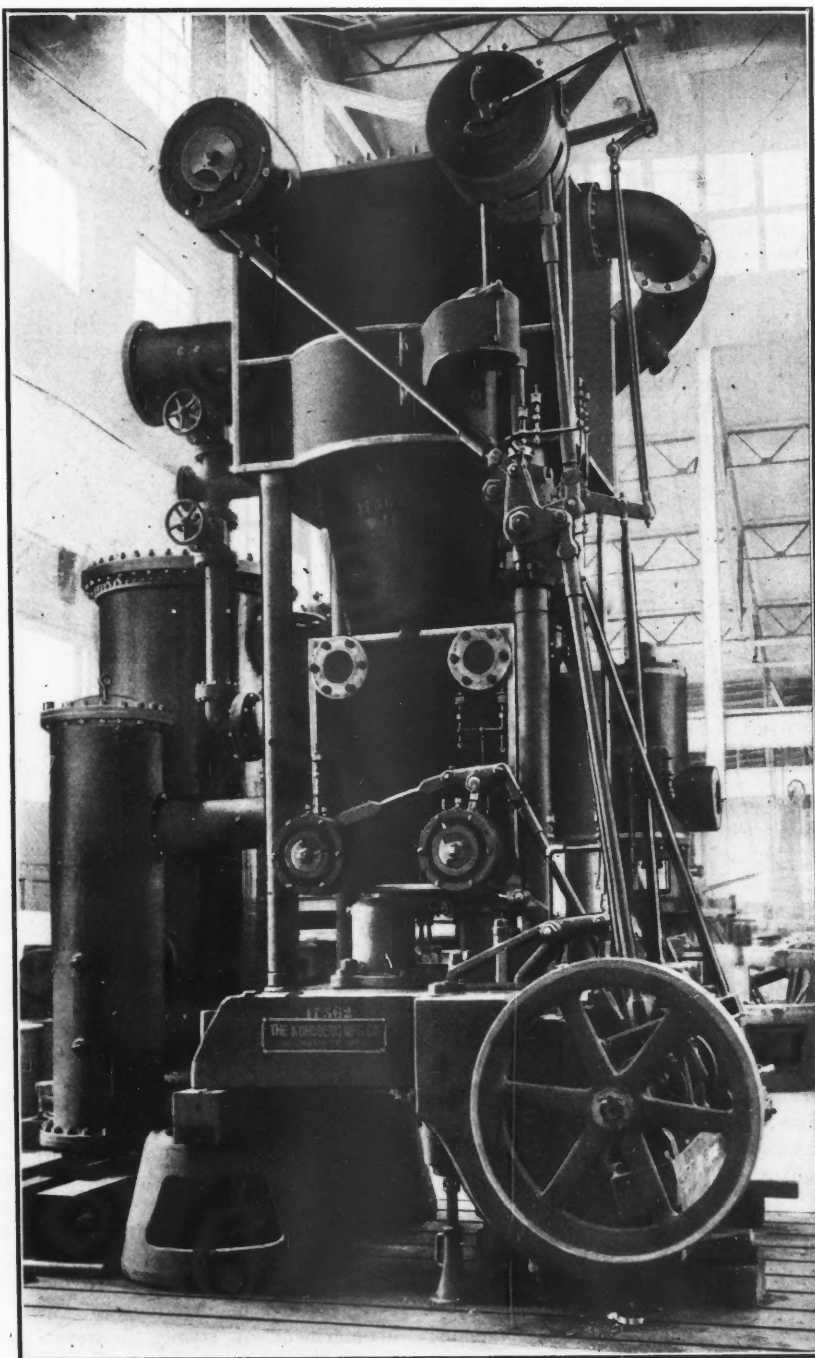
Up to 1903 the stamp most commonly in use in the copper district was the simple stamp. This consists of a steam cylinder 20 in. in diameter by 24 in. stroke fitted with four Corliss valves. The cylinder is mounted on a heavy casting or entablature which serves to connect it to the four columns, which in turn are supported by heavy sills anchored to the foundation. The columns carry two sets of guides which serve to support the stamp shaft and stiffen the whole construction. The piston rod extends through the entablature to a large bonnet where it is connected to the stamp shaft proper. In order to protect the stamp against too high a lift, the entablature is provided with a large stuffing box filled with rubber and covered by a plate against which the bonnet strikes before the piston strikes the top-head.

The lower end of the stamp shaft is dovetailed, so as to take a chilled cast-iron shoe weighing about 800 lb., the total weight of the reciprocating parts being about 5500 lb. The mortar is secured to solid cast-iron anvil blocks by means of links which are shrunk on, and the most recent practice is to have anvil blocks rest directly upon a concrete foundation, to which they are connected by anchor-bolts. The mortar is covered by a top plate supported by four distance pieces and bolts, and the cylindrical mortar screens are secured between this top plate and mortar proper. At the amygdaloid mines the general practice is to use $\frac{5}{8}$ -in. mesh mortar screens. At the bottom of the mortar there is a chilled cast-iron die and the inside of the mortar is lined throughout with chilled liners. The mortar is fed with rock through a hopper. The maximum sizes of rock fed to the stamp are pieces whose smallest dimension is about 4 inches.

The stamp is provided with a throttle valve so constructed that steam admitted to the bottom can be throttled independently of steam admitted to the top. Each of the four valves is driven by a separate eccentric, the steam valves directly, and the exhaust valves through wrist plates. The eccentrics which drive the valves at bottom of cylinder, or those which control the lift, are mounted on a shaft which is driven at uniform speed by means of a

belt; the eccentrics which drive the valves on top, or those which control the blow of stamp, are mounted on a shaft driven from the first by means of a drag link, which therefore gives it a non-uniform motion, resulting in a very fast motion at opening and closing of the valves. The connection between the valve drive rods and stems is made adjustable, so that

valve setting may be quickly done. In order to facilitate this the bonnets are provided with brass plates representing a cross section of the cylinder ports; revolving inside of this, and keyed to the extended valve stem, is another plate representing the valve; hence the relation between valve and its seat can be observed at all times.



STEAM STAMP, SHOWING VALVE GEAR

The average practice is to operate these stamps condensing, under a steam pressure of about 115 lb., at a speed of 105 to 110 blows per minute. Under these conditions their capacity is from 475 to 550 tons per 24 hours.

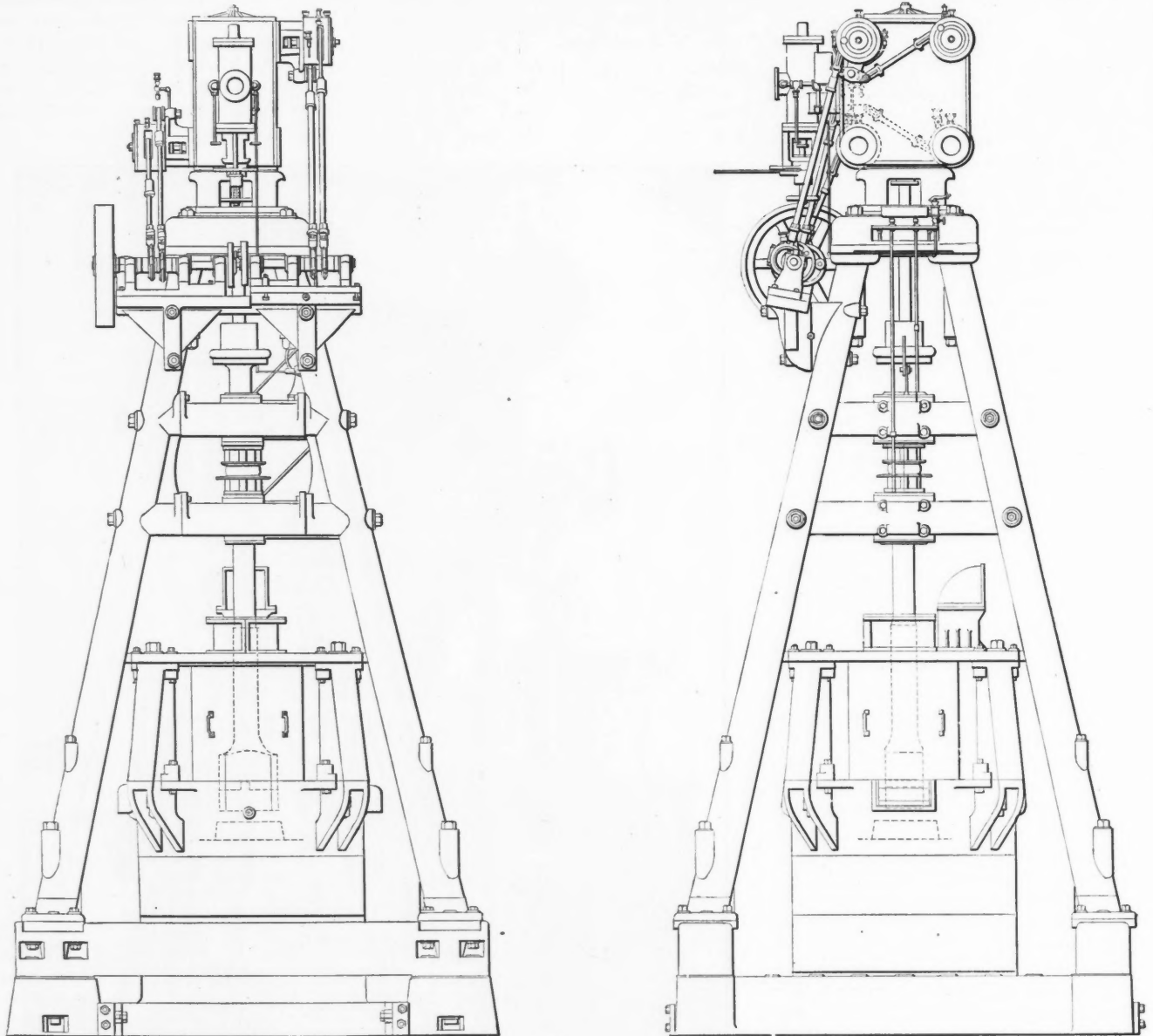
An inherent disadvantage of any simple stamp is the large clearance made necessary by the variable thickness of the rock between shoe and die, also by the allowance for the wear of die and shoe, the

haust into a large receiver, from which the low-pressure stamp would take its steam. Two sets of such stamps were installed in the stamp mill of the Champion Copper Company; the high-pressure cylinders being 21 by 24 in., low-pressure cylinders 32 by 24 in. Piping was so arranged that either stamp could be operated independently of the other. These stamps when tested demonstrated all the economy expected of them, stamping prac-

the economy. This was often impracticable for the reason that each set of stamps represented 50 per cent. of the capacity of the entire mill.

THE STEEPLE-COMPOUND STAMP

In order to overcome this disadvantage it was determined to make each stamp a self-contained compound, and in 1904 such a stamp was installed in the Osceola mill. The general construction of the stamp be-



STEAM STAMP, 20X24 IN., NORDBERG MANUFACTURING COMPANY

latter losing from 4 to 6 in. of its thickness before it is renewed. Under actual conditions of operation the clearance is in the neighborhood of 20 per cent.

THE FIRST COMPOUND STAMP

In 1902 the problem of how to increase the economy of stamps was carefully considered, and it was finally determined to operate two stamps as a cross-compound engine, the high-pressure stamp to be operated with 160 lb. steam pressure and ex-

tically twice as much rock per ton of coal burned as the simple stamp. This was considered an excellent showing in view of the fact that when these stamps were designed there were very few accurate data as to the power or proper steam distribution of simple stamps from which proper proportions of compound stamps could be determined. Such an arrangement of stamps, however, possessed the disadvantage of having to be operated in sets of two in order to secure

low the entablature is the same as for simple stamp. The steam end, however, was made steeple compound, having cylinders 15½ and 32x24 in. Figs. 1 and 4 show the construction of the steam end of this stamp. The low-pressure cylinder was mounted above the high-pressure cylinder so as to facilitate removal of pistons, etc. In this stamp the weight of reciprocating parts is about 7800 lb. in all.

The general construction of valve-gear for the high-pressure cylinder is the same

as for the simple stamp. The low-pressure cylinder, however, is provided with only two valves placed at the top. The under side of the low-pressure piston is in constant connection with the condenser,

economy and capacity of the steeple-compound stamp as compared with the simple stamp at the Osceola mill, provisions were made so that each stamp could be operated by a separate boiler, and the coal and rock

equipped with tandem-compound stamps and the actual results obtained during the year 1906 as compared to the year 1904, when the mill was equipped entirely with simple heads, have confirmed the economy as determined by above tests.

The steeple-compound stamps are now in operation in many stamp mills in the Lake Superior district.

TABLE I.

	COMPOUND STAMP.	SIMPLE STAMP.	INCREASE DUE TO COMPOUND STAMP.	
			Units.	Per Cent.
Date.....	Aug. 1-27, 1904.	Jan. 18 to Feb. 13, 1904.		
Duration of test.....	24 days.	24 days.		
Tons per day.....	686.6	543.3	143.3	26.4
Tons per 24 hours.....	709.4	554.5	154.9	28.0
Tons rock per ton coal.....	88.3	62.8	25.5	40.6
Possible hours running time.....	576.0	576.0		
Actual hours running time.....	559.5	585.5		
Lost time.....	16.5	10.5	6.0	
Lost time per cent.....	2.8%	1.8%		1.0%
Steam pressure.....	148.0	118.0		
Receiver pressure.....	26.0			
Average temperature feed water.....	203.0	202.0		

Lignite in North Dakota

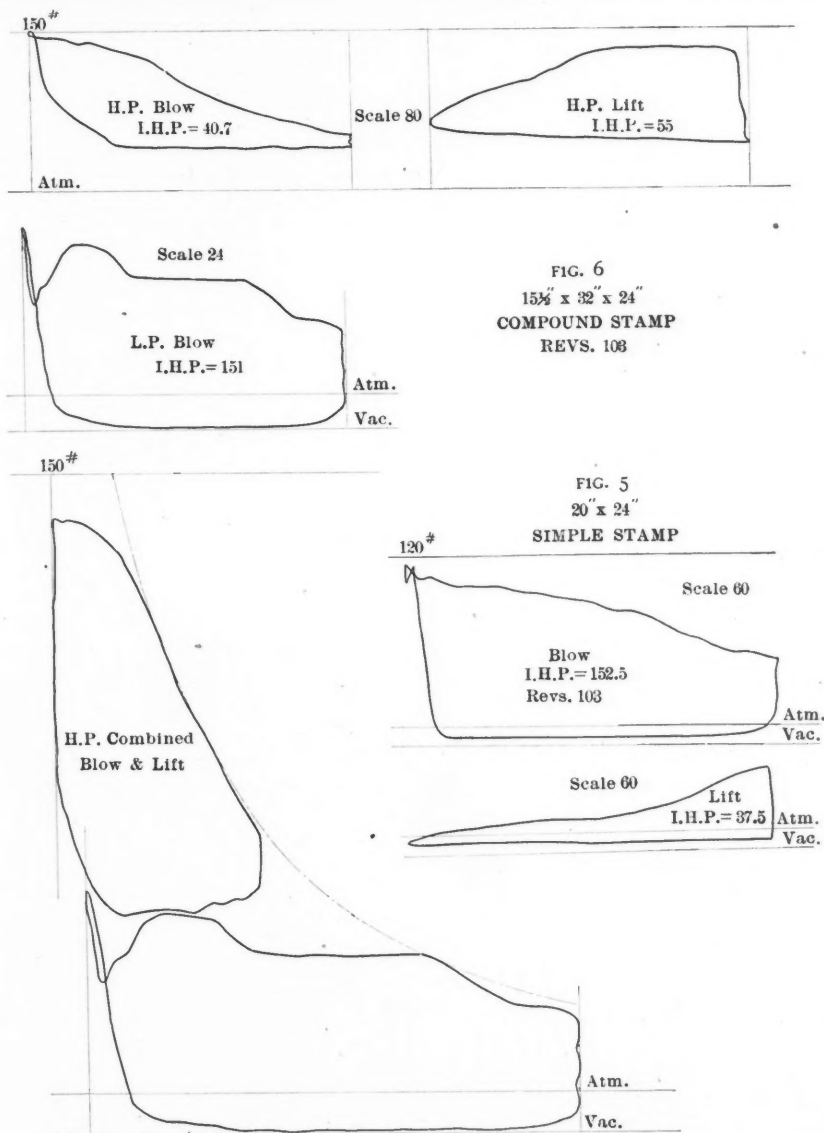
According to the United States Geological Survey, all of the mineral fuel produced in North Dakota is lignite, extensive beds of which underlie the greater part of the western part of the State. The lignite beds are local in development, and careful prospecting by drilling is essential before development can be undertaken. The deposits vary in thickness from a few inches to 33 feet.

The lignite is brown in color and as it comes from the mine contains about 40 per cent. of moisture, some of which it loses on exposure to the atmosphere. On account of its heavy percentage of moisture and rapid disintegration on exposure, it does not stand transportation well; its sale is restricted also by competition with Pennsylvania and West Virginia coal, which find their way into this country by way of the Great Lakes. Briquetting the lignite has thus far not proved very successful, but it is hoped that some method may be devised whereby it may be more satisfactorily utilized.

Driving a Spike under Water

It is sometimes necessary, says the *Iron Age*, to drive a spike under water, and much difficulty is experienced in the operation. It has been suggested that a piece of gas pipe large enough to hold the spike comfortably, and small enough to keep it upright, might be used in conjunction with a steel drift slightly longer than the pipe. The length of the pipe will depend upon the depth of the water, while the drift should leave a hand-hold above the pipe. By means of this expedient nails can be driven in several feet of water, and at any angle desired, as the spike will necessarily go at the angle at which the pipe is held, and the drift readily transmits the hammer blows to its head. This has been found a great help in building bottoms for foundations.

The only active manganese mine at work in Queensland in 1906 was the Mount Miller, at Gladstone, which produced 1113 tons of high-grade ore, averaging 77.75 per cent., and reaching as high as 86.26 per cent. of manganese-dioxide.



INDICATOR DIAGRAMS, SIMPLE AND COMPOUND STAMPS

thus eliminating a large amount of clearance. All the lifting effort is done in the high-pressure cylinder. Fig. 5 shows a set of typical indicator cards from a steeple-compound stamp.

In order to determine the relative

weighed. Each test covered a period of 24 working days, hence results show practical working conditions. The comparative results obtained are shown in the accompanying Table I. As a result of this test the Osceola mill was completely

A Cripple Creek Ore-handling Plant

A Single, Counterbalanced Skip, Discharging into Self-dumping Cars, Adds 33 Per Cent. to the Capacity of a Shaft

B Y S. A. W O R C E S T E R *

In this district one notable characteristic of the usual practice is the breaking and hoisting of the entire vein matter with little or no sorting in the mine. At the surface this mixture is first passed over inclined wire cloth screens with $\frac{3}{4}$ - to 1-in. openings. The screenings usually carry higher values than the sorted ore. After screening the ore is either sorted dry or washed and then sorted wet. Probably 80 per cent. of the crude ore is rejected and sent to the dump. This accounts for the immense waste dumps of the district, also for the large hoisting plants necessary for a comparatively moderate output of ore. The slimes which result from washing usually carry considerably higher values than the screenings.

Electric power is now being supplied by the power companies operating in the district at such low rates that even the largest mining plants are finding it more economical than steam. While there is always the possibility of a rise in the price of current, there is fully as great a probability of a rise in coal as past experience has shown. Thus it happens that electric power is rapidly growing in favor.

COUNTERBALANCED SKIP HOIST

The hoisting arrangement here illustrated is of a type little, if at all, known in this State. One end of the $\frac{7}{8}$ -in. plow steel hoisting rope is attached to the skip of two tons capacity, while the other end, after passing several half turns around each of the hoist sheaves or drums, is attached to the overbalance weight, which balances the skip with all attached parts plus one-half the average load. The tail-rope, attached below the skip and over-weight and passing under the sheave near the bottom of the shaft, keeps the hoist ropes in constant balance. The work of the motor, therefore, is only that of hoisting the actual load, plus friction. To do the work of hoisting two tons of ore, the hoist first raises 2000 lb. of unbalanced ore, then running in the opposite direction raises the 2000-lb. overbalance of the weight.

The arrangement at first proposed contemplated sinking a shaft 1500 ft. deep with two hoisting compartments and a manway and equipping it with a double-drum electric hoist of ordinary standard type. Upon being consulted, I pointed out that by using the overbalance system here illustrated, on which patent is now pending, and by including a single skip

of sufficient size, the required hoisting capacity can be obtained with the present shaft which has one hoisting compartment and a manway. This arrangement eliminates the expense of the new three-compartment shaft, and reduces the size of hoist required fully 33 per cent., with proportionate reduction in cost of current.

The continuous-rope system wears much longer than the drum hoist for the reason that the rope winds always in true alignment and does not rub on itself as when winding several laps on drums. The skip is to be filled by dumping the mine cars directly into it and to discharge its load into a side-dump car which travels from the head frame to the ore house. The bridge on which it travels has a 5 per cent. grade and after the loaded car has run down to the ore house by gravity and discharged its load, it is drawn back to the head frame by a light cable. The cable runs over a sheave at the head-frame and winds on a small drum in the hoist room. A similar rope, winding on the under side of this drum and passing over a sheave at the shaft has a weight attached and hanging in the manway. This weight is sufficient to return the empty ore-car, but is counterbalanced by the loaded car. Its speed is regulated by a governor brake and it is automatically stopped at dumping and loading points, by the same brake, the stops being set by levers controlled by the engineer. The car cannot start with a load until the skip, commencing to descend, releases it. The dumping cams also hold the door open so that all fine stuff will run out before the car returns to the loading position.

METHOD OF HANDLING

The engineer's levers for setting the dumping cams in the ore house have a mechanical arrangement similar to that used with block-signal systems in railroad work, the five levers being consecutively numbered and connected to the dumping cams by wires. They are also connected to automatic stops at the drum, which stop the car at the proper dumping point. Dumping at nearly a right angle to the grizzly is a feature of value as compared with those arrangements which dump parallel, because by checking the flow the screenings have a better chance to drop through the grizzly and less fine stuff is carried over with the coarse ore. The angle of the wire-cloth screens is adjustable to suit different ores, whether dry or wet and sticky.

The five ore-washers have bottoms of $\frac{1}{4}$ -in. plate with $\frac{3}{8}$ -in. perforations. The spray pipes above the washers have $\frac{1}{4}$ -inch perforations and are supplied with pressure water by a 3-in. rotary pump with direct-connected induction motor. The slimes washed from the ore return with the water to a tank having a baffle which reduces the current to a very low velocity. A baffle is also provided for the pump suction, so that there are no rapid currents in the body of the tank to interfere with the settling of the slimes.

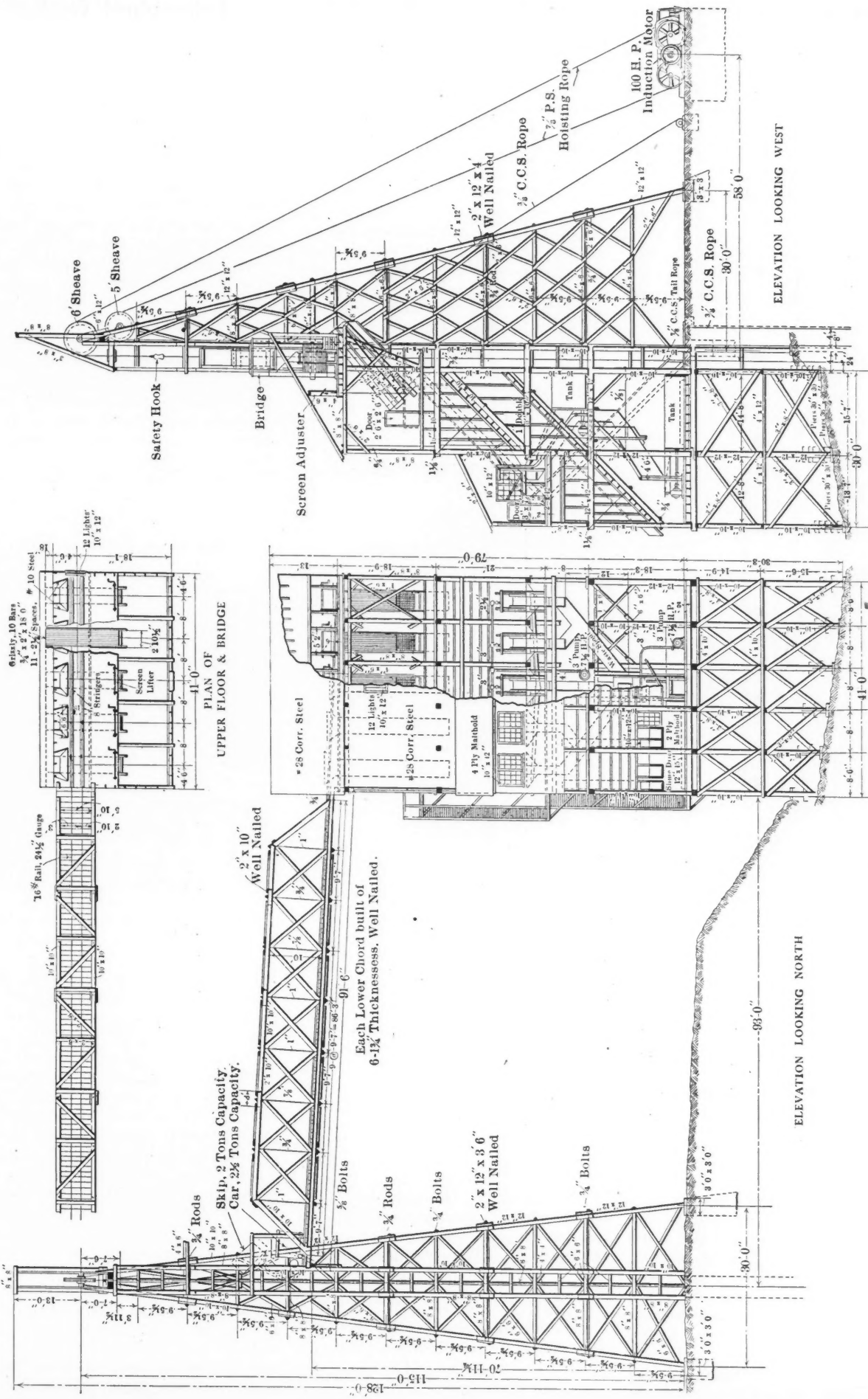
The ore is pushed over the front of the sorting tables and drops into the ore bins, while the waste is pushed over the side of the tables into waste spouts which converge at the upper end of the waste washer which, although larger, is otherwise similar to the ore washers. The question may here be asked, why not make the ore washers longer and do all the washing at one operation? The answer is that the second washing is found to have an added effect because new surfaces are exposed to the spray. In one plant now operating in this district it is found profitable to wash the waste three successive times.

The head-frame and ore house are made high in order to dump the waste at the height of the present shaft collar. The slimes drier is a steam-heated plate, on which the slimes are thrown when the tanks are shoveled out. The sorting tables are perforated and any drip from the washed rock returns to the tanks.

The main timbers of the head-frame are butt-spliced with ends simply squared. The usual practice differs from this in using the scarf or diagonal splice, which is not only more expensive but also weaker for resisting compression, the only strain which these members are ever likely to receive. The bracing of this head-frame consists of light material closely spaced, whereas the usual practice is to employ heavy braces, in many cases as heavy as the main timbers, and with long spacing. Expensive framing is avoided as far as practicable, the only mortising being done at the ends of the girts. The bracing, instead of being framed together, is spiked to the frame, a construction which is amply justified by its constant use in railroad work.

Placing the two hoisting sheaves in the same plane centralizes the strains and makes the head-frame cheaper and more symmetrical than the usual arrangement of parallel sheaves.

*Consulting mechanical engineer Victor, Colo.



GENERAL ELEVATIONS OF HEAD-FRAME AND ORE-HANDLING PLANT

ADVANTAGES OF CONTINUOUS-ROPE SYSTEM

The continuous-rope hoisting system is of particular value where the peak of load is to be reduced to a minimum. This is especially true in localities where the peak of load for any month regulates the current charge for that month. In some such cases the cost of current for the unbal-

capacity of the plant. The sheave hoist, with its short shafts and narrow frame and foundation, is of course a less expensive machine than the drum hoist, and as the tail rope has very little more than its own weight to carry, and its breaking would not endanger the skip, a cheap rope or almost any second-hand rope will an-

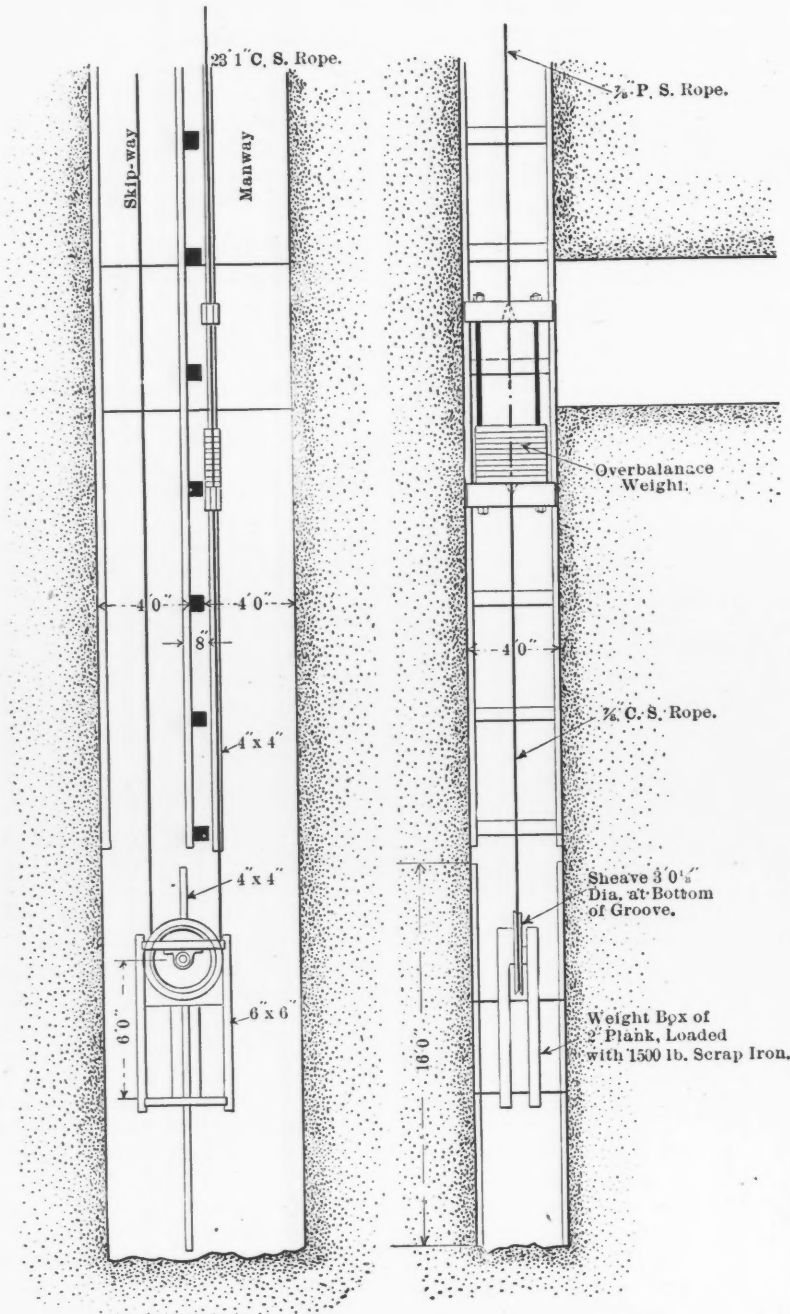
Deflocculated Graphite

Edward G. Acheson delivered an experimental lecture at the Niagara Falls convention of the American Institute of Electrical Engineers, illustrating the properties of a recently discovered form of graphite. This graphite is produced by adding water, gallotannic acid and ammonia to unctuous graphite as produced in the electrical furnace. Under these conditions the graphite is miscible with the water. When it is mixed with water, tannic and ammonia the graphite assumes what is called a deflocculated condition, a condition of fineness beyond that obtainable by mechanical means—one approaching the molecular state. Deflocculated graphite in water has been used successfully instead of oil in sight-drop feed oilers and with chain-feed oilers. It possesses the remarkable property of preventing rust or corrosion of iron or steel. The deflocculated graphite has also been successfully employed with kerosene oil as an effective lubricant.

American Coal in Italy

The following information as to the entrance of American coal into Italy is given by *L'Echo des Mines* (July 15, 1907). It seems that the Italian railroad called for bids from several English collieries to furnish 150,000 tons of steam coal to be delivered between June 20 and Aug. 20. Some firms contended that it was impossible to deliver such a large amount of coal in so short a time, and upon so little notice, and others sent in bids which were too high. Considerable surprise was caused when it was learned that the contract for the whole amount was placed in the United States, and already shipments have been made. It is also reported that German firms have placed orders for American coal to be delivered in Spanish and Italian ports.

The danger of misinterpreting official figures and statistics is well exemplified in the case of the importation of mining explosives into Great Britain. A glance at the official returns of imports shows apparently that foreign explosives are making rapidly increasing inroads, for the importation of nitroglycerin explosives has increased steadily from (in round figures) a million pounds during 1900 to three and a half million pounds during 1906. On further investigation it is found that the bulk of these are not real imports, and that most of the explosives are only sent to British ports for the purpose of being trans-shipped to other boats, which take them to their ultimate destinations. The chief explosive used in Great Britain that is imported from abroad is carbonite, which is made at Schlebusch in Germany, and the amount used in Great Britain during 1906 was 569,833 pounds.



SECTION AT BOTTOM OF SHAFT

anced hoist will be as much as three times that of a well designed overbalanced continuous-rope hoisting plant. As nearly all of the mines in the Rockies begin on a small scale and usually sink shafts with one hoistway and one manway, the change to a three-way shaft, when a large tonnage is to be hoisted, is an expensive undertaking. By using a skip of twice the usual length, it is quite feasible to hoist twice the usual load and thus double the

answer its purpose. The outlay for rope is therefore less for the continuous-rope system than for the double-drum hoist, which requires two full-length ropes for full load.

A considerable amount of scheelite (calcium tungstate) associated with wolframite and other tungsten ores has been discovered in Sardinia.

Burro Mountains Copper District

BY WILLIAM ROGERS WADE.*

The Burro Mountains are situated in Grant county, New Mexico. The present railroad point at Silver City is 15 miles distant, but a survey has been completed for a spur and construction will commence shortly. Freight is handled by wagons from the railroad for \$3.50 to \$4.25 per ton, depending on the exact location of the mine and the volume of its business.

HISTORY OF THE CAMP.

The first attempt to work the copper deposits of this district was made in 1881, when the Valverde Copper Company (afterward the Southwestern Copper Company) erected a reverberatory furnace at Paschal. The railroad terminated at Deming in those days, and it cost \$15

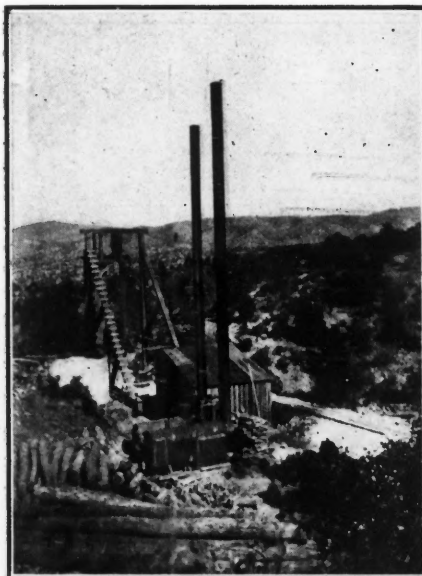
Sampson mines, together with the other property of the Southwestern Copper Company, and erected a concentrating mill. Today the mill is treating nearly 250 tons per day of ore averaging between 3 and 4 per cent. copper. The ore reserves are sufficient for a number of years and are rapidly increasing. The Comanche Mining and Smelting Company acquired property about the same time and has been developing. Several other companies have come into the district and today development is going on over a large area. The Chemung Copper Company, formerly the Tyrone Development Company, took over the Burro Chief group of claims last year and is developing three shafts. Large bodies of ore have been encountered. The same men are also developing the Alessandro group and the Houston group of claims. The Copper Gulf Development Company is working two shafts with good results. The Azure Mining Company has one deep shaft developing fissure veins and is in-

GEOLOGY OF THE DISTRICT.

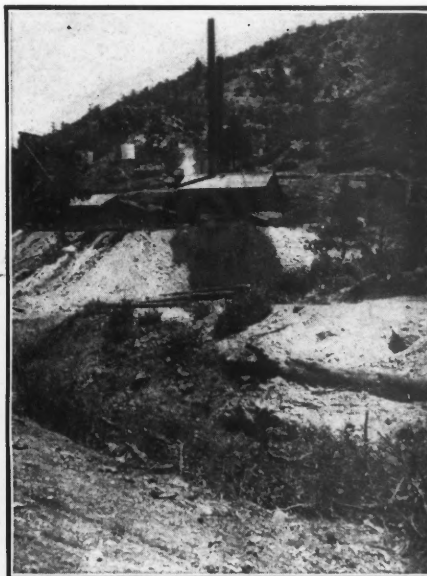
The area of copper deposits is roughly six miles wide and nine miles long, extending in a northeasterly and southeasterly direction. The area is composed of granites cut by numerous dikes of porphyry. Sedimentary rocks do not exist in the area except for a few conglomerates of small extent formed from the cementing of old arroya beds. These are often copper stained, due to the copper waters in the arroyas.

There are two classes of orebodies, those occurring in the porphyry dikes, and fissure veins in the granite. The porphyry ores are the larger and more important, and the biggest of these orebodies so far developed are confined to the large porphyry area near the center of the district around Leopold and Tyrone. Here orebodies 150 to 200 ft. wide are encountered.

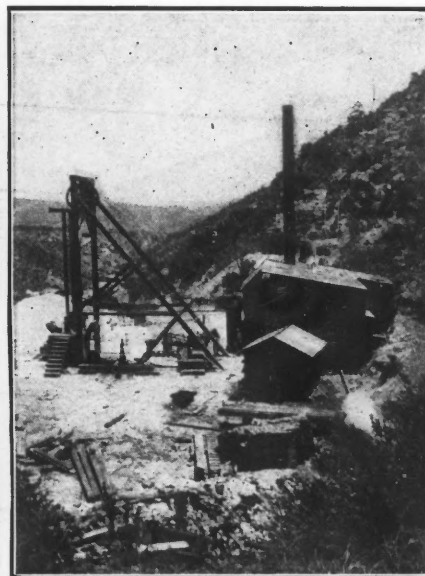
The ore is mainly black sulphide of copper (chalcocite) occurring as a secondary



NO. 1 SHAFT, CHEMUNG COPPER MINE



NO. 2 SHAFT, CHEMUNG COPPER MINE



NO. 3 SHAFT, CHEMUNG COPPER MINE

per ton to haul freight from there to the Burro Mountains. This fact and high prices for labor, together with the small supply of high-grade ore, soon closed the plant. Another attempt to work deposits in the district was made two years later when a smelter was built at Oak Grove. This attempt failed also; in fact the furnaces never ran long enough to get thoroughly hot.

From that time till 1904 the district was idle as regards copper ores, except for a few fitful attempts by leasers, especially in the St. Louis mines. Turquoise mining has been actively pursued for the past 18 years and was the only mining going on during the idle period in copper.

PRESENT OPERATIONS.

In 1904 the Burro Mountain Copper Company took hold of the St. Louis and

*Mining engineer, Burro Mountains, New Mexico.

stalling a prospecting drill to explore the porphyry ground adjoining the Burro Chief group.

The National Copper Company has proved that the ore is not confined to the vicinity of Leopold and Tyrone in the center of the district, because lying about four miles to one side, the company has opened a vein in granite 60 ft. wide. It will probably begin the erection of a concentrator this summer. This deposit carries some good chalcopyrite ore, the only one of its kind so far developed in the district, and the indications are that the ore will extend to great depths.

One thing that has delayed the development of the district is the fact that most of the outcrops are only slightly stained with iron and copper, little workable carbonate ore showing. The largest bodies occur in porphyry and often have no outcrop at all, or one so faintly marked as to make it difficult to recognize.

enrichment. These sulphides may be encountered at a depth of 75 to 500 ft. So far the bottom of the orebodies has not been reached. The ore occurs in lenses, often of great extent, which generally strike across or diagonally to the trend of the formation. In the porphyry the meeting of many slips permitting easy access of water causing decomposition and softening is favorable to the deposition of ore. These lenses have been fed by solutions, deriving their copper from large areas of surrounding slightly mineralized porphyry, leaching downward and laterally. The presence of broken and softened ground has permitted these solutions to deposit their copper, the precipitation being due to the reactions between pyrites and copper sulphate. Iron gossans are lacking at the outcrop of these lenses probably because of a second leaching and re-deposition of the black sulphide zone. In this zone much of the iron has been re-

moved in solution as a sulphate and when surface erosion brings this zone near the surface the copper again leaches down. As little iron remained in this zone a second leaching removes most of the remainder. Sometimes small bunches of carbonate ores are left, also a moderate iron gossan.

Many of the best orebodies are not indicated on the surface. One of the best surface indications is a yellowish discolored porphyry which has been leached of its original hornblende and mica crystals. When such altered discolored porphyry is present over large areas and near the center of the district the ground is considered favorable.

The second and less important orebodies, fissure veins in granite, occur as fissures of the replacement type. They are generally indicated by occasional bunches of carbonate ores, a moderate iron stain and bunches of quartz, along the outcrop. The quartz generally disappears on sinking, and the carbonate ores give place to

are sufficient to run the camp many years and many more will undoubtedly be discovered in the next few years.

Sublimed White Lead

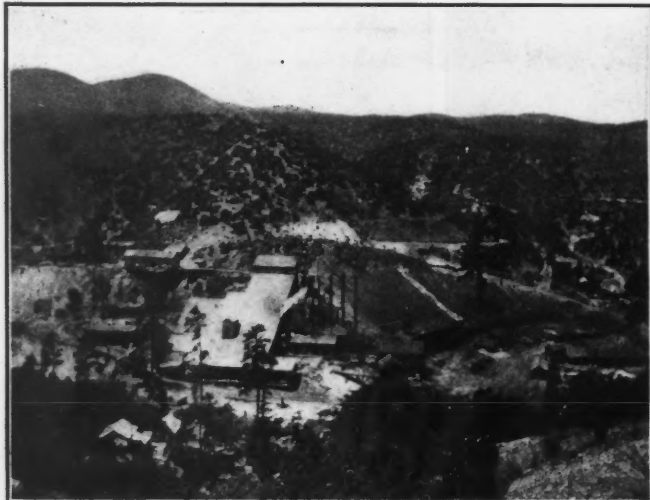
By L. S. HUGHES

The need for protective coatings caused by modern conditions of building has caused the introduction into paints of a large number of new compounds. The impetus was given about the middle of the last century by the discovery of a process for manufacturing zinc oxide from ores and a few years later E. O. Bartlett applied analogous methods to the production of a white-lead pigment from lead sulphide, or native galena. To differentiate the new material from the Dutch or corrosion process white lead, it was named according to its manufacture "sublimed white lead." The process of manu-

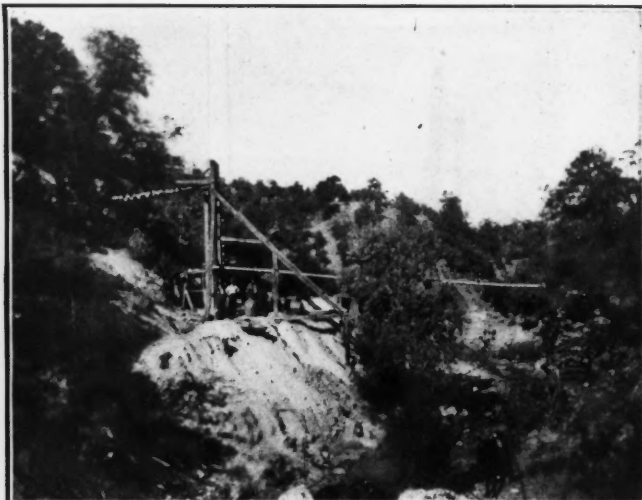
the product was a mixture of free lead oxide and neutral sulphate of lead or the true basic sulphate. Research has recently demonstrated the latter view to be the correct one.

Sublimation, when it is possible, is by far the most efficient and convenient means of purification for any substance, for the reason that the number of compounds capable of forming a vapor which condenses as a dry dust is exceedingly small. It is only because of this property of lead sulphide that a pure material can be produced directly from the ore. The process has the further manifest advantage of producing the material with particles of absolutely uniform size and of a degree of fineness that cannot be even approximated by any process of mechanical grinding.

But, in spite of its apparent simplicity and convenience, the manufacture of sublimed white lead includes a number of carefully guarded secrets. It is only by



250-TON CONCENTRATING MILL, LEOPOLD



PROSPECT SHAFT, NATIONAL COPPER COMPANY

an iron-stained reddish or yellowish clay and rotten granite on sinking until the sulphide zone is reached. Some of these veins carry carbonate most of the way down to the sulphides but these oxidized ores are too poor to work. Leaching has extended to much greater depths in the fissure than in the porphyry due to the more open formation of these veins. In one of the Chemung Copper Company's shafts a fissure vein is leached at 250 ft. while sulphides exist in the porphyry east of it on the same level and were encountered while sinking this shaft at 180 ft. The Azure Mining Company has a fissure vein which is leached below the 400-ft level. The fissure veins are always near a porphyry dike and parallel with them. It seems probable that the porphyry dikes influenced the mineralization of the fissures.

The district seems to have a promising future. Not more than 25 per cent. of the copper land is yet under development. The present known bodies of low-grade ore

manufacture has changed only in details since it was inaugurated at the Lone Elm smelter at Joplin, Mo., and in its present form is a good example of the methods used in producing fire-process pigments generally.

In outline the manufacture consists in feeding pulverized galena over an open coke fire, the furnace connecting directly with a flue through which the lead fume is drawn into a series of settling chambers by a suction fan, passing thence into a bag room of the ordinary type, where the condensed fume—now purified by the extensive air floating it has received in its long passage from the furnace to the screen system—is strained from the air and furnace gases, and is collected ready for the market.

Chemically, the process is an oxidation of the lead sulphide to the basic sulphate of lead which sublimes in the heat of the furnace and condenses into an impalpable and non-crystalline sublimate in the cooling flues. For a long time it was a subject of frequent argument as to whether

their discovery of these difficulties and the means of surmounting them that the original manufacturers have been enabled to obtain a monopoly of the manufacture. Attempts have been made to produce it by other companies, but they ended in complete failure.

A consular report from Monterey, Mexico, gives some information as to the increasing use of fuel oil on Mexican railways. The Mexican Central Railway is now taking 4000 bbl. of fuel oil daily from the Mexican Petroleum Company. The cost is \$1.10 a bbl. All new engines purchased by the Mexican Central are equipped for burning oil, and engines are being constantly remodeled in the general shops in Aguascalientes. Oil-burning engines will be soon placed in service on the Chihuahua and Guadalajara divisions of the Central. Storage tanks are being prepared at Guadalajara, Yurecuaro, Zapotlan and La Vega, and metal delivery tanks are now being erected.

Recent Developments at Wonder

By EDWARD R. ZALINSKI*

The new branch of the Southern Pacific railroad now connects Hazen with Fallon. At present one train a day connects with the Tonopah-Goldfield line. Freight is now unloaded at Fallon, and a large amount of lumber and supplies is being

so it is now possible to make Wonder the same night. Automobile connections are also established from Wonder to Tonopah, about 150 miles by the road.

Wonder has grown rapidly. The population has almost doubled since December, there being at present in the neighborhood of 800 in the camp and vicinity. A large amount of building is in progress, and the town presents an air of life and bustle. Substantial frame houses are re-

town of Victor, north of the Spider & Wasp, is growing rapidly. It has a boarding-house for the miners on this side, and frame buildings are being erected.

The pipe-line from Bench creek has been completed, the trench dug and pipe laid, but as yet is not connected. Water will be brought to a stand-pipe or tank on the ridge just north of Wonder, for distribution. The line will soon be in operation.

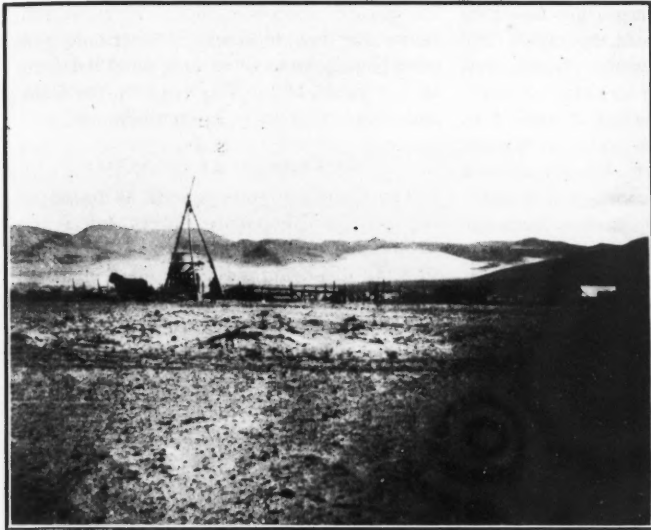


FIG. 1. STAGE STATION AT SAND SPRINGS

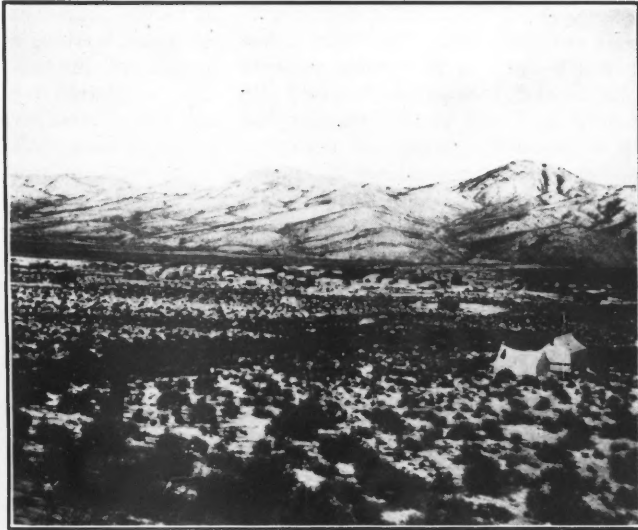


FIG. 2. TOWN OF WONDER



FIG. 3. NEVADA-WONDER MINE



FIG. 4. WASP OUTCROP AND LA PLATA MOUNTAINS

brought in. The stage road from Fallon to Wonder is in good condition. Two Concord stages have been put on the line, and the trip from Fallon to Wonder is made in a day. Four changes of six horses are used. Fig. 1 shows the stage station and well at Sand Springs. Sand mountain (Aeolian origin) is in the background, and stands out sharply against the basalt-covered hills. An automobile line has also been established and makes the run in about 5½ hours. Autos connect with the afternoon train from Hazen,

placing tents. New hotels, restaurants, stores, etc., have begun business, beside the customary number of saloons and dance halls.

There are now a number of brokers on the ground, and the town will soon have a stock exchange. Lawyers, promoters, surveyors, and people of all trades and description, are pouring into the district, and a good size boom is in progress. Two newspapers have been established. Fig. 2 shows the town at the present time, looking southwest.

Hercules is also growing. It has recently been granted a post-office. The

THE MINES

One shipment of ore has been made from the camp by the Vulture mine. This ran \$200 to \$300 to the ton.

The Nevada Wonder is sinking a shaft west of the tunnel and below the last visible outcrop of the ledge, to strike it on the northern dip. The shaft is down 100 ft. and is reported to have struck good ore. Ground has been cleared for a hoist. The Jack Pot shaft is down to the 100-ft. level. An 8-h.p. gasoline hoist has been added to the equipment. This is giving good satisfaction and three shifts are being worked. Fig. 3 shows the

*Mining engineer, Salt Lake City, Utah.

head-frame and engine house, with sacked ore in the foreground. The sorting house is in the center. Drifting is being done on the 100-ft. level and 4 ft. of ore exposed. The high-grade streak is about 2 ft. wide. The andesite bordering the ore is fractured and kaolinized. It often contains horn-silver in the cracks without any accompanying silification, though considerable hematite and limonite staining occurs. The Jack Pot will soon make its first shipment.

The Spider & Wasp leases continue to attract attention. Lease No. 7 has sacked ore and a shaft is now being sunk to strike the ledge at a lower level. On Toohey's lease, No. 13, the tunnel cut the vein as expected. Raising and sinking is now being done on ore from the tunnel level. The Spider & Wasp Company will soon begin work on its own account.

Fig. 4 is a view taken looking northwest, the outcrop of the Wasp ledge in left center. La Plata mountains are across the valley.

GEOLOGY

A correction is offered regarding former statements as to the geology of the district. The rhyolite dike on the Nevada Wonder, and also on the Spider & Wasp, is not the direct hanging of the ledge as stated, but is separated from it by 100 to 200 ft. of kaolinized andesite. This rhyolite dike is younger than some of the north-south andesite dikes, and crosses two of them on the Desert Queen claims.

Methods of Paying Miners' Wages

BY JOSEPH DANIELS*

The methods of paying wages to miners have varied in every country and district with the change from the condition resembling slavery in the sixteenth century to the present day of labor organizations and perfected methods of mining. Every period has had its particular method of payment; some of these are historically interesting.

EARLY METHODS

In the early days of mining, the owner or master set the rate and method of payment, and his word was usually law. He had absolute rights over the workman and could prevent the latter from selling his services to another mine owner. Today, the right of employer is not so absolute; the influence of organization and law have given the worker more freedom. The labor organization may set the rate of compensation; the law provides for the hours of labor and the methods of payment. So now the miner is free to move about and sell his labor in the best market.

*Department of mining engineering, Lehigh University, South Bethlehem, Penn.

This constant adjustment between the operator and the miner has resulted in a number of systems of payment of wages based on local economic conditions. For the purpose of classification, they may be divided into two classes, the day-labor, and the piece-work or contract-labor divisions.

DAY LABOR AND CONTRACT SYSTEM

Payment by day labor is the simplest and most universal method of payment in all mining countries. Wages are based on the actual working time of the miner, and necessarily in this system, superintendence is a large item of expense. Generally this method of payment is applied to unskilled labor, or labor which is not directly engaged in mining. The piece-work or contract system is more complicated, and is based upon other factors than the actual time worked. It usually considers quantity of work done, in other words, it pays for speed and value. In a great many cases, the day and the contract systems are combined.

In the piece-work system, the most general method of payment is that based on the amount of work done, either in tonnage or yardage. Any payment by volume excavated is usually calculated on the basis of weight per unit volume, but there is no necessary relation between the value of the material and the amount of excavation or mining. At the De Beers mines in South Africa, excavation of the "blue ground," the diamond-bearing formation, is paid for per load of 16 cu.ft.; and at Rio Tinto, Spain, mineral is excavated by the ton, the number of tons being found by multiplying the number of trucks by the average or approximate weight in a standard load. In most of our coal mines, coal is paid for by weight at the bank-head scales, although narrow work is paid for by yardage; the price of yardage in every case being computed on the average number of tons of coal in a cubic yard. In metal mines development work, such as shafts, winzes, raises, drifts, and levels, are usually paid for per foot or yard of advance.

OTHER METHODS OF PAYMENT

The "Hole-Contract" system is based on the number of feet drilled in any shift. Payment is made at a certain rate per foot drilled; the rate in this case does not include firing or loading which are done by other sets of men. This method of payment is employed in British Columbia at Rossland, at Mineville, New York, and several European localities. A modification of this system is employed in coal mines where payment is made for machine undercutting, and for shot-firing, on the basis of number of tons mined per shift.

The tribute system is historically interesting for it was in operation at the copper and tin mines in Cornwall for many centuries. This method of payment was based on the value of the mineral extracted.

Briefly stated, the miners speculated on the value of the ore in a "pitch" or working place, and they bid for the contract to mine the ore for a certain proportion of its value, the mines paying the cost of breaking the ore, hoisting it to the surface and dressing it. The owners or "adventurers" auctioned off the pitches for a definite period, usually one month, the lowest bidder securing any one pitch. This "dutch" auction procedure is explained by the fact that the richer the ore in a pitch the greater the percentage return per ton, hence the low bidding. The tribute system is still maintained in a modified form in Cornwall, but in this country the Colorado lease system is in common use.

THE COLORADO LEASE SYSTEM

The Colorado lease system is based on the old Cornish tribute system, but it has eliminated many of the latter's uncertainties and disadvantages. The method works out as follows: The lessee takes a certain block of ground on contract, to be worked entirely at his expense, the owner furnishing the necessary supplies such as tools, powder, fuse, candles, etc.; the lessee paying for these and for the cost of hoisting, and any other expenses of handling the ore, out of the value of the mined material. He also pays the owner a royalty on the value of the ore obtained. The ore stoped out on any lease is kept separate, and when enough has accumulated, it is shipped to a sampler where its value is determined, the lessee paying for the cost of sampling. The royalty is figured on the gross mill returns; then the cost of supplies furnished and hoisting expenses are deducted, and the balance paid to the lessee. This system finds great application throughout most of the mining camps in the West. In Alaska and California, the large mining and ditch companies control hydraulicking machinery and water work placer proposition on a "lay" or lease, paying the owners a certain percentage or royalty on the amount of gold recovered.

OTHER METHODS

Many other methods of payment are in vogue in different mining districts, methods which are local, but which in the main, embody the principles of the systems already outlined. Among these are sliding scales, premiums or bonuses for rich, selected ore, but in every case the additional compensation over that of day labor is paid to the miner to encourage his skill and intelligence in developing orebodies to their fullest extent, thereby increasing the production and the value of a mine. Employers are generally realizing that contract systems are far superior to the old day-labor method when dealing with skilled miners.

Centrifugal pumps that have given trouble from choking have been relieved by the use of smaller discharge pipes.

Electric Power Plant at Lansford, Pennsylvania

Great Plant Which Will Furnish Electric Power to Collieries of Lehigh Coal and Navigation Company and to Outside Enterprises

B Y W . E . J O Y C E *

Sixteen years ago the Sprague Electric Motor Company was engaged in an endeavor to convince anthracite mine owners that the motor offered a cheaper and more effective method for applying power than did steam. This idea has since been germinating and in the development now taking place there is furnished a striking illustration of the country's deficiency as it relates to demands upon manufacturers and particularly electrical appliances.

SLOWNESS IN ADOPTING ELECTRIC POWER.

It was about 1890 that the Sprague Company engaged a special representative to go among the anthracite mine owners and induce them to adopt electrical hoists, motor pumping and electric transportation apparatus. It was related of a manager of one of the larger coal companies of the Wyoming Valley at the time, that he did not believe in innovations and could not be induced to look kindly upon a proposition to even try motor power in any way. His policy was to adopt nothing in the way of new mining machinery until it had first been demonstrated beyond the shadow of doubt that it was practicable, safe and economical. Even then he was slow to concede that new ideas would supplant the mine equipment with different apparatus. Time did not convince the manager soon enough to save his position and the inevitable change came.

Now, however, electric mining equipment has come and the scale upon which it is being inaugurated shows conclusively that there is no lack of confidence in efficiency and money saving.

AN IMMENSE UNDERTAKING

With so many years for maturing it is not strange, therefore, that the real introduction of electrical power in the district is marked by an outlay of capital and elaboration and plans such as would have dazzled the pioneer coal operator. There are now two great electrical plants being installed in the anthracite district. The first and the one nearest completion, is that of the Lehigh Coal and Navigation Company, which is now putting the finishing touches upon a plant that will not only furnish light for the Panther Creek valley, hoist coal from the deepest mines, run breaker machinery, ventilating fans, pump water and transport the coal, but will have enough power left to operate the street railways. To transmit

*Freeland, Pennsylvania.

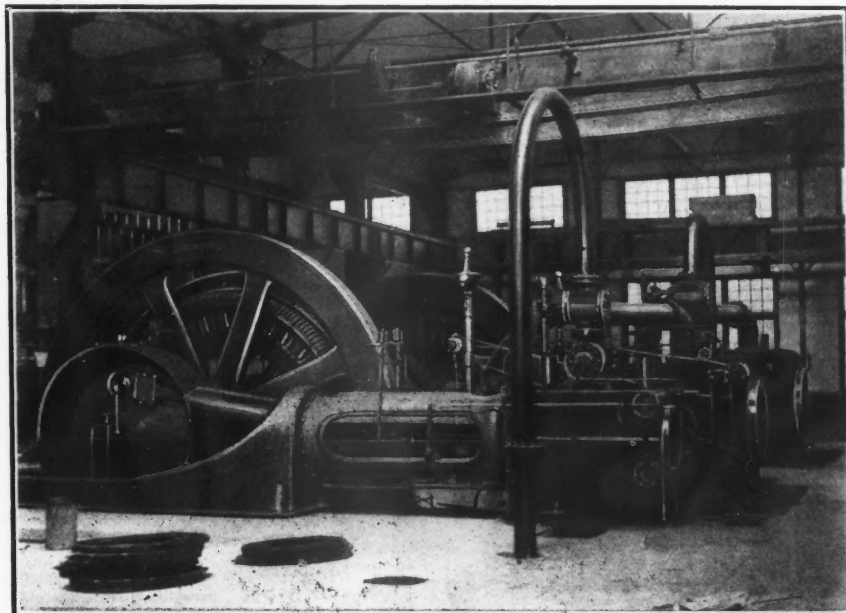
the same power to metropolitan centers is a feature of the enterprise that has received consideration. While this part of the plant here described is yet to be developed, the fact that such possibilities are considered is in itself significant. The problem of fuel is simplified in the immense culm banks which have been an eye-sore to the people of the mining districts and represent expensive waste to the operator. From these banks most of the fuel to be used under boilers supplying the first power for operation dynamos will be taken.

No doubt, it was such a possibility that suggested the installation of the Lehigh

besides the helpers and many small batteries of boilers. Following these will disappear the mine mule. As the company has already contracted with the Eastern Pennsylvania Railway Company to run traction cars, has arranged to light the boroughs of Summit Hill, Coal Dale and Lansford, an outside earning is at once begun. There is a double advantage derived in this way, because the power corporation is enabled to furnish light to these towns far below what it cost a private concern.

DESCRIPTION OF PLANT

The main power station of the com-



ENGINES FOR FURNISHING POWER TO TROLLEY AND MINES

Coal and Navigation Company's plan when President Riley first gave approval. That the same ideas were fully grasped by the superintendent, Baird Snyder, is shown in the manner in which he carried out the plans and offered as part equipment to the new president, W. A. Lathrop, the greatest electrical power plant in the anthracite field.

COST OF PLANT AND SAVINGS EFFECTED

The new plant will cost \$1,000,000. Sixteen coal mines will be supplied with power therefrom. Apportioning the outlay of money between the given number of mines this sum is not so large as would appear at first glance. There is an immediate saving of 1500 tons of coal per month, with about 50 firemen displaced

pany is located at Lansford and is housed in a building 125x190 ft. Dodge & Day, of Philadelphia, are the engineers. The work of construction began 14 months ago and, while it is not yet completed it is in such shape that it can be pushed as speedily as changes at the mines demand. The main structure is fire-proof, the only wood used being in the window frames, the walls are of brick while concrete is used generally throughout. The main floor rises 10 ft. above the foundation proper. The floors are of concrete arches and steel iron beam construction, the basement being so built as to permit the use of air ducts, placing cables, water sluices, ash-pits and channels for coal storage. In this connection the same plans are observed as in the original de-

signs, making ample provision for future development.

THE BOILER ROOM

To the boiler room particular attention was given. Here the labor-saving idea is scrupulously maintained. The supply of coal is regular and constant; the ash-pits are supplied with the traveling belt system which carries the ashes through a sluiceway to the dump. The firemen's work is further taken care of by mechanical water feeders which regulate themselves and maintain a given water level in boilers at all times. The feed-pump attached is operated automatically, stopping and starting as the rise or fall of water in the boilers may demand. Three batteries of Maxim boilers are used, being of 600 h.p. each, and arrangements are now complete to add 1000 h.p. more. In the main part of the building, new electrical devices have been introduced. A Niles-Bement crane of 20 tons capacity travels the entire length of the building, and the transformer room is taken care of by a 7½-ton Maris crane. In the center of the room are two large generating sets for furnishing the alternating current, one of 1500 h.p., and another of 750 h.p. There is now being completed another of 750 h.p. and two 400-h.p. 600-volt railway units; two 500-kw. rotaries that may be used either for street-

sub-stations are designed for a capacity of 600 kilowatts.

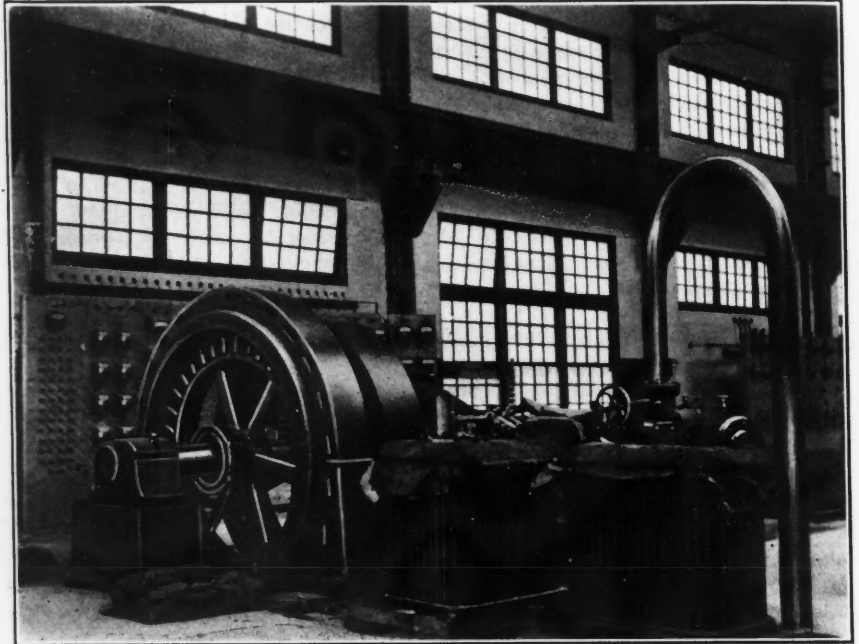
SUB-STATIONS

Sub-stations have been built at No. 4 and No. 6 collieries and plans are being made for sub-stations at No. 8 and

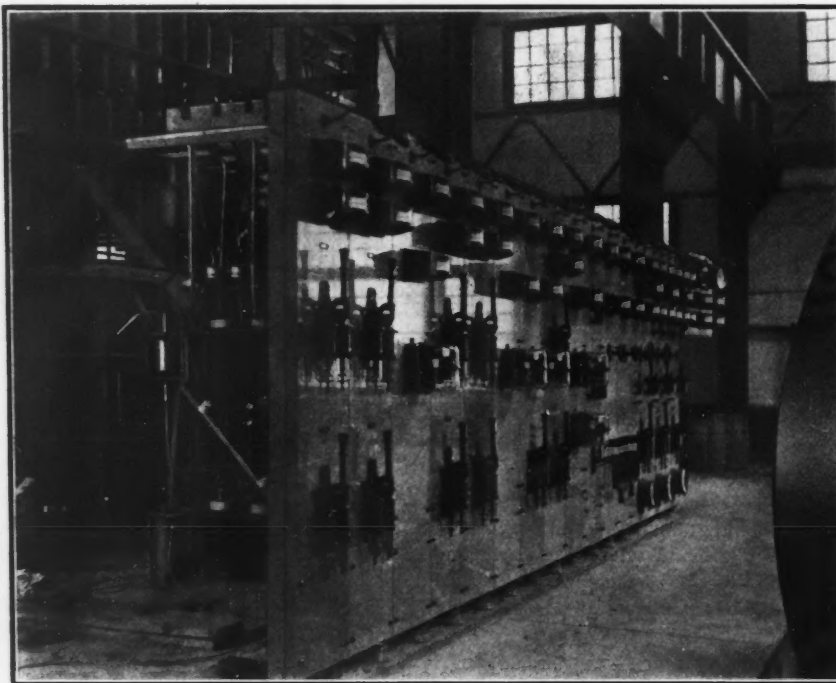
tax on the power increases, another 300-kw. machine will be added.

At No. 6 colliery, where the operations do not require such great current, a 300-kw. machine has been placed, with room for additions.

Another line to Nesquehoning, four



COMMERCIAL LIGHT PLANT AT LANSFORD



SWITCHBOARD FOR DISTRIBUTING CURRENT TO MINES

railway work or as inverted rotaries to furnish power for the mines. For the mines two miles distant from the main power house, 2300 volts will be used and for the mines beyond this distance, 10,000-volt transmission lines are installed. The

No. 10, the entire mine and breakers being wired for the application of motor power to machinery, fans, tramways, revolving screens, rollers, jigs, etc. At No. 4 mine a rotary sub-station of 300-kw. capacity has been installed and as the

miles away, furnishes power to a sub-station which is designed to transmit power to the various mines in that valley. The current for this section will be stepped up from 2300 to 10,000 volts. The station is fitted with two 150-kw. rotaries of 300 volts each. With the introduction of electric power in this district a most perplexing problem to the mine-owner is made easy of solution, a condition which resisted all efforts in the past. The current will be used here in connection with the tunnel work operating the drills and air compressors. A four-mile tunnel is to be driven in this way through the Nesquehoning mountain. This will drain all the mines beyond, furnish a natural drainage and entirely eliminate danger of floods which have been a serious menace as well as expense in the past. This tunnel will also be used as a tramway by which coal will be transported to the surface, thence to Hauto. These two plans of improvement mean a saving of many thousands of dollars annually besides providing practically a new lease of life for a large and valuable territory.

A new machine shop 100x160 ft. dimension has been built and fitted to be operated by electric power with all modern appliances.

ELECTRIC HAULAGE

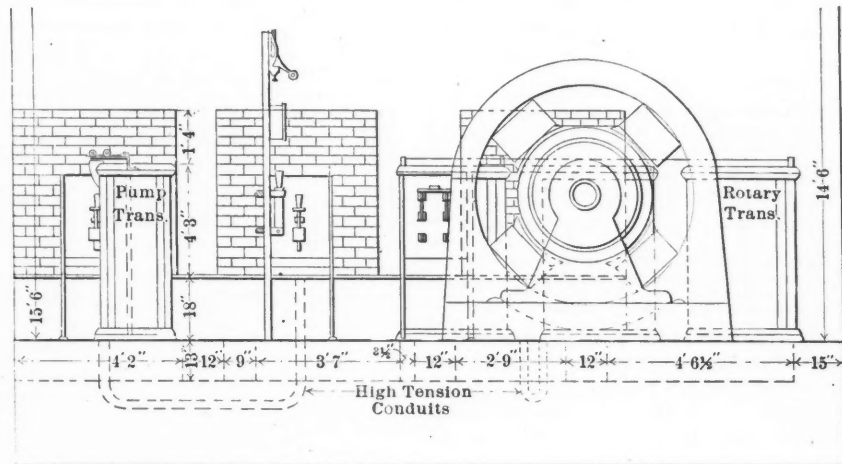
Up to the present time orders have been placed for 15 electric motor loco-

motives which will be used in hauling about the mines where mules are at present employed. These are being placed as quickly as they can be supplied by the builders, and of course, mules and men are being reduced in numbers. There are 270 mules used in this work, about 39 drivers, and many more patchers and runners. Electric haulage is now fully recognized in connection with mining. Of the locomotives being placed, two are of 150 h.p. two of 100 h.p. and eleven of 50 h.p.

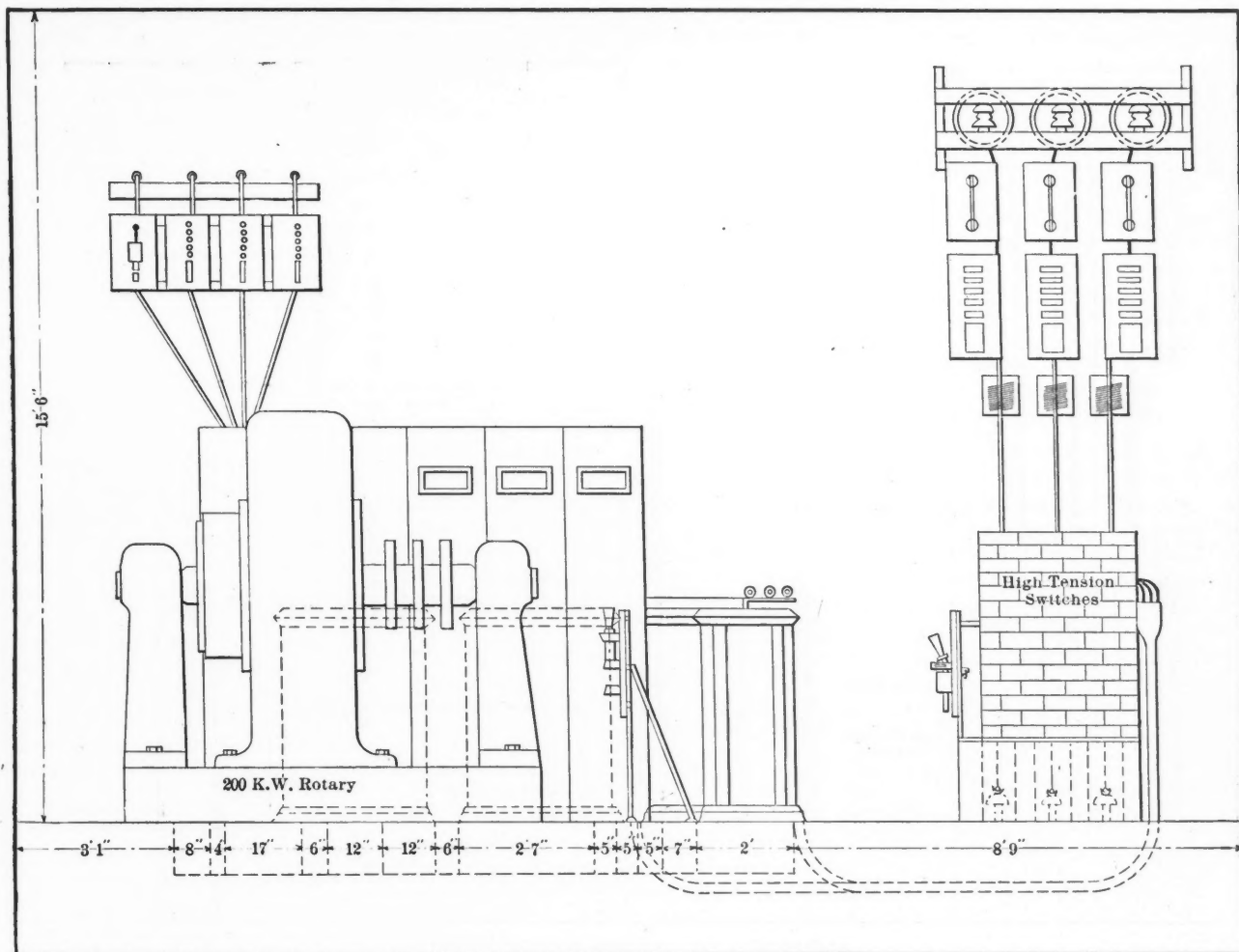
The greatest change is taking place in the pumping department of the several mines. In this district, owing to the many dips in veins, numerous pumps were installed, and these along with attendants and mechanics, kept an army of men constantly employed. To meet the demand for effective drainage and at the same time do it as economically and safely as possible, a system has been adopted which the less expert mine foreman can follow. This aims to limit the lift of each pump

men were required, three on each shift, there being four lifts in each mine, while under the new method three men will be able to handle the work. This it is esti

It is a question whether the application of electric power in this connection would be as satisfactory as the old system. The steam hoists on all main slopes will not



TRANSMITTERS AT SUB-STATION



PLAN FOR NO. 10 SUB-STATION

to 300 ft. in each mine, and as there are now 14 in active operation with about an equal number of lifts in each opening it is easy to estimate the scale upon which this feature of the plant will be operated. Under the old system the services of 12

ated, will be maintained with a saving of about 1200 horse-power.

ELECTRICAL HOISTING

For the present no material change will be made at the many hoisting plants

be disturbed until appliances offering better results than are at this time apparent are introduced. Human life being involved in this feature directly, mine operators will at least, await practical tests of motor hoists on deep openings with

heavy loads before consenting to change. This applies strictly to main openings, shafts and slopes, for swift movement. Water and timber hoists, however, are being equipped now. The water hoists have been very successful and this fact will do much to break up the prejudice against

the proposition of natural drainage cannot be considered, the water hoist is decidedly the best. The limit to a draft has been governed by available power. In some places cylinder boilers 25 ft. in length are used, and in times of heavy water on a double shaft line they have met all

shutting off power as the water recedes and applying it as the water rises. In this connection when compared to steam, where a full head must constantly be carried to the point where the regulation valve is located, there is no danger of bursting valves, always a serious menace to deep mines.

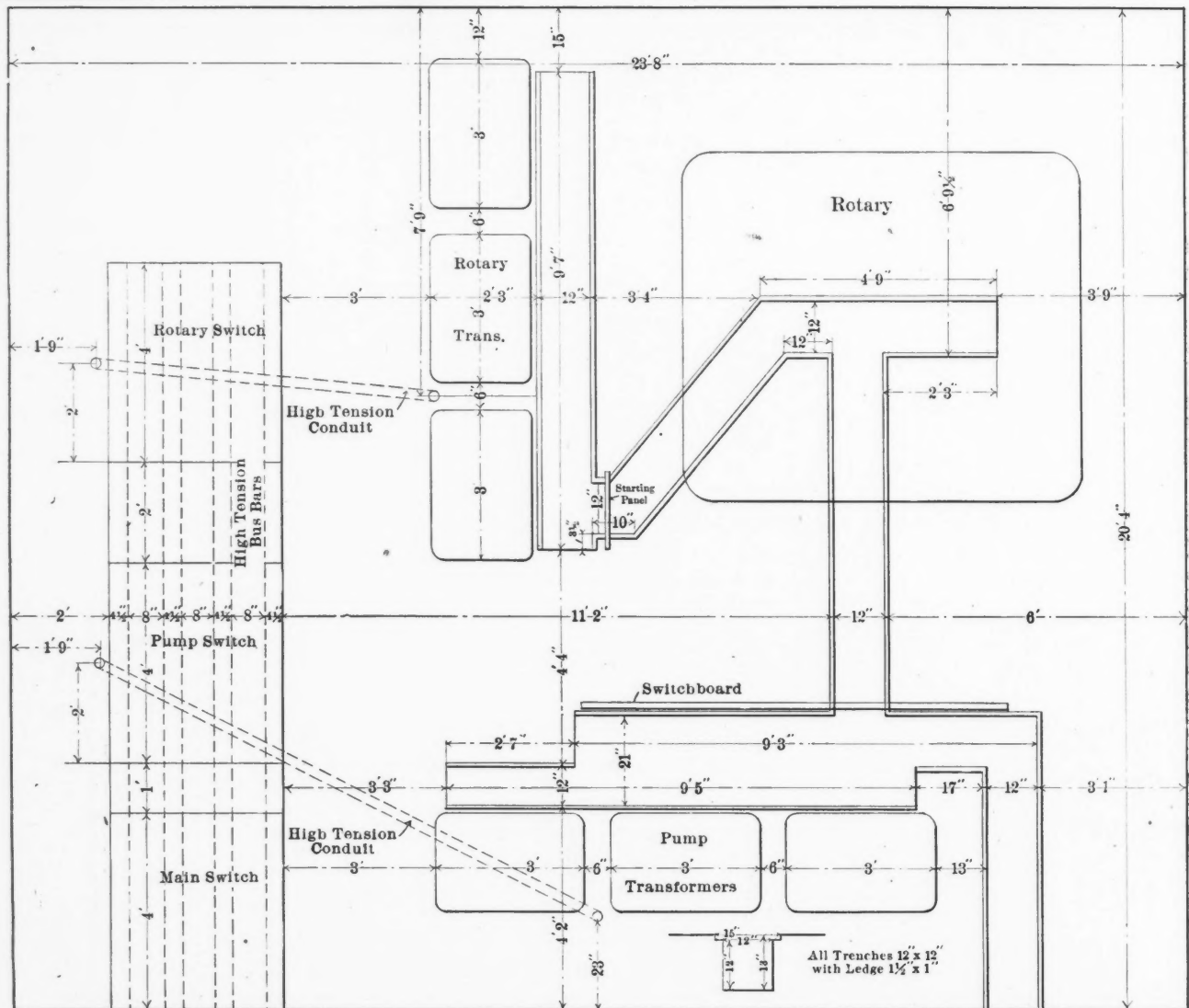
Insulation.	Covered.	Size.	Test Voltage Applied.	Feet.
R. or Cambric.	Lead.	No. 6.	5,000 for 10 minutes.	112
R. or Cambric.	3 Cond. Lead.	No. 6.	5,000 for 10 minutes.	45
R. or Cambric.	3 Braid Cotton.	No. 6.	5,000 for 10 minutes.	135
R. or Cambric.	Lead.	650,000 c.m.	1,500 for 10 minutes.	30
R. or Cambric.	Lead.	600,000 c.m.	1,500 for 10 minutes.	130
R. or Cambric.	3 Braid Cotton.	No. 6.	20,000 for 10 minutes.	50
Paper or C.	3 Cond. Lead.	No. 6.	20,000 for 10 minutes.	32
Paper or C.	3 Braid Cotton.	No. 4.	20,000 for 10 minutes.	90

- 9-2000 Volt Lightning Arresters.
- 2-300 Volt Lightning Arresters.
- 50 Minerallac Bushings for 10,000 volts.
- 50 Minerallac Clips for same.
- 12-6" Terminal Bells with caps and bushings.
- 36 G.E. No. 40,288 Porcelain Insulators.
- 36 Pins for same similar to G.E. cat. No. 40,253.

CONSTRUCTION

Another plant of immense size established by a coal mining concern and with the same ends in view is being erected in Lower Luzerne. The latter cannot be compared with the subject of this sketch, for years to come at least.

The firms working on the construction of this plant are: Allis Chalmers Company, Milwaukee, Wis., Westinghouse Electric and Manufacturing Com-



ARRANGEMENT OF SWITCHES AND TRANSFORMERS

the use of electric power on main hoists. The water shafts on which the electrical hoists are used, have automatic cut-offs and brakes. They have shown that danger of a runaway can be minimized, while in efficiency they will compare well. From comparisons it has been demonstrated the cheapest drainage for deep mines where

emergencies without particular strain. It is only a question of a short time when all coal mines not having natural water level will be drained in this way. The application of power is bound to increase under these conditions. In the present plant the rise and fall of water in the sump governs the movement of motors

pany, Pittsburg, Penn., Walker Electric Company, Philadelphia, Penn., General Electric Company, Schenectady, N. Y., Crocker Wheeler Company, Ampere, N. J., Maxim Boiler Company, Starrucca, Penn., Kellogg & Company, New York, United Electric Construction Company, Philadelphia, Penn.

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 order to prevent excessive wear and breakage of rollers used in a breaker, it is important that all bearings under strain should be in line and in perfect contact throughout their entire length.

James Epperson, Indiana State Inspector of Mines, is continuing his enforcement of the new mine laws of the State. Of the various charges made, the preponderance of violations are those of shot-firers. In one instance an operator was arrested and fined for failure to provide light at the bottom of the shaft.

The Lehigh Valley Coal Company has opened up the largest coal stripping in the world at Lattimer, Penn. Prospect work shows the coal-bed to be 1300 ft. wide and 30 ft. thick, extending from Lattimer to Drifton, a distance of about six miles. Rough estimates show that the stripping will produce more than 500 tons daily for a period of over 200 years.

To find the diameter of a pump cylinder to pump a given quantity of water per minute (100 ft. of piston speed per minute), divide the number of gallons by 4; then extract the square root, and the product will be the diameter in inches of the pump cylinder. To find the capacity of a cylinder in gallons, multiply the area in inches and divide the result by 231 which will give the capacity in gallons per single stroke.

In starting a new crushing machine it is well to remember that all oil boxes should be packed with clean cotton waste, and plenty of oil of good quality should be used. The toggles have lips and projections for holding in waste and retaining a surplus of oil and they also keep the toggle bearings free from small pieces of broken stone and dust. The machine should be run at least a day without a load as a new machine is liable to heat until worn down to perfect bearings. Watch the journals.

In the mines of Great Britain and Ireland, gunpowder continues to be the principal explosive used. During 1906 the amount used was 13,912,814 lb. After gunpowder comes Gelignite with 1,485,711 lb. Bobbinite with 1,215,085 lb., and Saxonite with 1,119,088 lb. After these come Carbonite with 569,833 lb., and then follow Westfalite with 511,992 lb., Ammonite with 507,669 lb., Monobel with 473,688 lb. and Roburite with 460,829 lb. The total quantity of explosives used during 1906 amounted to 22,162,048 lb., as compared with 20,316,194 lb. in the previous year.

Manganese steel is the best material for

screens to be used in the preparation of anthracite coal as it is tough and resists wear. Mine superintendents say that the saving in wages of the repair gang alone pays the cost of the manganese steel. Screens of the soft steel type wear out completely with use, whereas, a manganese steel screen is simply polished by use. On account of its strength and toughness manganese screens can be made lighter, consequently it requires less power to operate the plant than when screens made of other kinds of material are used.

The size of a diamond bit, consequently the core extracted, depends on the character of the strata. Experience has shown that a small bit, not over $\frac{1}{2}$ in., can be used in a country where the strata are more or less uniform. The rate of drilling is more rapid than when a larger bit is used, consequently the use of the small bit saves labor as well as wearing less on the carbon. In drilling through disseminated or soft and friable strata, the bit should be from 2 to $2\frac{1}{2}$ in. in diameter so that the core extracted will be about $1\frac{3}{4}$ in.; in bituminous coal the core extracted should be at least 2 in. in diameter.

The hose used to convey steam should be entirely different in both material and construction from ordinary water hose. It must be so made that it will resist pressure as well as heat. In order to get the best results from steam hose it is well to use a good many plies and avoid turning the steam into the hose at a higher temperature than is necessary. Usually steam hose will withstand a temperature of 240 deg. F. When the hose is subject to a continuous heat greater than this, the rubber will harden and the hose deteriorate. Under ordinary circumstances the pressure of steam should be below 40 lb. to keep the temperature of the steam within the limit of 240 deg. Fahrenheit.

An experienced mine superintendent who says that inclined troughed belt conveyers should be used instead of a vertical bucket elevator, bases his opinion on the fact that the troughed belt conveyers have a much larger capacity, can be driven faster, have fewer wearing parts and less power is required to operate them as there is less friction in operation; there is also less danger of breakage and they are practically noiseless. When installing a belt conveyer, the trough idlers should be placed about every 4 to 5 ft., while the bottom idlers should be from 10 to 12 ft. apart. The top and bottom guides, if used at all, are placed at long intervals

apart. The idlers should be lubricated through hollow shafts. A belt 10 in. in width has a capacity of 20 tons per hour.

Experience has taught us that in recording bore-hole sections there has been confusion in regard to the character of the strata, as there are no two drillers who call the same rock by the same name, and much valuable data has been lost on this account. In order to get a more accurate account of a bore-hole section by recording the hardness of each stratum that has been cut through by the drill, a scale of hardness has been adopted as follows, beginning with the softest: 1, Talc; 2, Gypsum; 3, Calcite; 4, Fluorite; 5, Apatite; 6, Orthoclase; 7, Quartz; 8, Beryl or topaz; 9, Corundum; 10, Diamond. Any one of two minerals that scratches the other is the harder, and by testing an unknown hardness of rock by those given in this scale, the degree of hardness of any given core may be obtained. For instance, a core that will scratch calcite, but is in turn scratched by apatite, would be estimated for hardness at 4, but should it also be scratched by fluorite its hardness would be $3\frac{1}{2}$. Having the hardness of a stratum together with its physical appearance and composition it is a comparatively easy matter to identify the stratum.

A magneto-electric machine is largely used in firing high explosives in and about coal mines. It very often becomes temporarily deranged through the accumulation of dust or some other foreign substance between the platinum contact points and by the surface of the commutator becoming tarnished by the mine atmosphere. In order to adjust and clean the machines, remove the rear of the case and the small pin near the lower end of the firing bar the shelf upon which they rest, are next and then pull the firing bar out of the case. The works of the machine, with the shelf upon which they rest, are next partially removed from the case, and the springs which press upon the commutator and the yoke which holds in place the spindle upon which the commutator revolves are disconnected. The commutator should then be cleaned with a piece of fine emery cloth. Due attention to these details and careful preparation of the wires and fuses saves a great deal of trouble and delay. The machine should be cleaned at least once in six months if used in mines. The precautions should be carefully followed in order to secure economy and success.

Metallics

With 3-in. lump ore, a 36-in. picking belt running 35 ft. per min. will have a rapidity of 35 tons per hour of ore.

For maximum efficiency in launders, the transported particles should move with a velocity one-half that of the transporting current.

High-speed, narrow-faced rolls appear to be losing ground in concentrating mills and the present tendency is to use moderately wide-faced rolls.

Zinc chloride for timber preservation is of little use when the timbers are to be exposed to water, as the zinc solution will be leached out in a short time.

Power required for trough-belt conveyers averages about 0.00015 h.p. hour per ton per foot of horizontal distance carried, plus 0.001 h.p. per foot of height elevated.

A method of shaft sinking has been tried in France, in which cement slurry is forced through boreholes into soft, fissured strata in order to form a wall of concrete within which sinking can be performed.

Lead and tin can be obtained very pure. Good brands of commercial lead contain 99.95 per cent. of lead and is often even purer. Lead is the purest metal which is made commercially. Good brands of tin contain 99.8 per cent. pure tin.

To secure the maximum efficiency in hand sorting, it is necessary to have good supervision (since any system of contract work is difficult to carry out), good light, and all arrangements which may increase the convenience of the pickers.

The American Vanadium Company reports that a sulphide of vanadium has been discovered in an immense quantity in the Andes, and that it is now prepared to furnish vanadium in the form of ferro-vanadium in any quantity desired.

Arsenic, antimony and bismuth go partly into solution, in electrolytic copper refining, and partly into the slime, depending on the form of combination in which they exist in the anode and various secondary reactions taking place in the electrolyte.

In order to avoid the freezing of pumps, operated by compressed air, during winter months, it is necessary to reheat the air near the pumps. The application of heat to the compressed air will also increase the efficiency of the pump with very little additional expense.

The increased demand for zinc ore during the last few years, which is by all means likely to continue, has made valuable as a by-product in many cases what was formerly an objectionable impurity, to be culled out so far as possible and thrown over the dump.

It may be safely reckoned that with proper picking facilities, and ore crushed to 1½-in. size, with wages at 37½c. per hour, an ore yielding 6 per cent. of lead mineral and 12 per cent. of zinc mineral can be culled for the two minerals at an average cost of 66c. per ton of mineral produced.

It has now been demonstrated that the reason copper and iron will not alloy is on account of the carbon that the iron absorbs in melting. If the iron and copper be melted together in a clay crucible so that no carbon can be taken up, the resulting alloy is perfectly homogeneous and free from any separated nodules.

In firing cement kilns there is a great difference between the flame of natural gas and the ordinary pulverized coal flame. The coal flame flares in a gradually increasing "cone," while the gas flame is similar to a "mushroom" and the heat zone is much nearer the discharge end of the kiln than in the case of the coal burning system.

Ozokerite differs from gilsonite in that it will not burn, but the physical appearance of the two minerals is very much the same. Ozokerite bears a close resemblance to rubber, and when held over a blaze will melt. It is used in sizing calico and paper, and is employed also by oil-refining companies in combination with petroleum to prepare various products.

When it is the intention to close down a mine for an indefinite period, it is a wise thing to place a substantial platform in the shaft some distance below the collar, and preferably at the natural water level. In the event of the upper portion of the shaft caving, the debris may fall no farther than the platform, which will result in a saving in case it is desired to re-open the mine.

The present high price of arsenic is ascribed by *Revue des Produits Chimique* (May 15) to the enormous demand for this material in South America, and especially in Brazil. In the latter arsenious acid is employed to destroy certain parasites of the coffee tree. There is reason to believe also that a combination among the chief producers has something to do with the elevation of the price.

In the electrolysis of fused sodium nitrate the best yields of nitrate and oxide are obtained with graphite electrodes. Rise in temperature, or increase in the current density, gives a better yield, and direct current is better than alternating. An increase in voltage diminishes the yield. Superimposed on the action of the current is the reducing action of the powdered graphite formed from the electrodes during electrolysis.

There are two types of centrifugal pumps, the volute and the turbine. In the former, the water is discharged into a volute or spiral shaped discharge chamber which terminates in the discharge

pipe. In the latter type, guide vanes are arranged in stationary passages around the circumference of the impeller to direct the flow of water and reduce its velocity, so that it may leave the impeller without waste of energy.

It is reported by *Engineering*, May 10, 1907, that the Peruvian Government has contracted with American capitalists, represented by Alfred MacCune, for the construction of a railway to the Ucayali, which is one of two large confluent of the Amazon. An existing Peruvian line from Lima runs eastward to Oroya, about 125 miles. A subvention of £2,000,000 is proposed to be granted to assist the construction of the proposed extension.

According to the *Iron Age* (June 13, 1907) an improvised electro-magnet consisting of a piece of steel 3 in. in diameter, on one end of which was wound a coil, protected by copper sheathing, was used to recover a broken jar rein from a well which was being drilled. Long leads were attached, and the device was lowered into the boring. When a current of 1¼ amperes, at 220 volts, was turned on and the magnet pulled up there was brought up with it not only the broken tool, but all the metal particles or borings which had been in the hole. The resistance of the coil was 125 ohms, and consisted of a 7-in. spool 9½ in. long of No. 18 magnet wire.

At El Oro, Mexico, it has been found by test that the efficiency of a tube mill increases in direct proportion to the amount of pebbles in the mill up to a certain point. The Danish pebbles used cost \$36.80 per ton at the mill, the average pebble consumption being 5 lb. to the ton of sand. The consumption of lining plates is about 1.2 lb. per ton of sand. Some preliminary comparative tests of the costs of grinding and regrinding by tube mills showed per ton of sand passed through the mills, \$0.367 using steam and \$0.274 using electric power. The cost of grinding fine sand was found to be far greater than for coarse sand, on account of the greater wear of pebbles and liners.

Tinol is a new solder, which consists of a soft solder metal, tin and lead in varying proportions. This composition is disintegrated to a very fine powder and mixed with dry-powder soldering fluxes. It is then worked up into a paste or viscous fluid with glycerin, alcohol or other such media. This paste was spread over the joints and the joints made either by simply warming or by passing over the hot soldering irons. It has been found possible to join all sorts of junctions which otherwise would have had to be made by other methods, such as screw-clamps, etc. The conductivity experiments show 4 to 5 per cent. higher value for tinol, while a strength-test gave similar results in comparison with the older methods of soldering.

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*Illustrated.

The Mayari Iron Ore Deposits

The announcement of the opening of an immense body of iron ore at Mayari, Cuba, by the Spanish American Iron Company, a subsidiary corporation of the Pennsylvania Steel Company, is of greater importance to the American iron and steel industry than any single item of news since the preliminary estimates of the possibilities of the Mesabi range were made public about 16 years ago. Careful estimates of the great deposits on the north coast of Cuba give an available supply of more than 600,000,000 tons, making an addition of 5 per cent. to the world's store of iron ore, according to the figures compiled by the Swedish Government and published about a year ago. The ore is of a remarkably uniform grade and is low in phosphorus, so that the change from the bessemer to the basic process of steel making which has been predicted as a development of the near future may be postponed for many years. The ore field has a pleasant climate, so that operations of mining and shipping may be carried on without interruption, a great advantage as compared with the climatic conditions of the iron ranges at the head of Lake Superior.

The officers and engineers of the Pennsylvania Steel Company deserve great credit for the thorough and systematic manner in which they have set about to render the deposit available for commercial purposes. There were many difficulties of a technical nature to be overcome. The ore is of a clayey character, containing high percentages of water and alumina. The material may be excavated by steam shovel, but for convenient handling a special form of dumping car had to be provided, and arrangements for drying and sintering to be devised. The proportion of alumina gives rise to peculiar slags in the blast furnace, requiring careful handling. The presence of chromium in the ore presented unusual metallurgical problems which have been thoroughly worked out. The work of development has so far advanced that terminal docks, storage plants and railroads are under construction, and 5000 tons of the material have been converted into steel rails which are now in use on the Pennsylvania railroad, showing that all the conditions have been successfully met.

Whether or not this discovery will pave the way for the development of a steel in-

dustry on the Atlantic seaboard on a scale comparable with that of the operations in the Pittsburg and Chicago districts remains to be seen. The transportation of ore from Mayari to the docks near Philadelphia and Baltimore or to the harbors of eastern Virginia should be no more costly than shipping by rail to Duluth, by water to ports on Lake Erie and Lake Michigan, and thence by rail to the furnaces. The location of great industries is not a matter of choice or whim, but is governed by laws of supply and transportation costs. The eastern States have long held the great markets for iron and steel products, and the opening of this enormous body of iron ore cannot fail to have an influence, the effects of which will be felt for many years. The cost of the ore will, of course, be increased by the import duty.

The announcement will no doubt be welcome to the gentlemen who have been worrying about the future supply of raw material for the steel industry. It will give them an opportunity to revise their figures and should induce them to have greater faith in future prospects. There are immense tracts of territory still unexplored, and if a single discovery in a region by no means unknown to the explorer can add 5 per cent. to the total known supply, it is only reasonable to suppose that other sources will come to light long before present supplies are exhausted.

The Sulphur Situation

The Sicilian sulphur producers seem to be still unable to realize their present situation. Our latest correspondence states that a conference was recently held, at which were present representatives of the Consorzio Obbligatorio—which now controls the Sicilian output and export of brimstone—and of the chief American producer. The American delegate not only refused to make any arrangement to give the Sicilian producers a part of the American trade, but also announced that, in case of any hostile measures, the producers here would export sulphur to Europe. At this, we are told, the Sicilian delegates withdrew "in just indignation." The Consorzio is now discussing the possibility of crushing competition by exporting some of its stocks to this country at a low figure.

The situation is shown by the statistics of the trade. In the twelve months ended

June 30 last the exports from Sicily fell from 408,921 tons in 1905-6 to 338,473 tons in 1906-7, a loss of 20.8 per cent. The sales to the United States decreased from 59,939 tons in 1905-6 to 13,259 tons in 1906-7, a loss of 77.8 per cent. Moreover, this decrease was progressive during the year, only 11 tons being shipped to this country in the month of June. That is, the American trade is practically gone; but the Sicilian producers still seem to think that this is only a temporary condition. They cannot realize that their monopoly of the trade is gone, so far as this country is concerned. Moreover they do not seem to know how largely the use of pyrites has grown in Great Britain and Germany; chiefly as a result of the high prices of brimstone, which were maintained by the monopoly.

Meantime the unsold stocks of sulphur in Sicily, which were 287,878 tons on July 1, 1904, had increased to 439,601 tons on the corresponding date in 1906, and to 513,468 tons in 1907; an increase of 78.3 per cent. in three years. The Banco di Sicilia, which has been financing the Consorzio, is at the end of its resources and can advance no more money unless the Government extends special aid.

Thus the Sicilian producers are facing two alternatives, a severe curtailment of production, or a heavy reduction in prices. In either case they are sure to have serious trouble with the miners, who are a difficult class to deal with in Sicily. They cannot continue to pile up unsold stocks, for their borrowing power is exhausted. The situation is anything but a pleasant one for the Consorzio.

Electric Plants at Coal Mines

The description of the Lansford Electric plant of the Lehigh Coal and Navigation Company, given on another page of this number, is of interest, not only on account of its size and special features, but also because it will probably become the starting point of a new policy. That is the generation of electric power at the coal mines for distribution to outside industries. Heretofore, the electric plants in the anthracite region have been for mining purposes only. The new plant at Lansford is already arranging to furnish light to neighboring towns and power for an electric railroad. The Lehigh Coal and Navigation Company is also planning to increase the carrying capacity of its canal

by the introduction of electric towage, the power to be supplied from this, or some other plant at its mines.

It is not only possible, but probable that this plan may be largely extended in the future. There are great possibilities of economy in the operation of large electric plants at the mines, where coal can be delivered directly to the boilers, saving much expense in sizing and preparation for market and utilizing much slack and small coal which now goes into the culm pile. With the added saving in the transportation of the coal, the transmission of electricity from such plants for lighting, heating and power ought to present an attractive field for engineers.

The Counterbalanced Skip Hoist

The article by S. A. Worcester, on another page of this issue, describes a hoisting plant of a type which has been little used at Cripple Creek, or in other Colorado districts. The advantages of the counterbalanced hoist and the continuous rope system are well shown in the article, and the diagrams fully explain and illustrate the system. It will repay a careful study. Doubtless other engineers may be able to see what disadvantages may attach to its operation, and may be inclined to criticize some of the details of the design. The author, however, makes out a strong case in its favor, and his description will be read with interest.

The Price of Silver

The price of silver has been well maintained and has, in fact, risen recently when other metals were falling. Last week it passed 32d. per ounce in London, and closely approximated 70c. in New York, the highest figures for a number of years, with the exception of the closing months of 1906, when these prices were slightly exceeded.

There has been no unusual demand for coinage in this country, where the Mint purchases have been lighter than they were a year ago. France has taken some quantity, but no unusual amount. The support to the market has come wholly from the East. It should rather be said, wholly from India. China has not been a buyer at any time this year; and, in fact, has reversed the usual movement several times during the year by shipping round lots to London. India, however, has been

a strong and steady buyer and has not been discouraged by the recent rise in prices. This indicates a prosperous year in that country, and it is likely that good buying will continue for some months to come.

The demand for silver for manufacturing purposes has also been good most of the year, though it has recently showed some signs of falling off in volume. This has not, however, been sufficiently marked as yet to affect the price of the metal.

The Eight-hour Day in British Mines

Following the issue of the report of the Royal Commission on the eight-hour day for miners, the British government has introduced in Parliament a bill for carrying the eight-hour day into effect. This bill cannot possibly be discussed in the present session of Parliament, and its introduction is a formality, the object of which is to let the country know the nature of the proposals which the government will submit to a future session. The report of the Royal Commission did not contain any pointed recommendations, but merely hinted that men should work harder during eight instead of nine hours and not take so many holidays; and that masters should provide improved machinery for increasing the rate of output. The government has adopted the eight-hour day from bank to bank under certain limiting conditions. The time to discuss the propositions in detail will be when the bill is presented to Parliament in its final form.

Diamonds in Arkansas

In the JOURNAL of Aug. 10 the statement was made that a detailed investigation of the Indiana drift material was made for the Canadian Geological Survey by Dr. F. D. Adams. To give credit where credit is due we wish to say that the samples, of which there were 30, were collected by Dr. George F. Kunz, independent of any geological survey, and submitted, together with a paper on the "Occurrence of the Diamond in North America," at the Ottawa meeting of the Geological Society of America, in December, 1905.

After the meeting the samples were examined by Dr. A. E. Barlow and Dr. F. D. Adams for Dr. Kunz and were described by him in the "Mineral Resources" for 1905.

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

Metallurgical Vagaries

The story by Dwight E. Woodbridge, in the JOURNAL of Aug. 10, of a burlesque smelting venture in the Southwest, whereby the evil influence of nitrogen in slag formation was to be avoided by volatilizing silica in a vacuum, with the net result of putting the particular unskilled fools who backed it out of pocket to the extent of \$75,000, excites wonder that such utterly extravagant nonsense can be commercially exploited. The Beam process, the Keeley motor, Bryce's antimony-gold, and other notorious fakes, had usually some semblance of a scientific basis, or were shrouded in mystery; but here comes one frankly reveling in extravagant physico-chemical absurdities, and money-spending suckers do not fail him!

It brings to mind a similarly astonishing case developed, not on the far desert where the worker of wonders is safe from molestation by persons who might enlighten the holders of the purse strings, but in a great city where metallurgy is extensively applied. Several years ago I was stopping over at St. Louis, and was asked to look at a small lead smelter in the suburbs, with a view to its rescue from a series of difficulties. That things had not gone smoothly was not surprising, considering that it had been built and run—or rather, *not* run—by a chronic inventor, for whom nothing "standard" was good enough. It is his metallurgical exploits before he attempted lead smelting that I refer to particularly, as an astonishing example of the power of silly pseudo-scientific frauds over the guileless business man. As I remember the circumstances, he first gained the attention of these St. Louis men by presenting a scheme for extracting aluminum from clay by eliminating silica in a treatment with boiling hydrofluoric acid, collecting the resulting gaseous silicon fluoride in water with formation of hydrofluosilicic acid, according to the well known reaction. I do not recollect how he was to recover his metallic aluminum from the residue, nor could I follow the intricacies of the process in the mass of huge steel cylinders, condensers, furnaces, etc., which remained near the smelter erected by the same parties, after some \$100,000 invested had failed to produce any aluminum. The remarkable thing in this change of the company's object from aluminum to lead production, was the retention of the same metallurgical genius to build and run it.

By this time he had made other discoveries which he worked up in an elaborate machine shop specially provided; among them a sort of artificial "bean" which would sprout and grow gold. This seemed to greatly encourage his backers, and they urged forward the work of building the lead smelter that was to run on the rich galena ores of central Missouri.

I found the plant to consist of two small reverberatory hand roasters, a small blast furnace and a mongrel Scotch hearth, besides power plant, etc., and there was in all these appliances hardly so much as a boiler-feed pump that had not been made from special designs of the inventor-metallurgist, at what cost may be imagined by engineers familiar with machinery built to order. There were a hundred and one "improvements" touching every detail of construction and operation; the most startling being a Scotch hearth with a bell-and-hopper arrangement, whereby an inherently intermittent process was to be made continuous. When I was there, the failure of a trial run with this curious aggregation of novelties, in the course of which less pig lead was obtained in the clean-up than had been melted down in the hearth to blow in with, had finally exhausted the patience of the backers, and the inventor was deposed. One marvels the more that it required years and a small fortune to arrive at this result, knowing that the impression given by this genius was not that of an eloquent swayer of men's views, but a very commonplace crank. And this in the heart of a community affording high-grade engineering advice for the seeking.

WM. MAGENAU.

Gomez Palacio, Mexico, Aug. 15, 1907.

The Lucky Tiger Mine, Sonora, Mexico

The Supreme Court of Mexico, by a unanimous decision, seems to have ended the vexatious litigation concerning this property in favor of El Tigre Mining Company of northern Sonora. The principal mine of this company is the Lucky Tiger and the case has been of peculiar interest on account of the circumstances through which it originated and in its relation to the security of American investments in the Republic of Mexico.

In 1903 B. F. Graham organized El Tigre Mining Company, of Mexico, and transferred to it his title to the mine. He then organized the Lucky Tiger Combination

Gold Mining Company, with offices in Arizona and Kansas City, and transferred to this latter company the stock of El Tigre Mining Company. Of this company he was president and general manager and was in personal charge of the Lucky Tiger mine. The mine rapidly developed into rich property and the Kansas City stockholders alleged that Graham persuaded the creditors, to whom payments were yet due on the purchase price, to organize a new company, the Ensenada Mining Company, with Mr. Graham as president and general manager. A short time previously he had resigned from the presidency of El Tigre Mining Company.

Of the two payments still to be made for account of the purchase price, \$48,864 was due July 6, 1905, and representatives of El Tigre Mining Company arrived at Bisbee to make the payment, July 3; strictly in accordance with the terms of the contract, the payment was exacted in gold coin, a shipment of which, however, was secured on time from Los Angeles, California. The Kansas City parties allege that the payment was duly and properly tendered, but Mr. Graham claimed it had not been properly made and refused to receive it. Affidavits were introduced by both sides later on, in support of these allegations. The following day Mr. Graham took a special train from Bisbee, Ari., into Mexico with a body of armed men and took possession of the property for the Ensenada Mining Company, and the litigation which has just ended was commenced immediately, under the direction of Judge D. J. Haff, of Kansas City, Mo., representing El Tigre Mining Company.

El Tigre Mining Company re-took possession of the mine Dec. 13, 1905, with the intervention of an official receiver, appointed by the local authorities. In February, 1906, Mr. Graham resigned from the presidency of the Ensenada Mining Company and was replaced by Epes Randolph. Over \$250,000, constituting payments for account of the purchase price, awaits the Ensenada Mining Company in the bank at Bisbee, Arizona, they having refused to accept it.

The whole transaction has been followed with much interest by everybody interested in the security and character of Mexican investments. Allegations have been freely made by friends of both parties that a policy of delay was being pursued, and that it would not be possible to obtain substantial justice.

Looking back, however, over the whole history of the suit, the procedure com-

pare very favorably with that of our own country, and it must be considered that the action of the courts has been prompt and effective.

We trust that the litigation, which was both of a criminal and civil character; is now entirely ended and that the property will be developed to the extent it deserves, unhampered by further difficulties.

W. N.

El Paso, Aug. 12, 1907.

Chemistry of the Iron Blast Furnace

I would like to call attention to the following statements, in view of Prof. Bradley Stoughton's article on "The Chemistry of the Iron Blast Furnace," in the *JOURNAL* of Aug. 3 last. The results were obtained in February, 1904, during research experiments made upon raw sulphide ores, such as molybdenum, iron and nickel. I quote two instances of these experiments, first with ferrosilicon of 15 per cent. silicon and second with ferrosilicon of 30 per cent. silicon; in both cases when equal weights of sulphide ore containing about 30 per cent. sulphur were fused in the electric furnace, copious whitish fumes were evolved, producing a hard and very brittle alloy containing: First case, 5.78 per cent. silicon; 4.76 per cent. sulphur; 88.88 total FeNi.

Second case, 8.10 per cent. silicon; 0.75 per cent. sulphur; 90.6 per cent. total Fe + Ni.

The presence of silicon sulphide was proved in the volatile portion; it was also observed to be absorbed in, or combined with, a mixed calcium sulphide-silicide, which product disintegrates fairly rapidly on exposure to the atmosphere; when added to an excess of water, bubbles of sulphureted hydrogen and gelatinous silica form in the water.

I do not offer this as a probable explanation as to the rôle of the FeS in a blast furnace in opposition to Professor Howe's explanation, because the temperatures are so wide apart; but does the FeS in the blast furnace actually become reduced before it reaches the bath of molten iron alloys? If the silicide and sulphide reaction does take place, what becomes of the silicon sulphide? Would this be decomposed by the moisture in the blast air or in the furnace gases?

On page 37 in Professor Howe's "Metallurgy of Steel" he quotes the fact that Percy experimented with sulphide and silicide of iron and found practically no alteration or reaction. These conditions of Percy's experiment are no more the conditions in a blast furnace than is the condition in the electric furnace like a blast furnace.

Molybdenum sulphide compounds do not submit well to treatment in the electric furnace, because of the oxidation of the volatile oxide which collects on the cooler electrode, or in the flue.

MAX. M. HAFF.

Ottawa, Ont., Aug. 12, 1907.

New Publications

ELECTRIC BLASTING APPARATUS AND EXPLOSIVES WITH SPECIAL REFERENCE TO COLLIERY PRACTICE. By Wm. Maurice. Pp. 166; illustrated. $5\frac{1}{2} \times 8\frac{1}{2}$ in.; cloth, \$3.50 net. New York, 1907: D. Van Nostrand Company. London: The Electrician Printing and Publishing Company, Ltd.

Contents: Electric fuses and detonators. Exploders. Wires and cables. Testing. Explosives and explosive risks. Practical applications. Laws and regulations relating to the storage and use of explosives. Home Office memorandum on the permitted list test.

This book is the result of the author's practical experience as manager of a colliery. It is intended to give concise information concerning the approved kinds of apparatus, the classification and properties of explosives, and the best known means of preventing accidents in the use of them. Special attention has been paid to the needs of underground officers and of shot-firers. While it is based on British practice and the requirements of the British mining laws, it includes much information which is of use in all mines and collieries where electric blasting apparatus is in use.

NEW OBSERVATIONS ON THE OCCURRENCES OF PRECIOUS STONES OF ARCHAEOLOGICAL INTEREST IN AMERICA. By George Frederick Kunz. Pp. 23; $7 \times 10\frac{1}{2}$ in.; paper. Quebec, Canada, 1907: Dusault & Proulx.

In this paper, which has just issued from the press, the author gives a brief résumé of certain precious stones and ornamental materials, and a description of the localities furnishing them. No attempt is made to refer to what has been described previously and only those discoveries are mentioned which have been made in the last five years, both on this and other continents, and described by the author in various publications.

The gem materials discussed are: (1) Turquoise in the United States, Mexico and South America; (2) nephrite in Alaska and British Columbia; (3) jadeite in Guatemala, Mexico, South America and Siberia; (4) beryl in North Carolina; (5) agatized wood in Arizona; (6) chalcedony (a mention of the famous inscribed Borgia Chaldean agate ax now in the Morgan collection of the American Museum of Natural History, New York); (7) obsidian in Mexico; (7) amber; (8) catlinite, or Indian pipestone material.

The zinc output of North Wales was 7548 tons of dressed ore during 1906, as compared with 7667 tons in 1905. The value remained about stationary during the two years. The chief center of zinc output is the zinc-lead zone of Flint and Denbigh.

Mining in Tunis

The British consul at Tunis gives some interesting information dealing with the mineral industries of that country during 1906. The output of phosphates is given as 800,000 tons, of which 751,421 tons was the amount exported, as compared with 508,039 tons during 1905. A large proportion of this comes from the Gafsa Company, the figures for their output being 500,000 tons. It is stated that this company's deposits are practically inexhaustible and that next year the output will have increased to 1,000,000 tons. It is very likely that to meet this increased output a new railway will be built, and also that a new harbor will be constructed at Gades.

The production of lead and zinc ores in Tunis does not appear to have increased during 1906. The actual figures of production are not available and there are only the exports given. The export of zinc ores was 27,058 metric tons during 1906, as compared with 33,049 tons during 1905.

The export of lead ores was 21,602 tons during 1906, as compared with 20,740 tons during 1905. Copper ores amounting to 1041 tons were exported during 1906, as compared with 626 tons in 1905.

The zinc ores went to Great Britain, Belgium and France; the lead ores to France, Belgium and Italy, while the copper ores went nearly all to Italy.

During the last two or three years iron-ore deposits in the northwest portion of the country have been opened up. A company called the Beni-Felkai Mining Company, Ltd., has been formed in London to work iron-ore deposits, ironmasters in Barrow and Middlesborough being interested in the project.

Slag Building Blocks

Consul Alphonse Gaulin reports that in France a building block is used in buildings of the cheaper class, the chief ingredient of which is slag. To obtain satisfactory results the slag selected should contain the smallest possible amount of cinders and coal. It should first be crushed or sifted and then mixed with cement and lime. Water is added to complete the mixture, which is afterward placed in special molds and subjected to heavy pressure. Blocks of various sizes are made out of these molds, the largest being about 8 in. high, 20 in. long and 10 in. wide, and the most common size measuring $2\frac{1}{4}$ in. high, 9 in. long and $4\frac{1}{4}$ in. wide. The slag from which the smaller blocks are made is crushed much finer than that which forms the larger blocks. The mixture is technically known as "agglomérés de mâchefer," and the blocks as Mâchefer blocks.

Personal

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

James P. Graves, secretary-treasurer of the Victoria, is a visitor at the mine.

R. Alvin Weiss, of New York, has gone to Denver, Colo., on professional business.

President Gay, of the Wolverine and Mohawk mines, is on the lake looking over the properties.

A. H. Ristedt, of Idaho Springs, Colo., is making a business visit to Cleveland, O., and other Eastern points.

Quincy A. Shaw has returned to Boston, after spending a few days at the Calumet & Hecla mine, Michigan.

James MacNaughton, general manager of the Calumet & Hecla properties, has gone to New York and Boston.

J. W. Boyd, of Idaho Springs, Colo., has gone to Elizabeth, New Mexico, to examine mines for Eastern capitalists.

B. Hochschild, vice-president of the American Metal Company, has returned to New York from a trip to Europe.

H. W. Hardinge has returned from a Western trip and is en route for Cobalt, Ont., to be absent about two weeks.

C. D. Mallette, of Garden Grove, Iowa, has been looking after mining interests near Rollinsville, Gilpin county, Colorado.

G. W. Miller, of Denver, Colo., is examining a mining property near Pocatello, Idaho, in the interests of Western capitalists.

J. O. McClung, manager of the Kalamazoo property, near Georgetown, Colo., has gone to West Virginia on a business visit.

F. W. Scofield has resigned the position of manager of the Utah plants of the American Smelting and Refining Company.

D. P. Rohlfing of Salt Lake City has recently made an inspection of the Gold Hunter mine in the Coeur d' Alene, Idaho, mining regions.

Fred Scranton, a graduate of the Utah School of Mines, has gone to Peru to enter the employ of the Cerro de Pasco Mining Company.

Dean Blakeslee, of Concordia, Kansas, has been looking after mining interests in the Kansas district, Gilpin county, Colo., during the past week.

H. Vincent Wallace of Nogales, Arizona, has returned from a professional trip to Yavapai county, and to San Francisco and Oroville, Cal.

Director Hyams, manager of the Osceola Consolidated, has returned after an extended visit to the various properties with which he is connected.

Frank J. Murphy, until recently at Velardena, Durango, Mexico, is now super-

intendent of the Yampa Smelting Company, Bingham Cañon, Utah.

F. L. Bosqui has been appointed metallurgical engineer for the Goldfield Consolidated Mines Company, and will have charge of the ore testing and mill installation.

John R. Stanton is making a four weeks' inspection tour of the Stanton properties, the Mohawk, Wolverine, Atlantic and Michigan copper mines in the Lake Superior district.

R. P. Clark, of Ashtabula, O., president of the Black Hills & Denver Gold Mining Company, has been visiting the property in Gilpin county, Colo., with a party of stockholders.

William Lawson, formerly mining engineer for the Hoesocket mine, Jasper county, Mo., is now at Mascot, Tenn., looking after the interests of the Holston Zinc Company.

W. J. Chalmers, of Chalmers & Williams, manufacturers of mining machinery, Chicago, Ill., has taken permanent quarters in the Commercial National Bank building, Chicago.

The President of the United States has appointed Walter Renton Ingalls, editor of the ENGINEERING AND MINING JOURNAL, a delegate at large to the next session of the American Mining Congress.

Dr. David T. Day, of the United States Geological Survey, sailed from New York for Europe this week. He will attend the meeting of the International Petroleum Congress at Bucarest, Roumania.

William W. Van Ness has returned to London from the Pyrenees, where for the past year he has been engaged in erecting a 200-ton silver-lead concentrating mill and a 7-km. aerial wire-rope tramway.

A party consisting of President T. F. Cole and J. B. Cotton, of the Oliver Iron Mining Company, with their wives, and L. D. Ricketts, of the Greene-Cananea Copper Company, is traversing the great lakes this week on the steamship "T. F. Cole," of the U. S. Steel Corporation's fleet.

Obituary

P. R. Budd, president of the Budd Coal Company of Cincinnati, Ohio, died at the Monongahela House, Pittsburg, from cancer on Aug. 8. Mr. Budd was also president of the Highland Automobile Company of Pittsburg.

George W. Delamater, president of the Pennsylvania Steel Tie Company, and interested in the American Aluminum Coating Company, Pittsburg, committed suicide, Aug. 7, in his office in the Diamond Bank building, Pittsburg. Financial troubles and worry are given as causes.

Homer C. Fordyce, for 35 years general manager of the Wilmington Coal Mining and Manufacturing Company, died suddenly on Aug. 8 at his summer home at

Spring Lake, Mich. He was born in Cambridge, Ohio, 60 years ago and had been engaged in the coal business during his entire active life.

Societies and Technical Schools

Appalachian Engineering Association—This body will hold its summer meeting at Newport News, Virginia, on September 7, the Hotel Warwick being headquarters. Engineers visiting the Jamestown Exposition at that time are invited to attend the sessions.

Société Géologique de France—This association will hold a special meeting in the Causses and the Cévennes, October 3 to 11. Sessions will be held along the route at Tournemire, Vigan, Ganges and St. Hippolyte-du-Fort. Secretary Jean-Boussac has issued a program including map, itinerary, full direction for travel, etc.

Industrial

The North Coast Engineering Company, Seattle, Wash., fuel oil-burning equipment, will move on Sept. 1 to No. 2003 Second avenue, Seattle.

The William Powell Company, No. 2525 Spring Grove avenue, Cincinnati, O., manufacturers of iron and brass specialties for engine and boiler rooms, has issued a new catalog containing, besides descriptions of the full line of products, a series of tables and information of practical interest to the engineer.

The Lagonda Manufacturing Company, Springfield, Ohio, in a pamphlet describing the Lagonda automatic cut-off valve, gives the results of a series of experiments carried out to show the efficiency of this type of valve in case of accident, the breaking of a steam main or fitting on the line, or when one boiler in a battery gives way.

Trade Catalogs

The Ohio Brass Company, Mansfield, O. Monthly Bulletin. Pp. 20, illustrated, paper, 6x9 in.; August, 1907.

Cleveland Pneumatic Tool Company, Cleveland, Ohio. Bulletin No. 10. "Cleveland" Air Hammer Drills. Pp. 16, illustrated, paper, 6x9 in.

Sullivan Machinery Company, Railway Exchange, Chicago, Ill. Bulletin 51-E. The Sullivan Rock Drill for Excavating Rock. Pp. 16, illustrated, paper, 6x9 in.

Construction News

Central City, Gilpin County, Colorado—The Santa Loretta Mining and Milling Company is considering plans for a large air-compressor plant. J. W. Tuckfield, Central City, Colo., is superintendent.

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

Aug. 14—Aside from the copper developments at Greenwater and adjoining districts, there are other camps which are improving and which show that Inyo county is once more becoming an important mining field. Numbers of the old camps which were producers 25 or 30 years ago are being reopened, while several new districts are being prospected with good results. The men who recently purchased the big low-grade dumps of the old Cerro Gordo mine, 22 miles from Keeler, expect to realize large sums from their enterprise. At the time this property was worked, in the early sixties, it yielded rich silver-lead ores, but high prices for working and for smelting finally caused a shut-down. For the last few years John Gunn has been working the mine under lease, and shipping small lots of ore to the smelter by way of Keeler. Doubtless the mine itself will be worked to a greater extent if the experiment with the dumps is successful. In the Panamint range, in the same county, C. G. Eddie and H. S. Le Compte have found silver prospects which are considered very favorable. Prospectors are going in numbers to this new Panamint camp, which is some miles distant from the old one of the same name. The great heat of that desert section makes the trip thereabout dangerous at this time of the year unless the men know the roads and the location of water holes.

Ubehebe is another district of Inyo county now attracting attention. Tonopah men have located about 2000 copper claims and high-grade gold ore has also been found. A large company is to be formed to open these properties, which are in the Panamint range. A 15-mile pipe line will be necessary to bring water to the mines. The Lila C. mine, in the Death Valley region, owned by the Pacific Coast Borax Company, has the largest vein of colemanite ore ever found in this country, and the company will, as soon as the railroad is finished, draw its entire supply of borax from that source, abandoning its old mines near Daggett entirely.

While important developments in copper claims are being made at many points in the southeastern part of California, notably at Greenwater and vicinity, in Inyo county, the same may be said of the copper claims in the northeastern portion of the State, in Plumas county, and of the northwestern portion, in Trinity county. In the three counties named large de-

posits of copper ore have been found and are being opened. But in neither one have any smelters been provided, nor have railroads been built. A railroad will soon be provided for the Inyo mines, and the Western Pacific will furnish transportation for the Plumas mines within a year. A railroad is planned for the mines in Trinity county also, but no start has been made upon it, though several hundred men are working in the mines of the Blue Lead section. The ore in this section is of a very satisfactory character, but at present there are no means of satisfactory transportation or smelting. The copper belt in Plumas county stretches from the southern side of the Genesee valley southwesterly to Mountain Meadows and the north fork of the Feather river, below Big Meadows. The miners are holding their claims by annual assessment work, and are doing some development, but no shipments are yet being made. In the Shasta county copper region extensive developments have taken place, and there are several large smelting plants while others are being built.

The Pocahontas copper mine, near Lewis, Mariposa county, has recently shipped a number of carloads of high-grade ore from Le Grand station to the Peyton Chemical Works, at Bay Point, on San Francisco bay, thus adding a new shipper to the California copper mines. Only 145 ft. depth has been attained on the orebody, but a new hoist is to be put in so as to sink 500 ft. deeper. It is the intention eventually to put up a smelter at the mine. David Ross is the superintendent of the property.

The three Georgia Slide seam mines, in El Dorado county, have been worked on the open-cut system for 50 years, but on the last one, the Blue Rock, a shaft is being sunk on the vein so as to properly drift at depth. The Beattie and Pacific mines have been worked underground for the past two years. These peculiar mines have made a large production in the past and now that they are being worked on an underground basis, instead of open cut, may show an increased output.

At the head of Poorman's creek, in Plumas county, Nevada, operators have secured 260 acres of patented mining ground, and a 160-acre tract farther down stream, the latter to serve as a dumping place and restraining reservoir for the tailings. The pipe line to furnish water for the three giants is nearly completed. This creek has been noted for its heavy gravel deposits, but the locality has only

been mined near the surface, and not 5 per cent. of the ground has been worked.

The Pittsburg-Liberty mines, at Masonic, Mono county, have a large ledge of ordinary ore, but through it run streaks of ore of very high grade. This latter is to be shipped to the smelters, but the rest of the ore will be treated at the company's own mill and cyanide plant in the district. More active development will now be done on the property as richer ore has been discovered of late. Wingfield & Nixon, of Nevada, held an option on a third of the property, but let it lapse, as the owners of the mine refused to grant an extension. The Red Rock mine in the same district, owned by Samuel Smith, has also recently struck a ledge of high grade.

The South Yuba Water Company, in Nevada, did not begin this year to draw from its mountain lakes until Aug. 5, this having been one of the best water seasons the company has had. The supply up to the date mentioned had been drawn from the natural flow in the streams fed by the melting snow at higher altitudes. The large amounts of snow which fell in the upper mountains last winter and the cold summer following, account for the abundant water supply.

Anticipating another heavy winter like the last one the mine managers in Grass Valley district are arranging to put in larger and auxiliary pumps, and also to equip the plants with both steam and electricity, so that they will be in a position to handle the water in their properties, no matter how bad the weather is. The Sultana is having an immense electric pump made, which is to be placed on the 800-ft. level of that property. On a 2100-ft. incline it will have a capacity of 5000 gal. per min. The Empire is installing a 250-h.p. compressor, so arranged that it can be operated either by steam or electricity, and should one means of power fail this winter the other will be used.

Numbers of claims have recently been located in Meadow Lake district, Nevada county, and renewed activity is expected. This has led to considerable claim jumping, and several of the older mines of the district have been jumped.

It is again reported that the Wildman-Mahoney properties at Sutter creek, Amador county, have been sold, this time to W. J. Murphy, of Chicago, Ill. He will make arrangements to pay off the indebtedness, if a reasonable compromise can be effected with the claimants. The purchase will take in adjacent mining ground.

The Mammoth Copper Company's new short railroad from Quartz, on the Southern Pacific, opposite Old Diggings, Shasta county, to the Quartz Hill mine, will be completed and in operation, August 15. The railroad is a narrow gage, three miles long. Two locomotives will belong to the little railroad, one being kept in reserve though it is expected that at times there will be work for both to do, for 400 tons of ore are to be shipped every day from the Quartz Hill mine to the smelter at Kennett. Opening the railroad will make it necessary to employ a much larger force of miners at Quartz Hill, which, it is to be remembered, will produce ore for fluxing purposes only. The narrow-gage cars will dump their loads of ore into bunkers, the ore will be delivered to standard-gage cars of the Southern Pacific and brought to Kennett. The distance from Quartz to Kennett is about 10 miles.

The Northern California Water and Power Company, which recently acquired the Eureka Lake Company's interest in the Badger Hill gravel mines, Nevada county, and now has full control of the property, proposes to work it on an extensive scale. The Northern California Company is said to have secured the bulk of the gravel-mining rights along the blue lead for a distance of about 10 miles, beginning at Columbia Hill and extending toward Bridgeport, and to be preparing for their development on a very extensive scale by the drifting process. In the past the lead was hydraulicked, but sufficient fall could not be obtained to bottom it, and the major portion of the coarse gold was passed over.

The property embraced by the Republican, Mammoth and Orcutt mines near Groveland, Tuolumne county, which formerly were operated by the Sierra Buttes Mining Company, Ltd., of London, are in the market, and investors have been investigating concerning the values that they contain. Good ore was struck in the Mammoth shaft about 12 years ago. The English company about that time closed all its mines in California, including the Sierra Buttes, Eureka Mills and Uncle Sam, to devote exclusive attention to properties in South Africa.

A new Los Angeles corporation, called the Princess Gold Mining Company, has bought a mill, crusher, cyanide outfit, etc., and intends working the low-grade ore in Little Tejuanga canton, in the Tejuanga mining district, distant about 22 miles from the city of Los Angeles, 7 miles from San Fernando and 6 miles from Pacoima (the nearest railway station), on the line of the Southern Pacific railway. This mining district lies in the mountain ranges northeasterly from San Fernando and northwesterly from Los Angeles, overlooking the San Fernando valley, and within the limits of the San Gabriel timber and land reservation. The district is not a new one though little has been

done heretofore with the claims which were of too low grade for individual effort.

Bisbee, Arizona

Aug. 16.—The Copper Buttes Mining Company, which has a large tract near Kelvin, on the Phoenix & Eastern road, has just made a contract with Los Angeles parties owning a lixiviation process in successful operation elsewhere, for the leasing of the mine for a term of years, the lessees to erect and have in operation in four months a works capable of treating 300 tons per day, and to increase this to 500 tons as soon as practicable. The lessees are to pay 40 per cent. of the net proceeds to the company, which will use the money for the development of its lower ore zones. There are large areas of 2 to 3 per cent. carbonate orebodies on and close to surface at this property, and mining can be done at slight expense. The Copper Buttes company has been operating in a more or less continuous manner and under several managements for a number of years, and has a large number of shareholders few of whom understand what the requirements of a mine are. Its headquarters are at Minneapolis, but the control is now held by mining men of Duluth, Minn.

Lewisohn Bros. of New York, interested in Arizona for many years, have taken a bond on the Nueva Cananea, lying to the northwest of the Greene Cananea, and will explore at once on a considerable scale. This syndicate had an option on the Cananea Central property of the Greene some time ago, but did not see that it was worth the money asked, and has been anxious since its wonderful success to get into the camp.

S. W. Clawson, who has been manager of the Copper Queen mines at Bisbee for many years, is to be succeeded by Parker Woodman, who has been in the employ of the Phelps-Dodge interests for a long time at various properties. Mr. Clawson resigned some months ago and leaves the employ of the company this month.

The Twin Buttes Copper Mining Company has cut rich ore in its property south of Tucson, on the 300-ft. level of the Morgan shaft. There are no data from which to judge the extent of the find. Twin Buttes has been developing steadily for several years and has done a large amount of work. Its copper production has been fair for a new property.

A 700-h.p. turbine generator set for the Calumet & Arizona smelter power house is being installed, also a pump of 5000 gal. per minute capacity, for smelter purposes. The present five furnaces of the works will be increased from 300 to 500 tons daily capacity each as soon as the work can be done. Material is now being collected at the works. When these five have been enlarged two more will be built, giving a total smelting capacity of 3500

tons a day. This will be used for the Calumet & Arizona company and the Superior & Pittsburg, the larger share for the latter company.

At the Copper Queen reduction works at Douglas a reverberatory furnace for smelting flue dust, such as was built experimentally at Morenci, has been completed. If successful, as expected, others will be built so that all flue dust from the furnace plant will be smelted in furnace slag instead of being briquetted. Nine furnaces of the ten erected are in operation, and an addition of 125 ft. is being put on the smelter building, and one of 90 ft. to the power house. It is probable that the Copper Queen works will be in shape to make up to 12,000,000 lb. a month in the course of a couple of years or so. Not all the work now planned can be completed during 1908. The new reverberatory for flue dust will receive the slag from the first settler, and into the stream of slag the dust will be blown by a jet, and thus melted without forming more dust, while the copper saved from the dust and the more complete separation of the slag will be tapped out from the bottom of the furnace.

Production at Morenci of the Detroit Copper Company is running about 1,700,000 lb. a month, and there is no disposition to change. The new converter plant is saving considerable money in the handling of material, and also in a higher saving of copper.

The Ray Mining Company, at Kelvin, is operating a 300-ton concentrating mill and is figuring on very greatly increasing the capacity. Ray ore is claimed to run as high as 3½ per cent. copper, which is considerably better than the old company was ever able to save. There is probably an enormous body of ore in the Ray deposit but attempts heretofore to operate it have resulted in disappointment.

After a brief strike the Arizona Copper Company's smelting works at Clifton have resumed operations with a reduced force. The smelter is not liable to be turning out its customary amount of copper for some time.

Phelps, Dodge & Co. are building at the Dawson coalfields large churches, schools, auditoriums to seat more than 2000 people, recreation parks with seats for 1000 or more, and other improvements of the sort.

General Manager L. D. Ricketts, of the Greene-Cananea, has gone to Duluth to confer with the directors and President Cole. It has been decided that the new smelting works shall consist of three furnaces each 54 ft. long, settlers at the ends, and furnaces and converters in one building. Construction of these works begins as soon as material can be assembled and the necessary contracts let, and when completed the present works will be scrapped. All tracks through the new works will be standard gage, and everything will be in large units. The company is now shipping

about 200 tons a day from the Cananea Central workings but chiefly in the progress of development, as the new extraction drifts are not far enough to permit regular mine operations. A working shaft equipped electrically has been sunk in the footwall of Bonanza vein and extraction drifts are being run out gridiron fashion, from which raises will be driven to connect with the present exploratory workings of the Bonanza. This vein has been cut on the 200-ft. level, and is still as rich as higher up.

Salt Lake City

Aug. 15—Existing conditions in Bingham as regards the transportation of ore to the smelters are deplorable. One company, the Boston Consolidated, has given up trying to obtain railroad cars to move its product and, as a consequence, has dropped 300 men from its employ. Until conditions change for the better, the management will make no move toward extraction. Summed up in a nut shell, the Rio Grande's head officials have not appreciated the importance of the developments made in Bingham during the past few years and have not improved the road and equipment to keep pace with the growth in population and in the building up of new enterprises. The Bingham branch probably earns as much as any other like mileage of track owned or operated by the Gould management, yet it cannot handle the business of the camp. It hasn't equipment enough and it is doubtful, even if the road had all the engines and cars it can operate conveniently, if it could give satisfactory service to its patrons, especially when the concentrating mills at Garfield begin to demand from 6000 to 12,000 tons of ore a day. Because of a car scarcity last month, the Utah Consolidated Mining Company could get to its smelter only slightly more than half its usual tonnage. With this situation to contend with and the probability of another fuel famine this winter, the outlook for the immediate future is anything but promising. It certainly looks as if the operators would have to take the transportation question into their own hands, unless the Rio Grande takes prompt steps to meet the demands of its patrons.

The cutting off of 300 men from the pay rolls of the Boston Consolidated has had the effect of stopping the agitation for higher wages among Bingham miners.

The ore and bullion settlements reported last week amounted to a total of \$603,000.

Some unrest is manifested by miners in the Tintic district and there is considerable talk of demands for higher wages. The present wage scale of the camp is: \$2.75 for muckers, \$3 for miners and \$3.25 for machine men, which is 25c. a day more all around than was paid at the beginning of the year when operators made a voluntary advance.

Dividends will be paid within the week by seven Tintic mining companies: Colo-

rado, \$120,000; Gemini, \$50,000; Beck Tunnel, \$40,000; Lower Mammoth, \$14,500; May Day, \$8000; Grand Central, \$12,500; Uncle Sam Consolidated, \$10,000.

The stockholders of the Indian Queen and Leland Mining companies have ratified the plan to consolidated the Beaver county properties owned by those corporations. The Indian Queen Consolidated Mining Company has been organized to operate them. Jesse Knight of Provo, Utah, is president of the new organization.

Good progress is being made with the work of constructing the first 2000-ton section of the Ohio Copper Company's new mill in Bingham. Some of the steel structural material is up. The contractors insist that they will have the plant ready for operation in November.

Denver

August 15—The contract for driving the Cripple Creek drainage tunnel has at last been let. The El Paso Consolidated Gold Mining Company was the successful bidder, and as that company's mines are most largely interested in its completion, this important undertaking will now be energetically pushed forward. The contract is for 15,000 ft. at \$25 per foot.

The first drainage and transportation tunnel scheme for Cripple Creek was the Pikes Peak Tunnel Railway, which was brought out in London just 10 years ago, with a capital of \$50,000,000. The projected tunnel had its eastern portal at Colorado City, and its western one at Mari-gold, not far from the one now being driven, passing directly under Victor at a depth of about 1500 ft., with laterals through the other portions of the district; the total length was 18 miles. The Earl of Dunmore was on the board of directors; Sir Douglas Fox, of Simplon tunnel fame, was the consulting engineer; and Lord Thurlow and other great names were connected with it; but the British public did not come in, and the project fell through.

Since the burning of the Cycle mill at Colorado City, there has been some apprehension among the miners of Cripple Creek that treatment rates would be raised. This, however, has not been the case, for the United States Reduction and Refining Company states that no advance in rates will be made to those whose ores were being treated at the Cycle mill, which is, of course, eminently fair and proper.

Connection with the Saratoga mine cage shaft was made in the lateral from the Newhouse tunnel on August 8, and this marks the era of the entrance of this tunnel undertaking to the great belt of pay veins which in the past 30 years have produced the golden millions of Gilpin county. These veins will be intersected at depths of from 1500 to 2200 ft., and great results should now be attained. Up to the intersection of the Saratoga vein, the tunnel was driven through comparatively barren territory, but now it is in

the heart of the gold belt which has made Gilpin celebrated in the annals of the West. The connection was made at a point more than 2½ miles in from the tunnel portal, and the lateral was about 2500 ft. in length. This furnishes ventilation for the tunnel, for hitherto the only surface connection was on the Gem mine, which vein was intersected about 8000 ft. in from the entrance. The length of the Newhouse tunnel is stated to be now 17,540 ft.

London

Aug. 8—The deep-lead undertakings in Victoria are not proving very profitable to English investors. Australian miners and capitalists have during the past 40 years done remarkably well by opening up these buried river beds. The Victorian government has done a good deal in helping those who wish to exploit the deposits, and geologists, such as Reginald Murray, J. W. Gregory and Waldemar Lindgren, have spoken in high praise of the projects. The districts so far acquired by English companies have proved to be of much less value than was expected, and at the present time the directors, the shareholders and the engineers are experiencing a period of mental depression.

The strip of country acquired was large enough to provide work for six different companies, all of which are located in Bewick, Moreing & Co.'s offices. The most important is the Loddon Valley Company and the work was concentrated on the property belonging to this company. For three years pumping was energetically carried on and toward the close of last year the water in the overlying strata was at last brought under control. Since then the buried leads have been worked to some extent. Unfortunately the results so far obtained have been negative. Very few payable patches of ground have been struck, and the prospects of finding anything are rather gloomy. In the meantime the funds of the company have been exhausted and this week the shareholders have agreed to a reconstruction of the company, with the object of raising further capital. The Victorian government, considering that encouragement is required, has signified its willingness to spend £8000 at the present time in aiding the company, so that opinion in Australia is favorable to the ultimate success of the project.

These deep-lead propositions originally came to England during the Whitaker Wright regime and at the time of the collapse of that group they were taken over by the Bewick, Moreing group at the same time as the West Australian mines. Bewick, Moreing & Co. were quite aware that these deep leads would present considerable difficulties and desired to have the best independent geological advice that could be obtained. That is how it was that Mr. Lindgren came to visit the district.

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

California

AMADOR COUNTY

South Eureka Mining Company—A new vein has been found on the east crosscut on the 2300 level of this mine near Sutter creek. Superintendent Finchley will shortly install a new electric pump at the 2500 level to raise the water 500 feet.

BUTTE COUNTY

P. V. Steifer Mining Company—In this property near Magalia, the 500-ft. double compartment shaft has reached gravel, which is reported to be of satisfactory value. An electric power plant is being built.

CALAVERAS COUNTY

Blue Jay—This mine at Jesus Maria will now be operated by a larger force of men, rock of good quality having been found in the shaft.

Calaveras Mining and Development Company—This company, Geo. W. Kirkley, manager, is constructing a new ditch to bring water to its quartz and hydraulic mines, which were formerly known as the Kenross mines.

K. C.—The owners of this mine near Angels, having found good paying ore, will sink to the 500 level.

KERN COUNTY

Karma-Ajax Consolidated Mining Company—This company at Mohave has opened a 7-ft. ledge on the 1400 level of the Karma, at a point just missed by the former owners.

Pine Tree—This old mine, worked for a time 30 years ago, is being developed and reopened by Los Angeles men, with C. M. Hauselman as superintendent. The 700-ft. shaft is being deepened to 1000 feet.

Strike—A strike of high-grade gold ore has been made on Indian creek in Hamilton district, eight miles from Paris. This ore has been found in several claims, the first strike having been made on the Henry Ward.

NEVADA COUNTY

Badger Hill—The Northern California Water and Power Company will probably work this old property by drifting. The company now has 10 miles along the channel from Columbia Hill to French Corral besides the Malakoff and other claims around Bloomfield.

Channel Gold Company—This company, owning the old Blue Tent hydraulic mine,

will soon have its new gravel mill running. The mine will be drifted.

Co-operative Mining and Development Company—This company will be compelled to put up its new mill a mile below the mouth of the tunnel, near the town of Washington, and will put in a railroad track for transporting ore.

Fairview—Superintendent Wilson is opening by tunnel a large body of low-grade ore in this mine at Relief.

Nevada County United Gold Mines Company—This company has been organized to work the Austin mine near Nevada City with the following directors: H. A. Moss of San Francisco, L. B. Bullens and E. W. Rose of Kansas City, and F. E. Ware and W. S. Beard of Nevada City.

Omaha-California Company—This company, owning the South Yuba mine, expects to work its large deposit of copper and gold ore at Spenceville by means of steam shovels.

PLACER COUNTY

Georgia Hill—This old mine near Forest Hill has been reopened with E. W. Drummond as superintendent.

Ophir Valley Mining Company—This company at Ophir, owning the Hathaway, Kirkwood and Eureka quartz mines, is about ready to start up, the new and complete electric power plant having been finished. A. R. Eastwood is superintendent.

PLUMAS COUNTY

Indian Valley—At this mine near Greenville, a 20-stamp mill with cyanide plant is about to be installed. The plant will be near the mouth of the 3000-ft. tunnel.

The Volcano—At this point on the Middle fork of the Feather river, A. Slaback is developing a 10-ft. vein of gold-bearing quartz.

SAN BERNARDINO COUNTY

Dicky Bird—A good strike is reported on this property owned by Gilbert and Hathaway, near Cave springs.

Quail Springs District—Several rich strikes have been made in this district west of Crackerjack, the principal one being in the Silver King mine owned by the Kennedy Bros.

SHASTA COUNTY

Milton—This mine in Lower Springs district, recently sold to a Minneapolis company, will shortly have an electric hoist. A new shaft is to be sunk.

Vulcan Copper Mining Company—Diamond drills are being used in opening up the claims of this company located between the Trinity Copper and Balaklala mines. The company is composed of many small stockholders in northwestern California. A wagon road is being built to haul in machinery.

White Oak—In the main shaft of this mine in Lower Springs district a 3-ft. vein of specimen ore has been found.

SIERRA COUNTY

Daneri—A. G. Burton and R. A. Riefe have taken an option on this claim near Downieville, and are organizing a company to develop it.

Plumas-Nevada Mining Company—This company is about to open up a copper claim on the Last Chance section, seven miles from the Chilcoot tunnel.

Rio Antigua Mining Company—This company, operating on the South Fork property, thinks it has the extension of the famous Tightner ledge, the vein having been cut in a tunnel run to tap a gravel channel.

Kenton—A. B. Royal and others are to open this old claim on Kanaka creek, near Alleghany, by extending the tunnel 500 ft.

SISKIYOU COUNTY

Sheba—This mine on Patterson creek is producing good quartz and the mill is shortly to be started up.

Ten Lakes Mining Company—This company, owning eight claims on the summit of the divide between Scott and Shasta valleys, nine miles from Edgewood, has struck good ore.

TRINITY COUNTY

Globe—At this mine, Dedrick, 25 men are at work, and the 5-stamp mill is kept running steadily.

La Grange—At this extensive hydraulic mine near Weaverville the giants are being run 16 hours daily. A larger water supply is being arranged for.

Colorado

BOULDER COUNTY

Interoccean Gold Mining Company—At the annual election H. J. Smith, of Chicago, was elected president and H. S. Merrill, of Chicago, general manager.

United States Gold Corporation—This company has purchased the big milling plant of the Wall Street Gold Extraction Company, in bankruptcy, for \$17,000, for

the treatment of ores from its own properties.

CLEAR CREEK COUNTY

Little Mattie—On account of a breakdown of the 12-drill air compressor, operations will be suspended for a couple of weeks at this property on Chicago creek.

North Star—A rich strike has been made in this property in East Argentine district, assays showing high value in silver and gold. F. Bonham, Georgetown, Colo., is the owner.

Saratoga—Connections have been made during the past week with the 1000-ft. level of the Saratoga mine in Gilpin county, through the workings from the Newhouse tunnel below Idaho Springs. A lateral was driven about 2000 ft. and an upraise of about 300 ft. was made to get under the west lower level of this property, draining several miles of workings and providing ventilation throughout the Saratoga mine, as well as in the Newhouse tunnel workings. Operations have been partially suspended for a number of years on account of water troubles. Besides unwatering these mines the connection makes it possible to handle the immense bodies of low-grade ores economically through the Newhouse tunnel to the mills at Idaho Springs. John Owen, of Idaho Springs, is manager. Eastern people are figuring on taking up the option calling for \$500,000 on this property, which is owned by Berry Bros., of Detroit, Mich.

FREMONT COUNTY

Colorado Fuel and Iron Company—This company has bought the right to 240 acres of coal land north of Williamsburg from Simon T. Smith, and will, it is reported, open another mine.

GILPIN COUNTY

Champion Mining and Milling Company—At the stockholders' meeting held recently the following officers were elected: President and general manager, S. P. Weller, Denver; vice-president, C. D. Mallette, Garden Grove, Iowa; H. C. Doolittle, Kansas City, Mo., secretary and office manager; treasurer, L. N. Brown, Kansas City, Mo. The offices of the company are to be moved from Kansas City to Denver, Colo.

Freight Blockade—After a six-weeks' tie-up on the Colorado & Southern road regular freight traffic has been resumed. The tie-up has interfered greatly with the shipments of ores to the Denver smelters, and the production for July and August will be small on account of the small working forces at the mines.

Gower Mines Syndicate, Ltd.—At a depth of 1425 ft. on the east side of the shaft in the Running Lode mine, near Black Hawk, smelting ores have been opened up in what is practically virgin ground, showing gold, silver and copper.

Hearne Gold and Copper Mining Com-

pany—This company has been incorporated with capital stock of \$500,000, with F. W. Hearne, F. Wild and Harry Kane, of Central City, as incorporators. The company has a five-years' lease and bond on the Anchor property in Russell district, on which it purposes installing heavier machinery. The property has been idle for a number of years on account of water, but has recently been drained by the Newhouse tunnel workings. Examination shows large bodies of low-grade concentrating as well as medium-grade smelting ores.

Pewabic Consolidated Mines Company—At the annual stockholders' meeting the following officers were elected: President, treasurer and general manager, J. C. Fleschhutz, Central City, Colo.; vice-president, D. N. Harper, New York; secretary, W. A. Funk, Central City, Colo.

Santa Loreta Mining and Milling Company—The directors are figuring on the installation of a larger air-compressor plant, sinking the shaft several hundred feet and actively working the property on company and leasing account. The property was recently purchased for \$50,000. J. W. Tuckfield, Central City, Colo., is superintendent.

LAKE COUNTY—LEADVILLE

Coal Situation—The railroad strike, should it continue, would virtually mean the closing down of several mines which have not sufficient coal to tide over the interim. The coal shortage is also likely to affect the electric-light plant, on which the city and several of the mining properties depend for power. The strike materially affects the tonnage and in many cases the production of ores has been cut in two, while the smelters have reduced their smelting capacity.

Delaware—The shaft is down 450 ft. and has developed an interesting geological formation, which is being watched with great interest by the mining men of the district. After passing through 350 ft. of white block porphyry, 50 ft. of gray quartz porphyry was passed and the shaft is now in coarsely crystalline porphyry.

Dinero Tunnel—A distance of over 1100 ft. has been reached in the tunnel on Sugar Loaf mountain, but at this point a heavy flow of water has retarded operations somewhat.

Fanny Rawlins—The lessee on this property on Breece hill is now prepared to take out ore.

Hopkins—A vein in this property, near the summit of Mount Sheridan, was recently opened which gives good assays in silver and lead. One great difficulty in mining this property is the expense of getting in supplies and getting the ore to the market.

O'Donovan Rossa—The shaft, South Carbonate hill, has reached a depth of 520 ft. and there is 80 ft. yet to be sunk before drifting to the west will be started. At

present the bottom of the shaft is in a disturbed state of broken material, talc, granite boulders, etc., the Pendery fault, previously known as the Carbonate fault.

Yankee Doodle—Lessees operating this property are taking out ore from the 450-ft. level. On account of the railroad strike the ore is being held in the bins.

ROUTT COUNTY

Blevins Mining Company—This company, which has been operating a placer dredge on its property in the Jack Rabbit district, 20 miles northwest of Craig, has sold its holdings for \$100,000 cash to Philadelphia capitalists. The property consists of 356 acres, and the new owners will spend \$50,000 more for equipment.

TELLER COUNTY

Vindicator Consolidated Gold Mining Company—The quarterly report of this company shows total profits for April, May and June, of \$78,185. The total receipts for ore, after deducting freight and treatment charges, were \$184,192 and mine expenses were \$85,415. The company shipped in all 5205 tons of dry ore and lessees' shipments amounted to 1231 tons. F. J. Campbell, general manager, reports that a large amount of development work is contemplated for the immediate future in driving drifts into unexplored portions of the property. Mill experiments are being carried on for the purpose of finding the proper treatment for the ores before proceeding with the construction of a large mill for which the directors are creating a reserve fund out of the profits. The usual quarterly dividend of 3c. a share was declared.

Idaho

SHOSHONE COUNTY

Rex—Capitalists in Montana and Washington have secured control of this mine near Wallace. The property is situated on Nine Mile and has been idle for some time because of litigation. The ore contains lead and silver and the property is well developed and is equipped with a 200-ton concentrator which is to be re-modeled. The Rex was formerly known as the 16 to 1 mine.

Indiana

FOUNTAIN COUNTY

New Coal Field—Steps have been taken to develop a new and rich coal field in this county. With the assurance of a new railroad a large area of coal-bearing land in this county has been purchased by capitalists from Indianapolis and Chicago. The sinking of shafts and the construction of the road will be begun simultaneously.

GREENE COUNTY

Latta Creek—A recent test of the capacity for production of the mine near Clay City showed an output of 79 flats of 34 tons each, or more than 2500 tons of

coal per day. Of the three seams of coal underlying this property, which are in thickness, respectively, 3, 5 and 7 ft., only the first and second are being worked.

WARRICK COUNTY

Hicks Coal Mining Company—This company, of Booneville, and other syndicates have purchased and taken options on several thousand acres of coal land in this county. A new field of "block" coal will be developed.

Michigan

HOUGHTON COUNTY—COPPER

Ahmeek—Sinking is being continued in No. 1 shaft below the seventh level and in No. 2 shaft below the ninth.

Allowez—No. 2 shaft is down 500 ft., and is being sunk at the rate of about 100 ft. a month. Foundations are being built for 10 new dwellings.

Calumet & Hecla—A portion of coal dock No. 1, at Hubbell, was destroyed by fire. The company has broken ground for its new No. 18 shaft, which will be located at the extreme north of the property, and is to be sunk on the Osceola-Amygdaloid lode.

Superior—This company is sinking below the sixth level in No. 1 shaft and is passing through a more uniform formation than was encountered in the upper levels. The rock continues to show up well in copper.

Tamarack—No. 3 shaft is temporarily shut down to permit changing the large single conical drum of the hoisting engine to a double conical drum. Stopping and drifting is being carried on and the rock stacked.

Michigan—The new mill is about half completed. When finished it will have a capacity of 700 tons per day. The mine is shipping 500 tons daily to the Atlantic mill. The new mill will cost between \$150,000 and \$200,000, all of which is being taken out of the earnings.

Missouri

RANDOLPH COUNTY

Randolph-Macon Coal Company—This company's properties are advertised to be sold under foreclosure of a mortgage held by the Central Trust Company, on the premises at mine No. 2 in Huntsville, on Sept. 14. The decrees of sale were rendered recently by the United States Circuit Court for the northern division of the eastern district of Missouri and the United States Circuit Court for the central division of the western district of Missouri.

Montana

LEWIS & CLARK COUNTY

Bald Butte Tailings—Larsen & Constans are at work on tailings from the Bald Butte mine, gathered years ago by Mr. Larsen on his ranch below the mine. The

new Constans method is being used with success. The system is one of settling and agitation by treating the slimes after being separated from the sand. The tailings are dumped into a tank and the slimes overflow into lower tanks and to the patented agitator. The sand is drawn from the tanks and treated in the agitator separately. The agitator is in the form of a large funnel, a spiral raising the contents from the bottom, spreading them and carrying the solution to the outer edge through a leaching cloth into the zinc boxes. In the same district Woolman & Edwards are working the old tailing of the Bald mountain, running a 150-ton cyanide plant with profit.

Platinum—In the Warm Springs gulch, nine miles from Helena, are a number of profitable gold properties. Recently Wilton Browne, assayer and chemist of Helena, has discovered that the gold ores from this district carry platinum in the shape of sperrylite. Tests of ores from four or five of the mines show from \$4 to \$18 per ton platinum. Further investigation will be made.

Rock Rose Mining and Milling Company—This company, operating west of Fort William Henry Harrison, is installing machinery and making preparations for sinking to the 500-ft. level. A promising body of copper ore is being developed.

Scheelite Deposits—Scheelite ores have been found in the Marysville district near Helena, carrying a larger percentage of tungsten than the ores in Park county. The Japanese government has experts investigating the deposits in the State, and a company has been formed to exploit the properties.

Nevada

ESMERALDA COUNTY—GOLDFIELD

Columbia Mountain Annex—This property, situated on the west side of Columbia mountain, will shortly be developed. At present the company's attention is being devoted to its promising lease on the Silver Pick mine.

Grandma—An English company has secured a three-years' lease of this mine, which adjoins the Kewanas, that recently struck a bonanza, and a diamond drill plant has been erected. A contract has been let for a steel gallows frame and a 100-h.p. hoist to enable the shaft to be sunk to a depth of 1000 ft.

Jumbo Extension—The Mohawk Ledge lease has made a rich strike on the 310-ft. level. The rich streak is about 20 in. wide at the point of discovery. Several weeks ago, in the west crosscut a strike was made near the side line of the Mohawk and returned encouraging values. The latest strike was made in a crosscut to the northeast, near the line that divides the Mohawk Ledge and the Higginson lease blocks. It is apparently a continuation of the Higginson vein. A ship-

ment of about 50 tons of ore has been made. The lease has been extended to March 1, 1908.

Kewanas—The new ledge in the 420-ft. level is over 8 ft. in width and in addition to its high gold value carries from 2 to 7 per cent. copper. President Schloss is of opinion that aside from the fact that the strike greatly enlarges the gold-bearing areas in the Goldfield district, considerable importance is attached to the occurrence of such good copper values. The vein apexes the company's ground and is not the Red Top or the Laguna. The workings are not yet deep enough to cut the latter veins, but they doubtless will be found on the Kewanas ground, although it will require a depth of at least 1200 ft. to reach them.

Laguna—J. H. Macmillan & Co. have secured a lease on the Miss Jessie claim, and have re-started sinking in the three-compartment shaft. The shaft is at present 190 ft. in depth, but will be run down to the 600-ft. level. The lessees are erecting the efficient plant they used on their successful lease on the Frances Mohawk mine, on the Jessie lease.

LANDER COUNTY

Reno Claims—Charles S. Warren, of Butte, Mont., and associates have purchased the Reno group of mining claims near Tenabo, and it is said that operations will begin at once. The property consists of three claims, the Reno, Winnemucca, and Ollie, situated between the Gem claims of the Reliance Mining Company and the claims of the Gold Quartz Mining Company.

NYE COUNTY—BULLFROG

Gold Grotto—The workings are hampered by water which percolates in from a slate dike that was recently met in the crosscut tunnel. Assay values continue low.

Homestake—The drift on the 400-ft. level is out 900 ft., and is in ore all the way. The vein is over 30 ft. in width, and has an assay value above milling grade. Large reserves of milling ore have been opened out. The company has decided upon the erection of a mill and cyanide plant. Plans for a large water-supply plant are also being drawn by the company's engineers.

Mayflower—The shaft is approaching the 400-ft. level. The ore is improving in value as it is being developed in the lowest workings.

Montgomery Shoshone—It is officially announced that although the new mill and cyanide plant are primarily for dealing with the company's own ore, the company has decided to set aside a part of the mill for some months to accommodate the mine-owners on the Bullfrog field. Some of the best ore at present is coming from the Polaris workings.

Original Bullfrog—The new shaft has

reached a depth of 80 ft. and is in promising country carrying copper stains. When the vein is cut in the footwall the shaft will follow it down, as it does not deviate much from the vertical.

NYE COUNTY—TONOPAH

Ore Shipments—Shipments of ore to the smelters over the Tonopah Railroad for the week ending Aug. 8 were: Tonopah Company, 730 tons; Belmont, 216; Tonopah Extension, 210; Midway, 96; Montana-Tonopah, 82; Jim Butler, 35; total, 1369 tons. Shipments from Goldfield were 815 tons, making a total of 2184 tons. In addition the Tonopah Company sent 1760, and the Belmont 440 tons to the mills.

German-American—This property, which is situated in the northwest section of the Tonopah district, and comprises a large number of claims, will be prospected by means of a diamond drill. The shaft is down 260 ft., and a drill has been installed at the bottom with the view of cutting out a core to a depth of 2000 ft. A large amount of attention is now being given to prospecting the outside mineral ground. Owing to the great depth of rhyolite capping, prospecting work is difficult and expensive.

Mizpah Extension—The main shaft has been re-timbered and put into working shape. The miners are engaged in following the stringers which appear in the ledge. Charles Knox, of Philadelphia, is the largest active shareholder in this company.

Tonopah—It is reported that a 16-ft. vein carrying high assay values has been cut in the 600-ft. level in the Valley View claim. The new strike is the greatest ever made in the claim.

West End Consolidated—The new double-compartment shaft has been connected with the west drift at a depth of 230 ft. The management intends to continue sinking and make connection with the drift on the 400 level as quickly as possible.

NYE COUNTY—FAIRVIEW

Fairview Eagle—A ledge 4 ft. in width and giving high assays has been cut in the 200-ft. level. The discovery is of special significance, for the reason that it was made on a ledge running parallel to the Nevada Hills ledge, which is about 600 ft. distant.

North Carolina

MONTGOMERY COUNTY

Carolina Barytes Company—This company has filed an amendment to its charter, increasing its capital stock from \$30,000 to \$40,000.

Iola Mining Company—Capt. M. L. Jones returned from his mine at Candor, bringing a gold bar worth \$5000, said to be the result of 15 days' work.

Ohio

HARRISON COUNTY

Magyar Coal Company—This new company has purchased the property of the Wabash Coal Company at Hopedale, including 600 acres of coal land and buildings. The company is to be operated on the cooperative plan. The directors and officers are Hungarians. Frank Kurutz is president and Julius Borsh, secretary, both of Wheeling, West Virginia.

Oregon

BAKER COUNTY

Greenhorn—P. Basche and W. F. Butcher, owners of this mine in the Greenhorn camp, about 26 miles west of Baker City, in the Blue mountains, have let a contract to make a 200-ft. upraise from the lower to the upper level.

Snake River—A. H. Willis reports that all the copper mines lying along Snake river are very active, and that the Peacock, on the Idaho side, is shipping ore. The Farrell group and the Gillett-Kogar groups are working 30 or 40 men on the Oregon side. Other properties near by are being developed.

Pennsylvania

ANTHRACITE COAL

Lehigh Coal and Navigation Company—This company on August 12 began excavation for a new breaker at Jeanesville upon property which had been practically abandoned for years. During the construction of the breaker the various mines will be re-timbered and prepared for operation. Kingsley & Wescott, of Scranton, have been awarded a contract for building a new breaker at Nesquehoning to replace the old No. 1 breaker. The Nesquehoning breaker will require fully a million and a half feet of lumber.

Panther Creek Drainage Tunnel—The Portland Construction Company has been awarded the contract for the construction of a tunnel between Mauch Chunk and Nesquehoning by which the Lehigh Coal and Navigation Company will drain its 13 collieries in the Panther Creek district. The tunnel will be 7200 ft. long and is to be completed in two years.

BITUMINOUS COAL

Old Colony Coal and Coke Company—The property and holdings of this company after prolonged litigation have been sold at public auction to G. W. McClure, one of the directors of the company, for \$340,000. The property consists of two mines and 100 coke ovens, with about 5000 acres of land near Ligonier, Westmoreland county, with two tipples and buildings. It also includes one mine and about 1300 acres of coal land in Moundsville, West Virginia.

CHESTER COUNTY

Opening Old Iron Mines—A company

of Pottstown capitalists headed by Edgar S. Cook, president of the Warwick Iron and Steel Company, has reopened the old "Middle Mine Holes" in Warwick township which had been idle for 17 years. The workings have been unwatered and 100 tons of ore are shipped to the Warwick furnaces daily. The output will be increased.

South Dakota

CUSTER COUNTY

Saginaw—Two shifts of miners are driving a tunnel to tap the orebody. It is in 342 ft. from the main shaft. Machinery is being installed in the 100-ton cyanide mill.

Slip-Butler—Owing to the slump in the price of antimony, shipments have been ordered stopped. Work will be abandoned until the material is in greater demand.

LAWRENCE COUNTY

Dakota—The hoist from the Titanic property has been moved over to hoist ore from the 80-ft. level while the shaft is continued to quartzite. The old Dakota hoist burned down Jan. 1.

Golden Reward—At the annual stockholders' meeting it was decided to increase the mill capacity from 300 to 400 tons daily by the addition of two new mills, one Chilean and one Huntington, and to improve the treatment of slimes.

Homestake—Both the Homestake and Star mills are to be overhauled and renovated. An aerial tramway is to be constructed for transportation of slimes from the bins to the cyanide plant. The water has been lowered to the 900-ft. and the miners have been put on two shifts to give the skips more time to unwater. The slime plant is treating about 1000 tons daily. Its capacity will be 1700 tons when all the presses are installed.

PENNINGTON COUNTY

Everly—Good values are being taken out of this placer ground and a larger force of men is to be put on.

Dakota Power—A 10,000-h.p. power plant is to be installed two miles below Placerville. It will furnish power to the Central Hills properties.

Golden West—A body of copper pyrites was found at a depth of 70 ft. in the shaft.

Graud View—Another large shipment of concentrates from the 5-stamp mill has been sent East and two more shipments will be made in a few days. The vein is widening with depth and the value increasing.

Jo Dollar—The new strike proves one of the richest in the hills. A shoot, carrying free gold and yielding high assays, is being uncovered in the tunnel at a depth of 100 ft.

Mainstay—New York parties represented by W. W. Trimpi of East Orange,

N. J., purchased the mill for \$7000. All debts will be paid and work will be resumed.

Upham—This mica property has been bonded to Eastern parties represented by Joseph P. Labaw of Hopewell, N. J., and work will be resumed.

Utah

SALT LAKE COUNTY

Ohio Copper—The work of extending the Mascott tunnel of the Dalton & Lark mine into the property of this company is progressing steadily. The objective point, where connection will be made with the present main workings of the mine, is about 9000 ft. in. Ore will be taken out through this avenue to the mill now being constructed near the entrance. Room has been provided for two tracks and electric haulage.

Tintic Mining and Development Company—This company, owner of the Yampa mine in Bingham, and operating a smelter in that camp, made net earnings during July of about \$100,000. The management expects to begin shortly the erection of a new aerial tramway, which will greatly facilitate the handling of ore and will overcome to a very large extent existing transportation difficulties.

SUMMIT COUNTY

Park City Shipments—Shipments for the week ending August 10 amounted to 1169 tons, the contributing mines and amounts being: Silver King, 621; Daly Judge, 473; Daly, 61; Little Bell, 64.

Ontario—Slow headway is being made with the pumping operations, but the management confidently expects to free the mine of water.

Wisconsin

GRANT COUNTY

Empire—This mine within the limits of Platteville is shipping from three to five cars per week, although it has shipped 410 cars in 40 weeks. The mine is the largest producer of zinc ore in the district. It began prospecting in 1901 and built a mill in 1904. The shaft has reached a depth of 160 ft., and work is carried on in day and night shifts. The plant includes an 18x48-in. Corliss engine, three 125-h.p. boilers, four 8-cell jigs, concentrating tables, an 8-drill air compressor, a roasting and magnetic separating plant, and electric light equipment. The company has paid \$240,000 in dividends. Fred Krog, Platteville, is president.

Canada

NOVA SCOTIA

Dominion Coal Company—The output for July was 312,815 tons, as against 318,291 tons in July, 1906.

Dominion Iron and Steel Company—The evidence for the defense in the action

of this company against the Dominion Coal Company for breach of contract, now in progress at Sydney, has been put in. A number of experts and officials of the company testified that the coal from No. 6, to which exception was taken by the plaintiffs, was a good commercial coal adapted for domestic use and steam purposes. No attempt was made to meet the issue raised by the steel company and show that it was suitable for coking or steel manufacture, the contention of the coal company being that under the contract it was not bound to furnish coal of that quality. The judge refused to hear evidence as to negotiations previous to the signing of the agreement.

ONTARIO—COBALT DISTRICT

Cobalt Ore Shipments—Shipments of ore from the Cobalt mines for the week ending August 10 were as follows: Buffalo, 60,000 lb.; Nipissing, 64,360; Silver Queen, 176,000. Total, 300,360 pounds.

Cobalt Contact—An 18-in. vein of silver and argentite has been found about 100 ft. from the main shaft, ore extracted at 10 ft. running from 9000 to 12,000 oz. silver per ton.

Foster—At this mine 75 men are at work and five drills are in operation. Vein No. 6 has lengthened and broadened and the wall rock shows good silver contents. Rich ore has been found at the 70-ft. level of No. 5. Vein No. 8 is making a good showing at its junction with No. 5 on the surface, and at 70 ft. There is enough ore at present blocked out to provide work for 12 months.

King Edward—Work on this mine, which had been suspended since the strike began, was resumed on August 15 with a force of 35 men. The management will pay union wages, but make no discrimination between union and non-union men.

McKinley-Darragh—Crosscutting on the Kendall vein has been done for 100 ft. to an average depth of 15 ft. Assays of the ore show 12,000 oz. silver to the ton and the vein also carries niccolite. The concentrator plant is being installed and will shortly be at work.

Rochester Cobalt—While installing the new compressor a vein was discovered on bed rock containing chalcopyrite, iron and galena.

ONTARIO—LARDER LAKE

Bluebell Larder Lake Company—Superintendent Hobson reports that specimens from two of the company's claims on the southeast corner of the lake show free gold and good assays. A winter camp is being erected on Spoon's bay. The shaft on claim 501 is down 22 ft., at which level the vein is 3 ft. 6 in. wide, and the ore improving with depth. It shows free gold.

ONTARIO—MANITOU LAKE AREA

Location H. W. 77—This property, adjoining the Victory gold mine, has been

purchased by Major J. E. P. Vereker, president of the Manitou Mines Company, for \$40,000.

Mexico

CHIHUAHUA

Chihuahua Copper Company—This company, incorporated in Arizona, will develop the Hathaway copper properties and the adjoining Justinia y Anexas, beyond Urique in the western part of the state in the Chorreros mountains.

Cuatro Senores—This new company has bought the Los Vigas property, at San Sostenos, on the Kansas City, Mexico & Orient Railroad, from George E. Voorhees, Jr., of Santa Barbara, Cal., and has unwatered the mine, made alterations in the mill, and is shipping a carload a week of copper concentrates to the American Smelting and Refining Company's agency in Chihuahua.

Coahuila Mining and Smelting Company—This company has taken a lease on the Filipinos, 25 pertinencias belonging to R. M. and J. M. Dudley, and adjoining the Los Vigas, at San Sostenos.

Elisa—This property in the Chorreros mountains, near the Hathaway, is being developed by the Prospecting Company of North America under the management of B. L. Jones.

Esperanza—This property at Santa Eulalia has been taken up by New York interests.

Esmeralda—These 12 pertinencias adjoining the Mina Vieja, at Santa Eulalia, have been acquired under a two-years' lease and bond from Mannel Gameros by Messrs. Jacobs, Skeels and Anderson of Chihuahua.

Mexican Mines Syndicate—This company is said to have given up its copper interests in the Chorreros mountains, and to have concentrated its efforts upon the country about Cusihiuiriachic where it is sinking three shafts on the La Reina property and remodeling the old mill at Buenos Aires.

San Toy Mining Company—The aerial tramway from Santa Eulalia to the railroad has been completed, and 100 tons of ore are daily shipped to the Torreon smelter.

Central America

COSTA RICA

In Costa Rica the gold mines operating during 1906 were the Abangarez Goldfields, the Esperanza (late the Boston) mine in the Abangarez district, and the Colburn mine at Pozo Azul near Chomes. Development work is proceeding at the Montezuma mine in the Barranca district and at the Machuca mine in the Aguacate district. The amount of bullion exported from Costa Rica during 1906 was valued at \$538,472, an increase of 90.6 per cent. over the previous year.

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. 21—The anthracite market has been quiet, with no change manifest from the conditions of recent weeks. The demand for small steam coal continues good, but nothing has been done toward raising prices, though an increase continues to be talked about. The coastwise trade is good, with a better supply of vessels.

The seaboard bituminous trade is also quiet, with little change. Prices have not varied, and the demand has been sufficient to take up about all the coal reaching tidewater. Car supply has been good for the season, and there has been no difficulty in getting coal to market.

In the West, demand continues good, but at many mines operators have been working part time, to avoid overstocking the markets. There is more disposition in the West than in the East to put in stocks for the winter, and this has encouraged the trade; at the same time it will help to prevent the trouble from car-shortage that is sure to come later. Lake trade has been active, shipments from Lake Erie ports have been heavy, and the lake towns will have a good supply when navigation closes.

COAL-TRAFFIC NOTES

Shipments of coal and coke originating on the Pennsylvania Railroad Company's lines east of Pittsburg for the year to Aug. 10 were as follows, in short tons:

	1906.	1907.	Changes.
Anthracite.....	2,615,769	3,438,072	I. 822,303
Bituminous.....	19,044,965	23,199,063	I. 4,154,098
Coke.....	7,691,970	8,530,512	I. 838,542
Total.....	29,352,704	35,167,647	I. 5,814,943

The total increase this year was 19.8 per cent.

Shipments of Broad Top coal over the Huntingdon & Broad Top Railroad for the year to Aug. 17 were 631,768 tons.

Receipts of coal at Boston for the seven months ended July 31 are reported by the Chamber of Commerce as follows:

	1906.	1907.	Changes.
Anthracite.....	911,593	1,237,408	I. 325,815
Bituminous.....	1,762,481	1,792,430	I. 39,949
Total domestic.....	2,674,074	3,029,838	I. 355,764
Foreign coal.....	419,487	310,606	D. 108,882
Total.....	3,093,561	3,340,443	I. 256,882

The foreign coal comes chiefly from Nova Scotia, but some is received from Great Britain.

New York

ANTHRACITE

Aug. 21—In spite of the approach of fall there is no disposition for the anthracite coal trade to show any activity, and the continued dullness of the summer months is still in force. This statement can be qualified, however, in that the demand for small steam sizes is pronounced, and the business in this branch of the trade is quite satisfactory. As yet no advance in these small sizes has taken place, in spite of rumors that it would happen. We continue to quote prices 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 or buckwheat No. 2; \$1.50@1.60 for barley; all f.o.b. New York harbor.

BITUMINOUS

The Atlantic seaboard soft-coal trade is calling for more coal than seems to be available at this time. All producers are working at full capacity, and a continuous stream of coal is coming forward to market. All consumers are trying to get in their winter stock of coal and consumption appears to be very large. Prices do not seem to advance much, notwithstanding these conditions, but with the approach of fall and prospective cold weather it is the opinion of many that an advance in price will soon take place.

Trade in the far east is calling for and is receiving large quantities of coal, and it appears difficult to supply needs in many quarters. The demand originally started with better grades of coal but is reaching far down the list at this time. Consumers do not hesitate to pay the prevailing current rate of water freights. This item is going to add 30c. per ton to the cost of coal on the greater part of the shipment to Eastern consumers.

Trade along the Sound is active, and it is believed that this condition will prevail for the balance of the year. Lack of Sound barges has interfered to some extent with deliveries, and is doing so now. It is unfortunate that this territory could not have taken on more coal earlier in the season.

The New York harbor trade is absorbing all the coal coming to market and prices are strong, with a tendency to advance. We quote for better grades of steam coal \$2.60@2.70 f.o.b. New York harbor shipping ports. The all-rail trade is showing a little more activity than it did, but prices are unchanged. Good steam coal can be bought at \$1@1.10, f.o.b.

mines. Car supply is fairly good and transportation from mines to tide is fairly regular and about up to schedule.

The coastwise vessel trade is in good condition and vessels are in a little better supply. Freights are holding at about the usual figures, which we quote as follows from Philadelphia: To Boston, Salem and Portland \$1.10; to Providence, New Bedford and the Sound 90c.; to Lynn, Saco and Bangor \$1.25; to Portsmouth \$1.15; to Newburyport and Gardiner \$1.30; to Bath \$1.10; towages included in the case of Saco and Gardiner.

Birmingham

Aug. 19—No change is reported in the coal situation in Alabama, the market being active and the production greater than it ever was. While the legislature of Alabama failed to adopt general mining laws to amend those which have been in operation for years, appropriations were allowed for the office of the State inspector which will give him better opportunity for looking after the work. The report of the Alabama Car Service Association for the month of July shows a good increase over previous months. Steady prices obtain for coal. There is still need for coal miners in all parts of the State. The Sloss-Sheffield Steel and Iron Company is selling surplus coal and coke. The Tennessee Company had been selling surplus coal and coke for some time; recently, however, announcement was made that the company could not remain much longer in the open market.

Chicago

Aug. 19—Quietness continues in the wholesale coal market, with prices fairly well maintained and no extensive evils from too large shipments. The threshing business is reported to be unusually good and, having begun late, will doubtless last to a later date than usual. Consumption for steam purposes is heavy and there is much buying in the open market, owing to the reluctance of consumers last spring to enter into new contracts. Domestic coals are almost at a standstill.

Illinois and Indiana run-of-mine sells for \$1.50@2.10, lump and egg for \$1.75@2.50 and screenings for \$1.30@1.40.

Eastern coals are firm, with no marked change, smokeless bringing \$3.20@3.35 for run-of-mine and Hocking Valley \$3.15@3.25. The demand is not heavy for these coals, but steady. Youghiogheny at \$3.20 and Pittsburg No. 8 at \$3 are in fair demand.

Cleveland

Aug. 20—A distressing condition is at present prevailing in the Cleveland coal market. Shippers and jobbers yesterday were sacrificing prices heavily in order to realize on large consignments which have been delivered at their yards here over Sunday and Monday, and on which demurrage charges have been collecting. This has all been caused by an order issued by the Baltimore & Ohio Railroad forbidding the shipment of coal over nine railroads connecting with that system through Cleveland. Local coal companies affected by the embargo are nonplussed over the situation, and have been forced to sell out at heavy losses. The reason given for placing the embargo is that the road is greatly in need of cars for its own use. It is not known when the embargo will be lifted. The following prices are quoted on No. 8 district grades at the mines: Slack, 45@50c.; mine-run, 90@95c.; ¾-in. lump, \$1@1.05. Prices yesterday, however, ran from 20c. to 35c. plus freight charges and demurrage.

Pittsburg

Aug. 20—Production of coal in the Pittsburg district is at the highest point and shipments are unusually good, there being an excellent supply of railroad cars. The Pittsburg Coal Company is breaking all records in its movement of coal to the northwestern markets. Reports received here this week show that 19,895 more cars of coal were loaded at the Duluth and Superior docks, and shipped in the second quarter of this year than in the same quarter in 1906. The rivers are not navigable, but all the river mines are in full operation, as there is a good supply of empty coal boats and barges in the pools. Demand continues fairly good, and prices remain unchanged on the basis of \$1.15@1.20 for mine-run coal at mines.

Connellsville Coke—There is practically no change in the coke market. The demand exceeds the supply, and no coke can be had for spot shipment. For later delivery it is possible to get an occasional tonnage at good prices. Standard Connellsville furnace coke is quoted nominally at \$2.75@3 and foundry at \$3.25@3.50 for any delivery. The *Courier*, in its weekly summary, gives the production at 407,735 tons for both regions. The shipments aggregated 14,334 cars, distributed as follows: To Pittsburg, 4572 cars; to points west of Connellsville, 8855 cars; to points east of Connellsville, 907 cars.

Foreign Coal Trade

Exports of coal from Germany for the half-year ended June 30 are reported as follows, in metric tons:

	1906.	1907.	Changes.
Coal.....	9,732,932	9,585,270	D. 147,662
Brown coal.....	9,293	9,836	I. 543
Total.....	9,742,225	9,595,106	D. 147,119

Exports of coke for the half-year in 1907 were 1,803,523 tons; of briquets, 577,370; of peat fuel, 11,141 tons. The coke exports were chiefly to France and Austria; they included 9413 tons to the United States.

Imports of coal in Germany for the half-year ended June 30 were, in metric tons:

	1906.	1907.	Changes.
Coal.....	4,151,872	5,780,078	I. 1,628,206
Brown coal.....	4,218,488	4,341,263	I. 122,775
Total.....	8,370,360	10,121,341	I. 1,750,981

Imports of coke for the six months in 1907 were 242,753 tons; of briquets, 83,765; of peat fuel, 5127 tons.

The production of coal in the German Empire for the half-year ended June 30 is reported as follows, in metric tons:

	1906.	1907.	Changes.
Coal.....	67,257,295	69,571,431	I. 2,314,136
Brown coal....	26,911,978	29,602,022	I. 2,690,044
Total mined..	94,169,273	99,173,453	I. 5,004,180
Coke made.....	9,778,480	10,629,561	I. 851,081
Briquets made,	6,956,631	7,721,908	I. 765,277

A large proportion of the briquets is made from brown coal, or lignite.

Exports of fuel from Great Britain, with coal sent abroad for the use of steamships engaged in foreign trade, are reported as follows for the seven months ended July 31, in long tons:

	1906.	1907.	Changes.
Coal.....	31,575,624	35,774,437	I. 4,198,813
Coke.....	416,947	505,968	I. 89,021
Briquets.....	835,261	850,565	I. 15,304
Total exports..	32,827,832	37,130,970	I. 4,303,138
Steamer coal....	10,676,372	10,755,349	I. 78,977
Total.....	43,504,204	47,886,319	I. 4,382,115

The exports to the United States, included in the above, were as follows:

	1906.	1907.	Changes.
To Atlantic ports.....	21,479	10,695	D. 10,784
To Pacific ports.....	28,002	20,141	D. 7,861
Total.....	49,481	30,836	D. 18,645

The larger exports this year were to France, 6,246,063 tons; to Germany, 5,228,821 tons; to Italy, 4,977,415 tons; to Netherlands, 2,247,212 tons.

Iron Trade Review

The iron market, so far as new business is concerned, has been dull and quiet after a fashion that has not been seen for many months. There has been a cessation of orders for pig and finished iron, which shows that the financial situation has had its effect, and that buyers are waiting to see how matters turn before they come into the market again. This does not mean any cessation yet at furnaces and mills, nearly all of them being still busy on orders, which will take some time to fill. It does not, for the present, mean any considerable change in prices, though there

is no disposition to buy far ahead just at present.

Pig iron is usually the first to feel a fall in prices. There has been a gradual decline—especially in material for 1908 delivery—going on for some weeks, but this has not been accentuated by the present situation. It has only suspended new transactions for the time being. Finished material also shows no change in prices, though the new business doing is light.

Baltimore

Aug. 20—Imports for the week included 1262 tons ferromanganese and 324 tons ferrosilicon. Receipts of iron ore were 9800 tons from Cuba. The imports also included 15,541 pigs spelter, from Rotterdam.

Birmingham

Aug. 19—The pig-iron market continues quiet but the manufacturers are not in the least alarmed. Quotations remain firm, with a few orders being received. The producers in this State have covered their probable make for the last quarter of the year. The quotations for iron to be delivered during the first half of 1908 are still \$18.50 per ton, No. 2 foundry. The manufacturers are making every effort to deliver on the orders on the book. A local mishap disturbed the make at North Birmingham furnace of the Sloss-Sheffield Steel and Iron Company during the past week. The raw-material supply has improved. The Sloss-Sheffield and others are stocking raw material for use during the winter.

Labor is again scarce at the ore mines, with some of the companies in this district. Foreign laborers are becoming dissatisfied and in many instances are quitting.

Steel, finished iron and steel, foundries, machine shops and other interests are in fine shape. Considerable repairs are being made at the Bessemer rolling mills, even while the plant is in operation. About 20 puddlers are needed at the Gate City rolling mills. The big Birmingham mills are quiet, though repairs are being pushed. There is a strong demand for finished iron and steel at good prices.

Chicago

Aug. 19—The pig-iron market shows as yet no signs of activity and hardly exists, except for a little trading in quick-delivery lots. These lots are small in volume, though perhaps increasing slightly in number. No premiums are being paid on quick-delivery lots; the market barely allows maintenance of standard quotations. For last-quarter delivery and first quarter of 1908 quotations appear to be based on small lots and a good-sized order could probably name its own figure of 50c. to \$1 below the quotations.

Southern iron brings for delivery in

August and September \$20 Birmingham and is quoted at \$19.50 for the fourth quarter, making the Chicago quotations \$24.35 and \$23.85 respectively. Northern is at \$24@25 for the last half, the lower price representing business now being done for quick deliveries. Lake Superior charcoal iron is quoted at \$27.50 for last-half delivery.

Melters apparently are running very close to their needs and when they come into the market for iron will buy heavily, in the judgment of those who follow the local markets closely. The facts that inquiries are beginning to increase and needs of business to all appearances will continue heavy, are pointed to by confident sellers as evidence that the market cannot long remain depressed.

Cleveland

Aug. 20—The local ore market continues steady. Shippers expect that the record of 6,433,369 tons for June will not be equaled this season. Vessel tonnage is in only fair demand, the coal rate remaining at 40c. to Duluth with ore the same as before.

Pig iron is featured by inquiries for September and fourth-quarter iron, with some demand for early 1908 delivery. The following prices are quoted: Bessemer, \$23.40@23.50; No. 1 Northern foundry, \$23.50@24; No. 2, \$23@23.50; No. 3, \$22.50@23; No. 2 Southern, \$23.85@24.35; gray forge, \$22@22.25 per ton.

Philadelphia

Aug. 21—Sellers are not making vigorous efforts to sell and consumers are not over-anxious to buy. Nothing has arisen to disturb conclusions arrived at some time ago as to the probable course of the market in the near future. The greater irregularity observed today is due to differences of opinion, and not to competition. Buyers throughout eastern and middle Pennsylvania are working up as much iron as ever, but they are not so anxious to control large stocks. Blast-furnace people indulge in the hope that the fall revival of demand will harden prices. Basic pig appears to have weakened. No. 2 X foundry is generally quoted about \$22; gray forge, \$19.50@20; basic, \$19.50@20.

Steel Billets—Most of the buying heard of is done in small lots at \$32@32.50. The larger consumers are remaining out of the market. Some business in forging billets has been done at \$36.

Bars—The bar trade continues active and a large volume of business is being done, some of it for late delivery at shaded figures.

Sheets—The card, 2.80@3.20c., is maintained without any trouble. The demand is largely for small quantities but some mills are working on large orders.

Pipes and Tubes—But little new business is going into the mills just now but the shops using tubes are working up as much stock as ever.

Plates—The fact that premium quotations are frequently paid for plates, especially boiler plate, shows the condition of trade. On the other hand, in large orders, especially for car work, prices lean in favor of buyers, as mill owners are more anxious for forward deliveries than they were some time ago.

Structural Material—This month so far has been one of activity in shapes. Small lots are in active demand for construction purposes in this territory.

Steel Rails—Our mills have a good bunch of orders for trolley roads. The demand for light rails this year has been a surprise.

Scrap—The larger dealers, in the absence of business of moment, are carrying a large stock of hope. They imagine steel scrap No. 1 is worth \$17.50. No. 1 wrought railroad is quoted at \$18.50, and machine castings about the same.

Pittsburg

Aug. 20—The booking of several important contracts for structural material by the McClintic-Marshall Construction Company prevented this week from being the duller of the year in the matter of new steel business. One of the contracts was for the steel work for new piers in New York, which will require about 13,000 tons. The company also has taken 2000 tons for railroad bridges for the Baltimore & Ohio, 1000 tons for the new plant of the Armstrong Cork Company, at Lancaster, Penn., and 2000 tons for a Government naval training school at North Chicago. A decided dullness is apparent in almost every line of finished iron and steel products. However, there is a fair run of business in plates and shapes. No orders of any consequence have been booked in sheets and tin-plate for over a week. The mills are almost caught up on all orders, and there has been practically no business booked for the fourth quarter. A number of the tin-plate plants of the American Sheet and Tin Plate Company are closed and repairs are being made, but the company is still operating about 97 per cent. of its sheet mills. The Carnegie Steel Company will not feel the falling off in orders until late in the year, as its order books are well filled. The National Tube Company is still taking on new business, but lately has been forced to refuse some orders as shipments cannot be guaranteed within from two to three months. This company has more unfilled contracts than at any time in its history. Tin-plate is one of the most disappointing lines, as the mills have barely enough business to run them through this quarter. Pig tin has

been declining rapidly, but so far there is no talk of a cut in tin-plate, or in fact any of the finished lines. Prices are being well maintained for all finished iron and steel products, but all premiums for prompt shipment have entirely disappeared.

The Republic Iron and Steel Company and the Western Bar Iron Association, after several days' hesitation, were practically forced to sign the new wage scale favorable to the workers. This scale gives the puddlers an advance of 50c. a ton dating from Aug. 12, and is the highest rate paid in many years. The independent mills that signed the Amalgamated Association scale subject to the action of the leading interests are also bound to operate under the new scale until June 30, 1908.

Pig Iron—The pig-iron market is lifeless this week, as no sales of note have been recorded. The market is somewhat firmer, however, since a lot of low-priced foundry iron offered by a Lake Erie furnace has been disposed of. It amounted to about 4000 tons of No. 2 foundry and was sold in the East at a price equal to a trifle less than \$22, Pittsburg. No. 2 foundry is now quoted at \$22@22.50, Valley furnaces, equal to \$22.90@23.40, Pittsburg. There is no demand for basic and gray forge, and both grades are quoted nominally at around \$21, Valley furnaces, or \$21.90, Pittsburg. Three small lots of bessemer iron were sold during the week at different prices ranging from \$22.50 to \$23, Valley furnaces, but the market for future delivery is around \$22. The Cambria Steel Company has blown in another furnace with an annual capacity of 150,000 tons, and that company will not be a buyer of outside iron again this year. Since Jan. 1 it has been taking about 30,000 tons each quarter, but has not bought beyond Oct. 1. The Carnegie Steel Company is operating all but one of its 55 blast furnaces, the idle one being No. 1 of the Clairton group, which will be in again before the end of the coming week. With full production of its furnaces it is not likely the Steel Corporation will come into the market again this year, unless it is necessary to bolster the market. Bessemer iron may be quoted at around \$22, Valley furnaces.

Steel—There is a more pronounced scarcity of crude steel, and prices remain firm, bessemer billets being quoted at \$30 and open-hearth billets at \$32. Plates remain at 1.70c., and merchant steel bars at 1.60c.

Sheets—The market is quiet, but the mills are fairly busy on old contracts. Prices are unchanged, black sheets being quoted at 2.60c. and galvanized at 3.75c. for No. 28 gage.

Ferro-Manganese—The market is dull and \$62.50 might be shaded for prompt delivery, while \$61 is quoted for fourth quarter.

Sault Ste. Marie

Aug. 17—The freight movement through the Sault canals in July showed the effect of the strikes in the Lake country. The total was 7,193,236 short tons, or 1,672,206 tons less than in June. For the year to Aug. 1 the total freight passing was, in short tons:

	1906.	1907.	Changes.
East-bound.....	18,386,401	18,906,348	I. 519,947
West-bound.....	4,221,150	6,075,207	I. 1,854,057
Total.....	22,610,551	24,981,555	I. 2,371,004

The number of vessel passages this year was 9165, showing average cargo of 2725 tons. The mineral freights included in the totals were as follows, in short tons, except salt, which is in barrels:

	1906.	1907.	Changes.
Anthracite.....	321,857	632,335	I. 310,478
Bituminous.....	3,248,503	4,880,486	I. 1,631,983
Total coal.....	3,570,360	5,512,821	I. 1,942,461
Iron ore.....	16,018,806	16,364,443	I. 345,637
Pig & manu. iron	186,635	140,481	D. 46,154
Copper.....	52,657	35,291	D. 17,366
Building stone...	640	100	D. 540
Salt, bbl.....	207,673	194,400	D. 13,273

Iron ore this year was 65.5 per cent. of the total tonnage; and coal, 22.1 per cent.

London

August 10—Exports of iron and steel, and of machinery, from Great Britain for the seven months ended July 31, are valued by the Board of Trade returns as follows:

	1906.	1907.	Changes.
Iron and Steel..	£21,932,681	£24,003,825	I. £2,071,144
Machinery.....	15,181,396	18,050,407	I. 2,869,011
New Ships.....	6,380,333	6,231,759	D. 148,574
Total.....	£43,494,410	£52,285,988	I. £8,791,578

The total increase was 20.2 per cent. The leading items of the iron and steel exports were, in long tons:

	1906.	1907.	Changes.
Pig iron.....	868,761	1,244,828	I. 376,067
Wrought iron.....	111,982	129,229	I. 17,247
Rails.....	237,785	254,028	I. 16,243
Plates.....	143,224	194,947	I. 51,723
Sheets.....	255,505	289,696	I. 34,191
Steel shapes, etc....	169,568	206,261	I. 36,693
Tin-plates.....	206,874	213,210	I. 6,336

The total quantities of iron and steel were 2,535,213 tons in 1906, and 3,167,204 tons in 1907; an increase of 631,991 tons. Exports of pig iron to the United States this year were 365,081 tons, an increase of 229,123 tons over the same period in 1906; of tin-plates, 38,487 tons, an increase of 9177 tons.

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

	1906.	1907.	Changes.
Iron and steel...	£5,384,618	£3,915,314	D. £1,469,304
Machinery.....	3,081,543	3,249,747	I. 168,204
Total.....	£8,466,161	£7,165,061	D. £1,301,100

The total decrease was 15.3 per cent. The chief items of the imports were, in long tons:

	1906.	1907.	Changes.
Pig iron.....	48,621	51,269	I. 2,648
Wrought iron.....	70,555	35,560	D. 34,995
Steel billets, etc....	397,451	176,774	D. 160,677
Bars and shapes.....	37,126	9,015	D. 28,111
Structural steel.....	96,505	54,425	D. 42,080

The total quantities of iron and steel were 811,853 tons in 1906, and 510,868 tons in 1907; a decrease of 300,985 tons.

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

	1906.	1907.	Changes.
Manganiferous ores.	207,047	205,011	D. 2,036
Iron ores.....	4,418,976	4,312,481	D. 106,495
Total.....	4,626,023	4,517,492	D. 108,531

Of the ores imported this year, 158,468 tons of manganiferous, and 3,462,990 tons of iron ores came from Spain.

Metal Market

NEW YORK, Aug. 21.

Gold and Silver Exports and Imports

At all United States Ports in July and year.

Metal.	Exports.	Imports.	Excess.
Gold:			
July 1907..	\$ 7,478,366	\$ 3,390,962	Exp. \$ 4,087,404
" 1906..	1,302,248	9,834,333	Imp. 8,532,085
Year 1907..	43,779,098	24,859,609	Exp. 18,919,489
" 1906..	32,912,962	72,372,111	Imp. 39,459,149
Silver:			
July 1907..	5,955,052	3,361,100	Exp. 2,593,952
" 1906..	4,360,628	3,277,706	" 1,082,922
Year 1907..	35,174,251	25,756,711	" 9,417,540
" 1906..	37,797,855	26,954,534	" 10,843,321

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. 17 and years from Jan. 1

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week.....	\$ 56,000	\$ 74,510	\$ 1,344,497	\$ 35,781
1907.....	30,241,255	6,722,532	30,948,507	1,264,014
1906.....	5,940,603	48,444,963	38,254,638	1,377,630
1905.....	37,929,843	1,027,173	20,987,569	2,383,349

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

The joint statement of all the banks in the New York Clearing House for the week ending Aug. 17 shows loans \$1,096,221,100, a decrease of \$14,231,200; deposits, \$1,059,457,300, a decrease of \$17,447,300, as compared with the previous week. Reserve accounts show:

	1906.	1907.
Specie.....	\$189,129,000	\$203,988,300
Legal tenders.....	81,411,500	70,170,100
Total cash.....	\$270,540,500	\$204,158,400
Surplus.....	\$ 7,101,500	\$ 9,294,075

The surplus over legal requirements shows an increase of \$1,533,525, as compared with the previous week this year.

Specie holdings of the leading banks of the world, Aug. 17, are reported as below, in dollars:

	Gold.	Silver.	Total.
Aas'd New York.....			\$203,988,300
England.....	\$179,274,405		179,274,405
France.....	560,255,915	\$193,941,215	754,197,130
Germany.....	174,265,000	48,335,000	222,600,000
Spain.....	77,850,000	128,035,000	205,885,000
Netherlands.....	29,505,500	28,156,000	57,661,500
Belgium.....	16,066,665	8,028,335	24,095,000
Italy.....	169,225,000	23,620,500	192,845,500
Russia.....	586,565,000	34,520,000	621,085,000
Aust.-Hungary.....	227,155,000	60,965,000	288,120,000
Sweden.....	20,690,000		20,690,000

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.

Shipments of silver from London to the East are reported by Messrs. Pixley & Abell as follows, for the year to Aug. 8:

	1906.	1907.	Changes.
India.....	£ 10,964,113	£7,316,924	D. £ 3,647,189
China.....	243,400		D. 243,400
Straits.....	1,750	544,012	I. 542,262
Total.....	£ 11,209,263	£7,860,936	D. £ 3,348,327

Imports for the week were £151,000 in bars and £5000 in Mexican dollars; £156,000, all from New York. Exports were £1000 to Egypt and £92,500 to India; £93,500 in all.

Indian exchange has been steady, the Council bills offered in London being all taken at an average of 16.03d. per rupee. Buying of silver for Indian account has fallen off for the present.

The foreign trade of the United States for the seven months ended July 31 is valued as follows by the Bureau of Statistics of the Department of Commerce and Labor:

	1906.	1907.
Exports, merch'dise..	\$969,536,002	\$1,069,215,726
Imports.....	739,951,779	876,043,246
Excess, exports.....	\$229,584,223	\$193,172,480
Add excess of exports silver.....		9,417,540
Add excess of exports, gold.....		18,919,489
Total export balance.....	\$221,509,509	

The movement of gold and silver in detail will be found in the table at the head of this column.

The movement of gold and silver in Great Britain for the seven months ended July 31 was as follows:

	1906.	1907.
Gold:		
Imports.....	£25,789,348	£27,158,812
Exports.....	19,106,163	19,759,643
Excess, imports.....	£ 6,683,185	£ 7,399,169
Silver:		
Imports.....	£11,756,632	£ 9,562,262
Exports.....	12,529,404	10,700,236
Excess, imports.....	£ 772,772	£1,137,974

Of the silver imported this year £6,316,003, or 66 per cent. of the total, came from the United States.

Prices of Foreign Coins

	Bid.	Asked.
Mexican dollars.....	\$0.52½	\$0.54½
Peruvian soles and Chilean.....	0.48	0.50
Victoria sovereigns.....	4.85	4.87
Twenty francs.....	3.80	3.86
Spanish 25 pesetas.....	4.78½	4.80

SILVER AND STERLING EXCHANGE.

Aug.	Sterling Exchange.	Silver.		Aug.	Sterling Exchange.	Silver.	
		New York, Cents.	London, Pence.			New York, Cents.	London, Pence.
15	4.8685	69½	31½	19	4.8750	68½	31½
16	4.8700	69½	31½	20	4.8765	68½	31½
17	4.8740	68½	31½	21	4.8785	68½	31½

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.	New York, Cts. per lb.	St. Louis, Cts. per lb.
15	18½ @19½	17½ @18½	76½	36½	5.25	5.70 @5.75	5.55 @5.60
16	18½ @19½	17½ @18½	77½	37½	5.25	5.65 @5.70	5.50 @5.55
17	18½ @19½	17½ @18½	.....	37½	5.25	5.60 @5.65	5.45 @5.50
19	18½ @19½	17½ @18½	77½	37½	5.25	5.60 @5.65	5.45 @5.50
20	18½ @19½	17½ @18½	78½	37½	5.25	5.60 @5.65	5.45 @5.50
21	18½ @19	17½ @18	79	36½	5.25	5.60 @5.65	5.45 @5.50

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—There is very little change in this market since our report of last week. During the week business was again of small proportions, such transactions as took place being mainly for export to the other side, where there is a small though steady demand, which is being readily met. Domestic consumers have not changed their attitude in spite of the prices at which metal is being offered to them by a number of sellers; these ought to be attractive, particularly when they are compared with the nominal point at which a number of the larger sellers are holding the metal. They have not been successful apparently in drawing the larger buyers from their waiting position. It is expected, however, that there will be a more general interest in the market the beginning of next month, as doubtless stocks in the hands of manufacturers are getting very low. The close is still unsettled at 18¾@19c. for Lake copper; 17¾@18c. for electrolytic in ingots, cakes and wirebars; 17½@17¾c. for casting copper.

The oversold condition of the standard market in London is making itself felt, and as the supplies of copper are small and concentrated in a few strong hands, the bears have had some difficulty in covering their commitments, except at higher prices. The market, after showing a rather firm undertone all week, reached £80 for spot and £77 15s. for three months', but the tendency at the close is weaker, the quotations being cabled at £79 for spot, £76 15s. for three months'.

Statistics for the first half of the current month show an increase in the visible supplies of 1300 tons.

Refined and manufactured sorts we

quote: English tough, £79; best selected, £85; strong sheets, £91.

Tin—The London market during the week recovered some of its severe decline and closes steady at £166 12s. 6d. for spot, £166 5s. for 3 months. It touched as low as £162 for both spot and three months.

Notwithstanding the lower prices quoted in this market, no interest is manifest among consumers, who are supplying their immediate wants only. The buying therefore is of a hand-to-mouth character; while spot tin has been rather scarce, still small quantities could be had at only a slight premium over import prices. The market closes at 36½c.

Exports of tin from the Straits in July are reported at 4660 long tons. For the seven months ended July 31 the exports were 33,114 tons in 1906, and 32,463 tons in 1905; a decrease of 651 tons.

Lead—The market for desilverized remains unchanged at 5.25c. per lb., f.o.b. New York. Brands not controlled by the largest interest can be bought at considerably less.

Freer offerings from Australia as well as from this side brought about a decline in the London market, which, however, relatively speaking, is holding exceptionally well. The close is cabled at £19 for Spanish lead, £19 2s. 6d. for English lead.

Spelters—Business in this metal shows a decided falling off. There is some pressure to sell stocks which have accumulated in the hands of producers, and as a result prices are declining from day to day, the close being weak at 5.60@5.65c. New York; 5.45@5.50c., St. Louis.

The London market is barely holding its own at £22 for good ordinaries, £22 5s. for specials.

Zinc Sheets—The base price has again been reduced 35c., and is now \$7.75 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.

Antimony—The market is dull and listless, both here and abroad, and no business to speak of is doing. Prices are a trifle lower than last week, quotations being 10½@11c. for Cookson's; 9½@10c. for Hallett's; 9@9¾c. 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 \$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 domes-

tic orders, and \$36.50@37 for export. The London price is £7 per flask, but £6 16s. 3d. is quoted by jobbers.

Platinum—The platinum market remains the same as last week, with ample supply and good demand. The prices are quoted as follows: Ordinary metal \$28; hard metal \$30.50 per ounce. The market for scrap is a trifle stronger than last week, quotations being \$22@23 per ounce.

British Metal Imports and Exports

Copper—Imports and exports of copper in Great Britain for the seven months ended July 31, were as follows, in long tons; the totals giving the copper contents of all material, in long tons:

	1906.	1907.	Changes.
Copper ore.....	53,421	64,179	I. 10,758
Matte and precipitate...	41,928	41,634	D. 294
Fine copper.....	43,003	37,994	D. 5,009
Total imp., fine copper.	69,309	65,229	D. 4,080
Exports.....	23,441	30,445	I. 7,004
Re-exports.....	9,338	11,481	I. 2,143
Total exports.....	32,779	31,926	D. 853
Balance, imports.....	36,530	33,303	D. 3,227

Of the imports this year the United States furnished 391 tons of matte and 11,913 tons of fine copper, against 3130 tons of matte, and 14,590 tons of copper in 1906.

Tin—Imports and exports of tin in Great Britain for the seven months ended July 31, were as follows, in long tons:

	1906.	1907.	Changes.
Straits.....	21,882	20,435	D. 1,447
Australia.....	2,486	3,064	I. 578
Other countries..	1,732	1,773	I. 41
Total imports..	26,100	25,272	D. 828
Exports.....	4,730	5,263	I. 533
Re-exports.....	18,987	16,519	D. 2,468
Total exports....	23,717	21,772	D. 1,945
Balance, imp....	2,383	3,500	I. 1,117

Imports of tin ore and concentrate were 12,797 tons in 1906, and 12,515 tons in 1907, a decrease of 282 tons. Of the imports this year 10,140 tons were from Bolivia.

Lead—Imports and exports of lead in Great Britain for seven months ended July 31, were, in long tons:

	1906.	1907.	Changes.
United States.....	11,348	11,876	I. 528
Spain.....	66,968	62,738	D. 4,230
Australia.....	31,213	28,249	D. 2,964
Germany.....	10,787	3,808	D. 7,479
Other countries.....	1,863	7,466	I. 5,603
Total imports.....	122,179	113,637	D. 8,542
Exports.....	26,676	28,954	I. 2,278
Balance, imports....	95,503	84,683	D. 10,820

The lead credited to the United States is chiefly Mexican lead, refined here in bond.

Spelter—Imports and exports of spelter in Great Britain for the seven months ended July 31, were, in long tons:

	1906.	1907.	Changes.
Spelter.....	52,065	53,098	I. 1,033
Zinc sheets.....	11,030	11,494	I. 464
Total imports.....	63,095	64,592	I. 1,497
Exports.....	4,562	3,125	D. 1,437
Balance, imports..	58,533	61,467	I. 2,934

Imports of zinc ore are not reported separately.

Quicksilver—Imports of quicksilver into Great Britain for the seven months ended July 31, were 2,759,701 lb. in 1906, and 2,845,346 lb. in 1907; an increase of 85,645 lb. Re-exports of imported metal were 1,103,102 lb. in 1906, and 1,431,618 lb. in 1907; an increase of 328,516 lb. this year.

German Metal Imports and Exports

Imports and exports of metals in Germany for the half-year ended June 30 are reported as follows, in metric tons:

	Imports.	Exports.	Balance.
Copper.....	57,157	2,641	Imp. 54,516
Tin.....	6,611	3,489	Imp. 3,122
Lead.....	37,304	17,336	Imp. 19,968
Spelter.....	15,320	45,354	Exp. 30,034
Nickel.....	1,193	646	Imp. 547
Aluminum.....	1,948	1,066	Imp. 882

Spelter includes zinc sheets and other manufactures. The imports and exports of ores, other than iron and manganese, for the half-year were as follows, in metric tons:

	Imports.	Exports.	Balance.
Gold ore.....	30	.....	Imp. 30
Silver ore.....	2,123	46	Imp. 2,077
Cop'r ore&pyrites	11,286	7,222	Imp. 4,064
Tin ore.....	5,146	85	Imp. 5,061
Lead ore.....	61,598	785	Imp. 60,813
Zinc ore.....	88,205	14,700	Imp. 73,505
Nickel ore.....	16,875	.....	Imp. 16,875
Tungsten ore....	1,115	110	Imp. 1,005
Uranium ore, etc.	538	.....	Imp. 538
Chrome ore.....	11,305	75	Imp. 11,230

Molybdenum ore and other ores of rare metals are included with uranium ores.

Missouri Ore Market

Joplin, Mo., Aug. 17—The highest price reported paid for zinc was \$48 per ton for 4½ tons of concentrate; \$47.50 being the general high price. The base price ranged from \$43 to \$45 per ton of 60 per cent. zinc, and the average price was \$44.94, showing higher than last week on account of a shortage in zinc silicate shipments.

The highest price paid for lead was \$65 per ton for one bin, another bin of 1,000,000 lb. selling at \$63, while the week-end offerings were only \$56 per ton. The average price of the week was \$60.56.

Only during one year, 1905, in the history of zinc mining, have the producers succeeded in restricting the output to the needs of the trade. That year a uniform price was maintained. Last year prices slumped far behind 1905. This year now promises to be a repetition of last, and may show even a greater loss, because of the unlimited output creating a reserve stock of 6000 tons. The smelters have attempted to carry the load, but cannot do it longer and are forced to restrict their purchases, and the surplus stock is forcing prices down.

Following are the shipments of zinc

and lead from the various camps of the district for the week ending Aug. 17:

	Zinc, lb.	Lead, lb.	Value.
Webb City-Carterville.	2,506,540	878,790	\$83,199
Joplin.....	1,960,620	254,640	52,733
Duenweg.....	1,094,820	128,240	28,502
Galena.....	833,950	126,890	22,349
Alba-Neck City.....	459,780	.....	11,034
Oronogo.....	468,400	.....	10,790
Aurora.....	419,310	22,620	9,498
Spurgeon.....	310,400	55,860	6,993
Badger.....	260,730	3,930	6,245
Prosperity.....	216,140	39,130	6,056
Stott City.....	106,480	.....	2,402
Sarcoile.....	106,100	.....	2,387
Playter.....	64,630	9,510	1,739
Carl Junction.....	54,520	10,040	1,534
Baxter Springs.....	66,480	.....	1,470
Zincite.....	56,710	.....	1,304
Reeds.....	56,520	.....	1,243
Wentworth.....	58,450	.....	1,062
Totals.....	9,090,580	1,530,350	\$250,260

33 weeks.....394,916,770 59,778,990\$11,459,365
Zinc value, the week, \$204,276; 33 weeks, \$9,161,164
Lead value, the week, 46,344; 33 weeks, \$2,298,201

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	63.53
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	.....

Wisconsin Ore Market

Platteville, Wis., Aug. 17—The production of the entire district continues to hold its own, showing an increase in some camps. The ore-bins are not suffering from over-filling, as the ore is sold as fast as it is ready for the market, and with favorable weather conditions as they were in the past it ought to keep moving right along with the present market price.

The price of zinc ore remained the same as last week, ranging from \$47@48 per ton. Lead also held last week's price of \$29.50 per 1000 lb. Sulphur and dry-bone sold at the usual price.

The following is the shipment of the district, by camps, for the week ending Aug. 17:

Camps.	Zinc ore, lb.	Lead ore, lb.	Sulphur ore, lb.
Buncombe-Hazel Green..	383,800	.....	.....
Benton.....	365,910	166,730	.....
Highland.....	355,600	.....	.....
Platteville.....	350,720	48,210	.....
Galena.....	235,000	.....	.....
Mineral Point.....	206,000	.....	.....
Cuba City.....	155,000	89,000	.....
Linden.....	115,110	.....	.....
Harker.....	66,840	.....	.....
Livingston.....	60,000	.....	.....
Shullsburg.....	43,100	.....	.....
Total for week.....	2,337,060	303,940	.....
Year to Aug. 17.....	66,567,637	2,949,360	335,060

It is possible that there will be a slight decrease in the tonnage next week, on account of the several county fairs opening up; it is thought that several of the larger camps throughout the district will be affected by having to close down for a day or so at a time.

Mining Stocks

New York, Aug. 21—The stock market continues in depressed condition. There have been slight reactions, but the general tone has been weak, with no signs of immediate recovery. The discouraging feature is the absence of outside buying, notwithstanding the low prices at which good securities can be had. At the close it was further depressed by the announcement that more gold had been taken for export. Foreign markets are not much better than our own, and money seems scarce and dear all over the commercial world.

Amalgamated Copper sold down below \$68, closing at \$68¼. American Smelting common sold at \$93½, and Utah Copper at \$23¾. United States Steel closed at \$30¼ for the common and \$92¾ for the preferred.

The course of the curb market was parallel with that of the Stock Exchange. There were occasional rallies, with a weak closing, and very little outside buying.

The coppers were most in demand, and Boston Copper held its own well, closing at \$18½. Cumberland-Ely sold at \$6¾; British Columbia at \$8; and Greencananea at \$12¼. The Cobalt stocks were weak, Nipissing selling at \$6½. Little was done in the Goldfield and Tonopah stocks.

Boston

Aug. 20—Still further recessions are to be noted in the market prices of mining shares the past week, although recoveries have followed the lowest. Prices a week ago, or so, were jammed down to a point which invited the investor with cash and since then prices have been at a slightly higher level, although the final today was considerably below a week ago.

Two dividend announcements were made during the week, while a few are deferred owing to the fact that many of the directors are out of town and perhaps for other reasons. The Parrot Silver and Copper Company announces a regular quarterly dividend of 25c. a share and Butte Coalition a regular quarterly dividend of 50c. per share. Calumet & Arizona and Quincy mining dividend declarations are overdue.

The foremost feature is the attack made by T. W. Lawson on Copper Range, which caused the price to break to \$57.75, with rally at the close tonight to \$62.50, which is \$4.50 below the price a week ago. Officials of the company are on record as predicting that the \$8 rate per annum will be maintained. At present there are about 4200 stockholders. Amalgamated touched \$65.50 in this market Aug. 15, and \$65 in New York. Calumet & Hecla is off \$24 to \$715 for the week, and Calumet & Arizona, after advancing \$8 to \$155, fell back to \$148. North Butte broke \$5.75 to \$60.25, but is back to \$65.25, and Old

Dominion fell \$3.75 to \$27.25, with recovery to \$29.75. Osceola broke \$9 to \$98, rallying to \$104; Quincy \$6 to \$94, recovering \$1, and Tamarack \$8 to \$74, with a \$5 recovery.

Utah Consolidated ran off \$4.75 to \$35.25, closing at \$37.50 tonight, and U. S. Smelting fell \$2.25 to \$38.50. Boston Consolidated yielded \$2.25 to \$18, with partial recovery. Labor conditions in the Utah mining camp are becoming critical. Arizona Commercial touched \$13.25, closing tonight at \$15; Bingham \$10.50, closing at \$12; Butte Coalition \$18, closing at \$19.25; Greene Consolidated \$11.87½; Isle Royale \$13.12½, closing at \$15.25; Michigan \$10.75.

The curb market has been little different, with selling pressure uppermost.

STOCK QUOTATIONS

Table with columns for NEW YORK Aug. 20 and BOSTON Aug. 20. Lists various stock names and their prices.

Table with columns for N. Y. INDUSTRIAL and BOSTON CURB. Lists various stock names and their prices.

Table with columns for ST. LOUIS Aug. 17. Lists various stock names and their prices.

Table with columns for S. FRANCISCO Aug. 15 and NEVADA Aug. 21. Lists various stock names and their prices.

Table with columns for New Dividends. Lists company names, payable amounts, rates, and amounts.

Table with columns for Assessments. Lists company names, delinquent dates, sale dates, and amounts.

Monthly Average Prices of Metals

Table showing Average Price of Silver for New York and London from January to December.

New York, cents per fine ounce; London, pence per standard ounce.

AVERAGE PRICES OF COPPER

Table showing Average Prices of Copper for New York and London from January to December.

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 Average Price of Tin at New York from January to December.

Prices are in cents per pound.

AVERAGE PRICE OF LEAD

Table showing Average Price of Lead for New York and London from January to December.

New York, cents per pound. London, pounds sterling per long ton.

AVERAGE PRICE OF SPELTER

Table showing Average Price of Spelter for New York, St. Louis, and London from January to December.

New York and St. Louis, cents per pound. London is pounds sterling per long ton.