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Mining the Porphyry Ore of Bingham

Two Companies Will Mine 10,000 Tons per Day from a Mountain of Ore and Will Produce 80,000,000 Pounds of Copper Yearly

BY WALTER RENTON INGALLS

The expression "a mountain of ore" is common in the literature of promoters, but there are only a few cases in which that description is accurate. The mineralized monzonite, commonly called "porphyry" of Bingham, Utah, however, constitutes literally a mountain of ore, and the operations of the Boston Consolidated Mining Company and the Utah Copper Company can be characterized simply as mining a mountain. At some future date the top of a mountain of considerable proportions, even as mountains go, will have been cut off for three or four hundred feet, the adjacent gulches will have been filled with discarded rock and the bulk of the mountain will have been distributed in the form of fine sand and slime over the slopes leading down to the Great Salt Lake near Garfield, 27 miles from the original mountain. No one would venture to predict when this transfer will be completed. Even on the enormous scale of operations for which equipment is now nearly ready—10,000 tons of ore per day—it will be many, many years before the reserves of ore (as reckoned now) are exhausted; and before that time an immense quantity of mineralized rock that is not now considered ore may have be-

LOWER WESTERN PORTION OF THE UTAH COPPER COMPANY

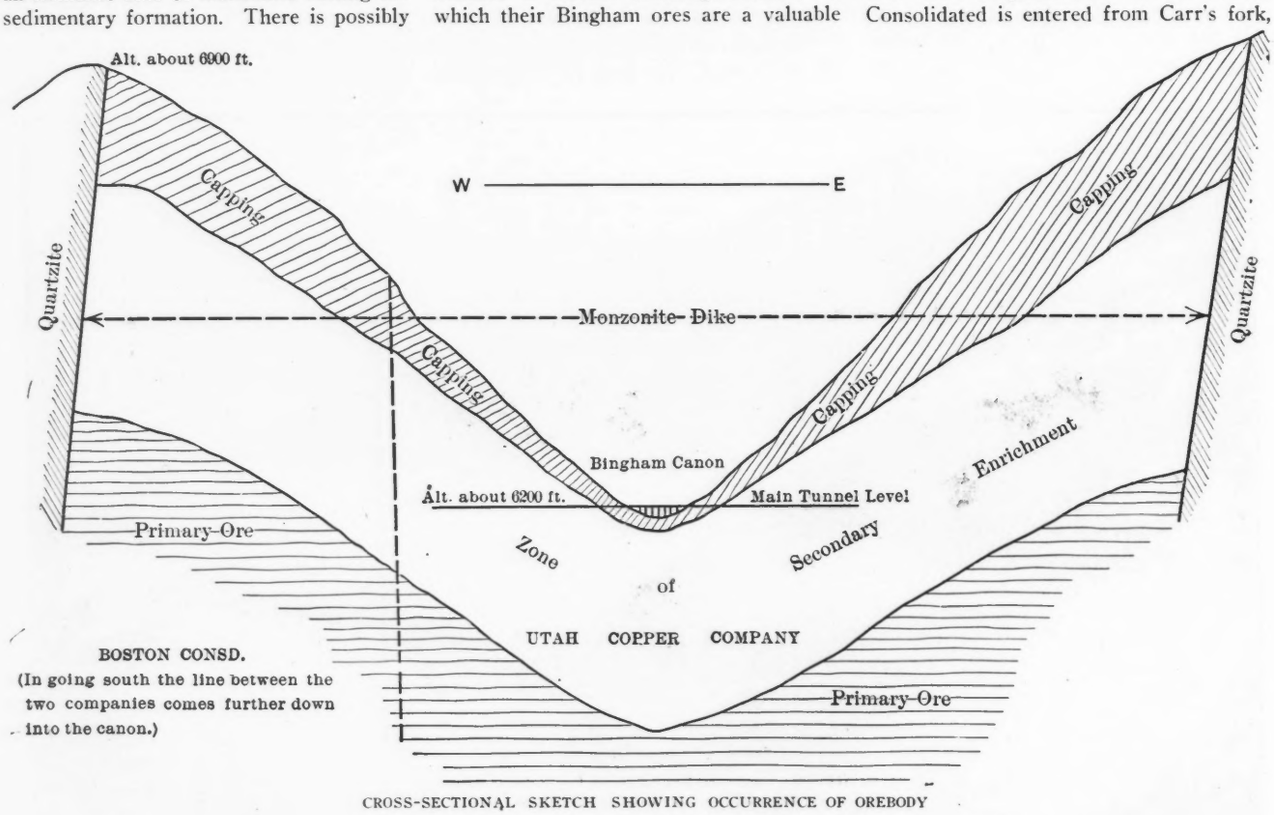
This photograph, which is taken looking north, shows the trestle over Bingham canon, which connects the eastern and western portions of the Utah mine. The main adits enter the mountains on each side at this level. The tracks on the same level extend around the shoulder of the mountain at the extreme right of the photograph into Carr Fork, and thence to the Boston Consolidated, the ore of the latter coming out this way, although the workings of the Porphyry mine of the Boston Consolidated are on the same side of the mountain as those of the Utah Copper Company, but above the latter.

come so through changes in conditions of exploitation.

Geology

The complex geology of the Bingham district has been ably described in a recent monograph of the U. S. Geological Survey by J. M. Boutwell, and it is unnecessary that I should make any attempt to give more than a general idea of the occurrence of the important orebodies. The latter are of two classes, viz. (1) the lenses of pyrites, which are found as replacements in limestone in a sedimentary formation; and (2) the dissemination of sulphide minerals (chalcocite, bornite, chalcopyrite and pyrite) which occurs in an immense dike of monzonite cutting the sedimentary formation. There is possibly another important class of ore deposit as exemplified in the property of the Ohio Copper Company, where sulphide minerals occur as a dissemination in quartzite, one of the sedimentaries of the district, which is said to show a large quantity of ore similar in grade to the monzonite, but this I did not examine.

The lenticular deposits are of great size, single lenses yielding upward of 250,000 tons of ore, attaining large dimensions in length, width and thickness. They consist generally of a friable pyrites, which is occasionally zinky and always is silicious. At the best this ore shows 8 to 15 per cent. excess of iron over silica, but a good deal of it is only neutral. Its copper content is variable. In the Highland Boy mine it has been particularly high. The Yampa mine is said to have high-grade orebodies, and the Sulphide mine of the Boston Consolidated is also favorable in that respect; its shipments at the present time probably assay approximately 2.5 per cent. copper. On the other hand the ores of the Commercial mine of the Bingham Consolidated and the mines of the United States Mining Company are of comparatively low grade in copper and are valuable largely as a flux, on the basis of which profitable silicious ores from Tintic and elsewhere can be smelted. This explains the metallurgical development of the several companies. The Utah Consolidated (Highland Boy) and Yampa smelt only their own ores, the object being simply extraction of their copper. The United States and Bingham companies conduct a custom smelting business in which their Bingham ores are a valuable basic flux that also yields some copper. The Boston Consolidated ships its ore to the Garfield smelter.



CROSS-SECTIONAL SKETCH SHOWING OCCURRENCE OF OREBODY

The Porphyry Ore

Bingham is situated in a long narrow gulch, which rises steeply. Near the mouth of the gulch is the first concentrating mill of the Utah Copper Company. A mile or so farther up is the Yampa smelter, perched on a steep sidehill. A little farther up are the lower terminals of the aërial tramways of the Highland Boy mine and the United States Mining Company, then the railway station and about a mile above that the principal part of the town of Bingham. Carr's fork then makes off westerly from main Bingham cañon. In the latter, somewhat more than a mile above the town, the cañon cuts through the dike of monzonite above referred to. This is where the property of the Utah Copper Company is situated. The dike shows on both sides of the cañon, rising high on the slopes of the mountains on either hand. The property of the Boston Consolidated adjoins that of the Utah Copper Company on the west and at the beginning is far higher up, covering indeed the very top of the mountain, but the surface lines of the two properties are irregular and in going farther up the cañon the boundary line of the Boston company comes farther down into the cañon. The general situation is shown in the accompanying sketch of a cross-section on a general easterly-westerly line through the lower part of the two properties. The Sulphide mine of the Boston Consolidated is entered from Carr's fork, and the approach to its Porphyry mine is also that way.

The monzonite dike is more or less mineralized over a large area, but the payable portion, i.e., as considered at present, is believed to be comprised in a large somewhat elliptical area beginning near the scene of present operations of the Utah Copper Company, and extending southwesterly. The porphyry has here a copper-stained capping, or leached zone, which is from 30 to 150 ft. thick. The capping is thinnest near the bottom of the gulch, where the erosion has been greatest. In going up the sides of the mountain the thickness increases. The cap-rock is brownish from oxidation of iron and frequently shows brilliant stains of azurite and malachite in the seams. It contains a small percentage of copper and some day itself may be considered as payable

ore, but at present it is simply "waste." Under the capping is a zone of secondary enrichment, containing the sulphide minerals (chalcocite predominating), which is 100 to 300 ft. thick. This is a grayish, non-weathered porphyry, in which the sulphide minerals are very finely disseminated—so finely that crushing to approximately 30-mesh size is necessary to liberate them satisfactorily for concentration. There are portions of the deposit where the mineralization is coarser, some particles being as large as 0.1 in. in diameter, but in general the dissemination is extremely fine, so that to casual inspection the porphyry shows no mineral, looking simply like gray rock. A prospector might walk many times over the occurrence of such material in place without thinking to have it assayed, as indeed was the experience at Bingham. But in the light of present knowledge attention will doubtless be more sharply directed toward similar occurrences. However, it is to be remarked that even if this great mineralization of Bingham had been appreciated 10 years ago, it is doubtful if engineers would have been prepared to handle it on the broad, economical lines that they are doing at present. Nevertheless, it is worth while to remark that several years before the exploitation of the property of the Utah Copper Company was begun it was examined by D. C. Jackling, now the general manager of the Utah Copper Company, and R. C. Gemmell, now the general superintendent of that company, who were then on the engineering staff of J. R. De Lamar. They reported favorably upon the property, but Capt. De Lamar either did not appreciate its value or was not prepared to take it up. Later Mr. Jackling interested McNeill, Penrose and others of Colorado Springs, who organized the Utah Copper Company, in which the Guggenheims eventually purchased the controlling interest.

The Zone of Secondary Enrichment

The zone of secondary enrichment conforms generally to the contour of the surface. There are variations in the degree of mineralization, but over large areas the mineralization is quite uniform. The amount and grade of the ore in this zone are largely matters of the basis of figuring. There are large sections which will go 2 per cent. copper and even a little upward. The Utah Copper Company estimates that it has actually developed 39,000,000 tons of "positive" and "probable" ore that will go 1.8 per cent. copper; on the basis of ore having a minimum assay of 1.25 per cent. copper and a probable average of slightly better than 1.5 per cent. it is believed safe to assume 100,000,000 tons in the 60 acres now partially developed. The Boston company estimates that it has developed 58,580,000 tons that will assay 1.5 per cent. or better in an area of 49 acres, estimating the thickness of the ore at 300 ft. It estimates that it has 156 acres of porphyry (including the above 49 acres) that contains 1 per cent. copper or more. The best developed block in the Boston property is estimated to contain 10,626,000 tons averaging 1.92 per cent. copper.

Under the zone of secondary enrichment the porphyry contains 1 per cent. of copper or so, and when estimates of the tonnage are reduced to that basis they become a wild revel of ciphers. In this main mass of primary ore the predominant sulphide is chalcopyrite.

It is to be carefully explained that these estimates, extravagant as they may appear, are not mere guesses, but are sound engineering computations. The property of the Utah Copper Company has been extraordinarily well developed by drifts and raises, and that company possesses not only the results of many samplings both by its own and by independent engineers, but also has the result of actually milling 350,000 tons of ore taken out in development work, which averaged 1.983 per cent. copper. The sampling of the same openings by the Guggenheim engineers showed an average of about 2.03 per cent. The underground workings in this mine aggregate nearly 17 miles, and it is a remarkable record that so great an amount of driving has been done in less than four years, the work having been begun Sept. 20, 1903.

Mine Developments

The Boston mine has not been so thoroughly developed. The drifting, raising, etc., in it amount to only 31,000 ft., or, say, six miles. In comparing the estimates of tonnage with the lineal development in the case of the two companies the difference is obvious. Yet this is no disparagement of the management of the Boston company. On the contrary, I am led to wonder if the Utah mine may not have been over-developed. The porphyry is after all rather uniform and it must be mined without close discrimination; anyway, both companies contemplate mining the whole of the enriched zone. The Boston company had the advantage of the results of the costly work of the Utah company in proving the uniformity of the ore occurrence, and it seems to me has been correct in relying upon a less amount of actual opening. It is questionable whether the Utah company would have done so much drifting had it not been considering that it was developing its mine with the view of extracting the ore by caving. Of this, however, more later. Neither company has done any extensive diamond drilling. The ore is soft and seamy and does not give any core.

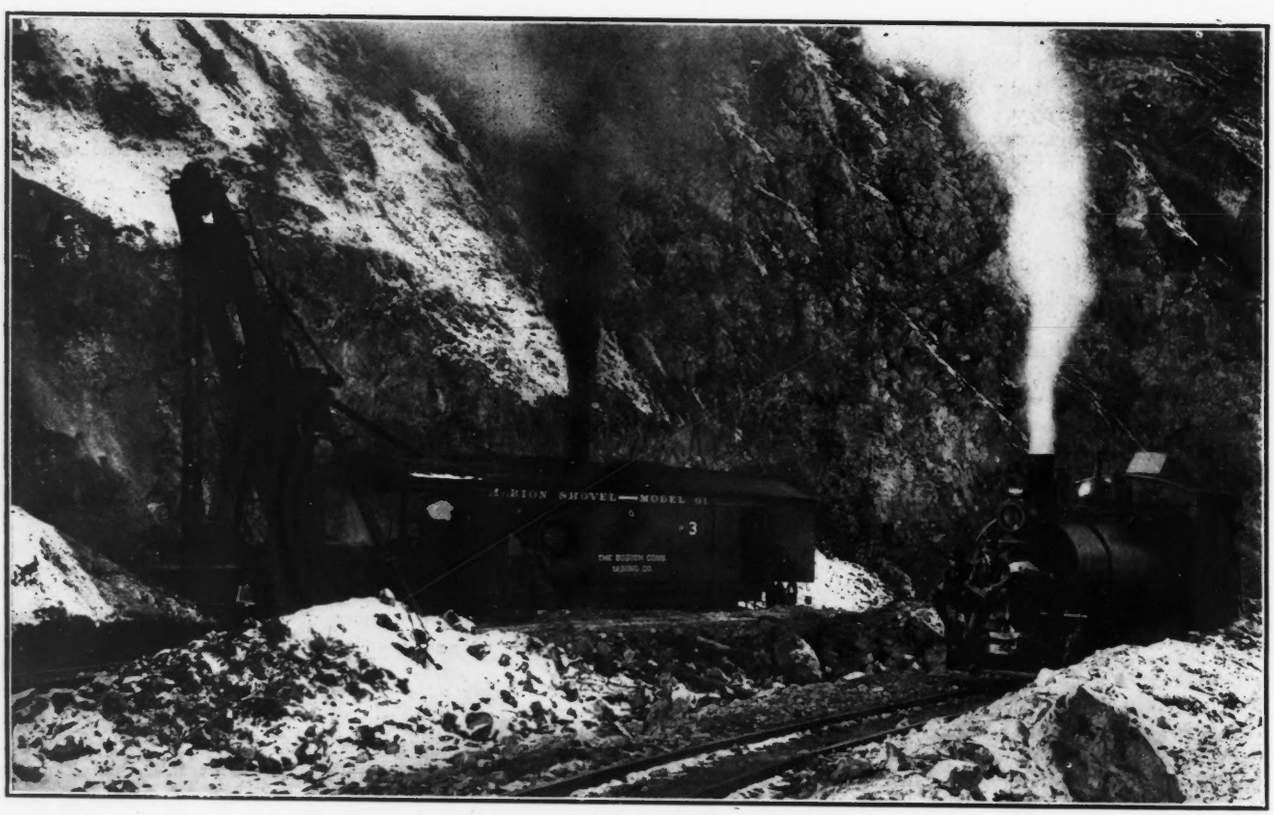
Both mines were admirably situated for economical development, their ground being capable of entry by adit levels, while the Utah company was able to go into the mountains on both sides of the gulch, and the rise of the mountains is so steep that the adits rapidly gain depth. Besides the copper, the ore contains a little gold and silver, chiefly gold. The precious-metal value may be generalized conservatively at 25c. per ton. If we say 25c. per ton in gold and silver, and 30 lb. in copper, and multiply by the tonnage estimates, we get stupendous figures. Even at the milling rate of 10,000 tons per day, for which the equipment will be ready by Oct. 1, 1907, or, say, 3,600,000 tons per annum (it being planned to operate every day save the few holidays), the life of these mines will probably exceed that of many of the men who are now developing them; and they are nearly all young men.

Methods of Mining

The methods of mining are as unique as the mines and have involved the solution of many difficult problems in their development. At first sight the impressive feature is their colossal scale. An idea of this may be obtained from the panoramic view which accompanies this article. The essential features are the first introduction of the steam shovel in metal mining west of the Rocky mountains, and some natural conditions which temporarily, at least, limit the complete application of this cheap method of mining in one of the porphyry mines of Bingham. The methods employed by the two companies differ materially in several important particulars. The Boston company is using steam shovels exclusively and expects to continue to do so. The Utah company is at present mining both by the steam shovel and by the caving system, but aims gradually to abandon the latter.

The steam-shovel work does not require any very minute description because it is in detail similar to the same kind of work that is done in the iron mines of Michigan, Wisconsin and Minnesota, and to steam-shovel excavation in general. As applied at Bingham, the steam shovel is first put to work removing the gravel and cap-rock, which is called "stripping." The stripping is necessarily kept well ahead of the digging of ore. Up to date the Boston company has been engaged solely in stripping, its mill not yet being ready to receive ore; the Utah company is both stripping and digging ore, it having been milling 3000 tons of ore per day since about the middle of July. In the steam-shovel work the ground is taken down in benches, which are from 30 to 50 ft. in hight. It has been found undesirable to put a steam shovel at work against a bank much higher than 30 ft., because of the danger of the bank caving down. The Boston company has one Vulcan shovel of 3 cu.yd. capacity and three Marions of 5 cu.yd. The Utah company has four Marions. The men operating these shovels are chiefly men who have been engaged in railway work or iron mining in the East. According to them the Bingham porphyry is favorable digging ground. It is certainly a revelation to the Western

STEAM SHOVELS AND ORE TRAINS, BOSTON CONSOLIDATED



STEAM SHOVEL, BOSTON CONSOLIDATED

mining man to see one of these powerful machines claw up 5 cu.yd. of porphyry from a rock face, swing the shovel over a car and deposit its load in the fraction of a minute.

Loosening the Ground

The Boston company loosens the ground by sinking holes with churn drills and exploding large charges of dynamite in them. It has five Keystone drills for this work. These use a 5⅝-in. bit, making a hole about 6½ in. in diameter, which is sunk to a depth of 150 or 160 ft. The holes are put down 15 to 20 ft. below the level of the bench that is being broken so as to insure loosening of the ground below the level on which the steam shovel is at work and prevent the existence of unbroken knobs in the floor, which would be troublesome to the shovel. The holes are put down about 30 ft. apart and at such distance back from the face of the bench that the horizontal distance from the face at the bottom will be about 30 ft. From six to nine holes are shot at a time, with 1200 to 4700 lb. of dynamite per hole. Dynamite with 40 and 60 per cent. of nitroglycerine is used, the former grade being most commonly employed. This grade costs 11.5c. per lb. at Bingham. As much as 225,000 tons of rock have been dislodged by a blast of nine holes, the powder cost being about 1.5c. per ton.

In the Utah mine the ground is loosened by means of 3¼-in. Ingersoll air drills, which put down holes 20 ft. deep with 1¼-in. steel, star bits. These holes are put down 15 to 20 ft. apart, about 20 ft. back from the face. It is obviously a less efficient method of loosening the ground than that which has been adopted by the Boston company. The extensive character of the underground workings in the Utah mine is practically prohibitive as to the use of churn drills there.

By either method the ground is so thoroughly shaken up that the shovels have no difficulty in handling it. One of these shovels will easily handle a boulder of several tons' weight. Such boulders as fall too big for the shovel to take up are blasted while the shovel is idle between trains, but the porphyry is so seamy and is so thoroughly shattered by the main blasts that there are comparatively few boulders that require further breaking up.

Handling the Rock

The Boston mine is laid out with tracks of 3-ft. gage and grades not exceeding 2.5 per cent. On these are operated 18-ton Porter locomotives, which draw trains of 12 cars of seven tons capacity each. There are 12 of these locomotives. The Utah mine has tracks of 4 ft. 8½ in. (standard) gage at grades as high as 5 per cent. The operation is with 45-ton locomotives and two standard railway cars per train. Here the steam shovel loads directly into the car which is to take the ore to the mill. In the Boston system transfer is necessary. The latter is effected by running the trains of narrow-gage cars around to the Carr fork side of the mountain and dumping into bins which discharge into the cars of a four-track gravity railway, about 1600 ft. long at 30 to 40 per cent. grade, discharging into a 3000-ton cylindrical steel tank at the main railway track connecting with the Rio Grande system. This track skirts the mountain, passing through a tunnel about 200 ft. long, and connects

STEAM SHOVEL, UTAH COPPER COMPANY

This photograph shows several of the drifts run for the development of the mine, which have been uncovered by the steam shovel excavation.


MAP OF MINING PROPERTIES
BINGHAM, UTAH
N
Bingham Con. M. & S. Co.
Bingham Con. M. & S. Co. Electric Tramway
Bingham Consolidated Mining & Smelting Company
Majestic Tunnel
Bingham Consolidated Co.
Lerwill and Richards Group
Tecumseh Group
Extra Session Group
New Mammoth Group
Fortuna Mining and Milling Co.
Congor Group
Illinois Group
Marvel Group
Badger Group
Saint Joe Mining Company
Lenox Mining Company
Bingham Consolidated Mining Company
Bingham Mining Company
Bingham Mining Co.
Cluster Mining Co.
Clusto Group
Butterfield Group
Continuous Mining
United States Mining Co's. Aerial Tramway
Copper Belt R.R.
Tecumseh Group
Eddie Group
Stanless Group
Ohio Copper Company
Utah Copper Company
Utah Development Co.
Shawmut Group
Aluno Group
Bingham and Eastern Group
Butler Liberal Consolidated Mining Co.
Montezuma Mining Co.
Phoenix Mining Company
Bingham Mary Co.
Boston Consolidated Mining Company
Bingham Con. M. & S. Co.
Tunnel
Utah
Last Chance Group
Bingham Central Mining & Milling Co.
Bingham New Haven Copper & Gold Mining Co.
Group
Utah S.
Sunset Group
Vesuvian & Lincoln Group
Mountain Chief Group
Nancy Hanks Group
Western Mining and Milling Company
Bingham Copper Boy Mining Co.
Utah Consolidated Mining Company
Argentine Mining Company

with the Rio Grande in the main working yard of the Utah Copper Company. From this point the ore of both companies goes to the mills at Garfield, 27 miles distant, via the Rio Grande "high line." The branch of the Boston company is about one mile long and is costing about $60,000, which will give an idea of the cost of railway construction under difficult conditions in that vicinity.

It will be observed that there is a radical difference in the methods adopted by the two companies for the handling of the material. The Utah eliminates all rehandling from the time the steam shovel originally loads the car, but gains that advantage at the expense of a heavier train equipment, including locomotives of such size that two men are required in the cab, together with a brakeman, according to union rules, while the Boston locomotives are handled by one man each. By the use of narrow-gage tracks the Boston company gains the advantage of more elasticity in the laying-out, which is of considerable importance on so steep a hillside, at the expense of an inevitable transfer, and in this particular case of two transfers. The second transfer, however, is necessitated by the natural position of the property so high up on the mountain. Both transfers are made by gravity, but men are required at the head and foot of the tramway. The additional expense per ton of ore on this account ought not to be large. The principal objection to it is perhaps the danger of a breakdown which would temporarily cut off the mine from the mill.

Disposal of the Stripping

While the natural position of the Boston property puts it at a certain disadvantage in the matter of getting the ore down the mountain, as pointed out above, it confers a very important advantage in another respect. This is the disposal of the stripping, which is simply run around to the Carr fork side, as the cars receive it from the shovels, and dumped down the hillside upon the quartzite formation, where it finds a final resting place. The Boston management estimates that it has capacity for piling 42,000,000 tons of stripping upon the quartzite, within a mile of the property, which under the most unfavorable circumstances would correspond to the extraction of 84,000,000 tons of ore. This is assuming that the relative thickness of cap-rock and ore zone are as 1:2, or, say, 150:300 ft., which figures are approximately correct for the portion of the property that is now being worked. I do not know if any estimates of the actual relative thickness of cap-rock and ore over the whole of both of these properties have been made. It is certain, however, that the thickness of the cap-rock increases in going up the mountain, and although in going southeasterly the Boston company has some comparatively low-lying ground, on the whole the amount of stripping to be done from the Boston property is doubtless considerably more than from the Utah. In this connection it may be noted that the Boston company is beginning operations at the point where its cap-rock is about the thickest. The ratio of cap-rock to ore in the part of the Utah property that is now being worked is about 1:5.

The disadvantage of the Boston company in the matter of greater volume of material to be removed cuts much less figure in the mind, however, when the conditions at the Utah property are studied. There this question immediately arises: although the amount of stripping is comparatively light, being as little as 30 ft. at some points near the bottom of the cañon, what is going to be done with it? The headquarters of the mine, and the main openings into the mine are right at the bottom of the cañon, down which passes the stream of the cañon and the county road. The dump-room immediately adjacent to the mine is now very small indeed. Of course, the exigencies of this situation are fully appreciated by the Utah management; so much so, indeed, that it has made a contract with the Rio Grande railway to remove waste rock to the mouth of Bingham cañon at a cost of 7c. per ton for the carriage; and now, evidently foreseeing that the railway company may not be able to move the tonnage, the Utah Copper Company itself is grading a line for several miles down Bingham cañon, this grade being above the Rio Grande high line.

It is clear that the disposal of waste will be a good deal more costly to the Utah company than it will be to the Boston, and because of this problem, and possibly for other reasons, the caving system of underground mining, for which the mine was originally opened, will not be entirely abandoned. This is manifested by extensive developments in preparation for caving which are now being carried on in the mine, and by the fact that the main adit levels on both sides of the cañon are being enlarged to 12x14 ft., so that regular railway cars can be run into the mine to receive ore directly from the chutes. It is hoped, however, that in the course of two or three years sufficient ground can be stripped to enable all of the ore required by the mill to be dug by steam shovel, and the company is planning its operations with that in view.

The Caving System in the Utah Mine

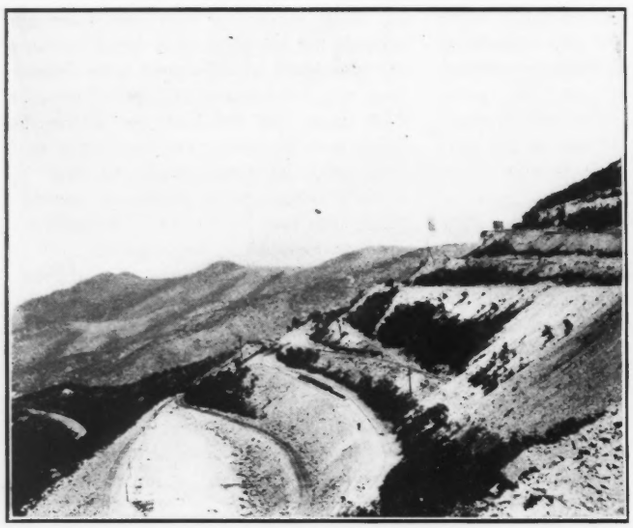
The caving system as practised in this mine is simple and efficient. The ground is cut up by drifts and crosscuts into blocks 50 ft. square or 100 ft. square. A large part of the development work is done with 50-ft. blocks, especially in the west mine. From the main level raises are put up to the cap-rock at an angle of about 55 deg. Sub-levels are opened at vertical intervals of 30 to 33 ft. The caving is conducted from the top downward, block by block. In starting the cave in any block, raises (or mill holes) are put up from the sub-level next below opening into the block to be caved with funnel-shape tops, and stopes are opened into the block from the sub-level on which the caving is to be done. The ore stoped falls down into the funnel-shape openings of the mill holes and is drawn off through chutes into cars on the sub-level next below, or perhaps lower down, and is trammed to the nearest main raise, through which it is dropped to the main level. These raises are made at the angle of 50 to 55 deg., because at that the ore slides down freely and can be handled most easily.

The effect of the stoping on the sub-level to which the cave is to be brought down is to leave the upper part of the block supported by pillars. The caving is then brought about by robbing and shooting down the pillars until they will no longer support the weight and the block crushes down, the cap-rock following. When the pillars have been cut down to small dimensions, holes are drilled in them, loaded and fired, knocking out the legs so to speak; but sometimes the roof will not cave down for two or three days. The caved material is finally drawn off through the mill holes. It will be remembered that this mine has been described as occurring on both sides of a cañon with rather steep sides, the cap-rock and the ore beneath it sloping approximately the same as the sides of the mountains. Consequently in an easterly-westerly cross-section the mine has the general shape of a triangular trough. The caving is begun at the rims of the trough and is brought downward step by step in a broad section. One such section has already been caved completely down on the eastern side of the cañon, showing on the surface as a broad depression extending up the mountain side. This section is at the lower end of the property. Similar sections will now be caved going up the cañon.

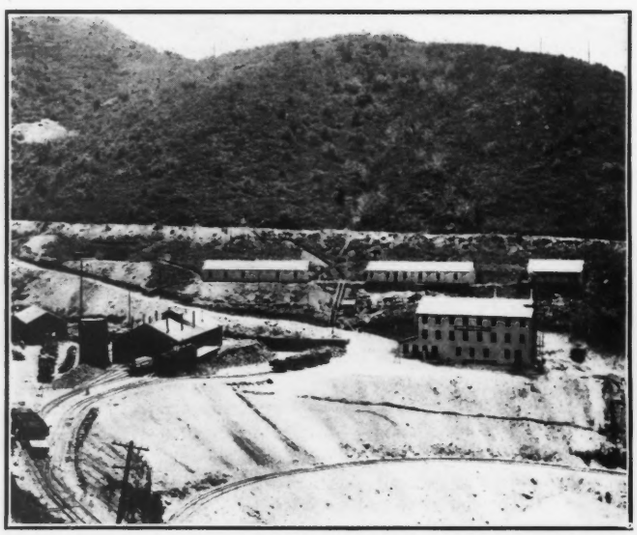
The Mathematics of the Caving System

In order to get a good understanding of the caving system of mining it is necessary to analyze the results that are achieved by it. Taking the case of the mine of the Utah Copper Company, a block of ground opened by drifts at 50-ft. centers, the sub-levels being 33 ft. apart, will contain $50 \times 50 \times 33 = 82{,}500$ cu.ft. The drifts run around the block are about 7 ft. high and 2.5 ft. wide.[1] Consequently $7 \times 2.5 \times 190 = 3325$ cu.ft. of ore are removed from the block by drifting, which is a comparatively expensive form of mining. This part of the mining cost might perhaps be reduced by developing by means of drift stopes, but it is

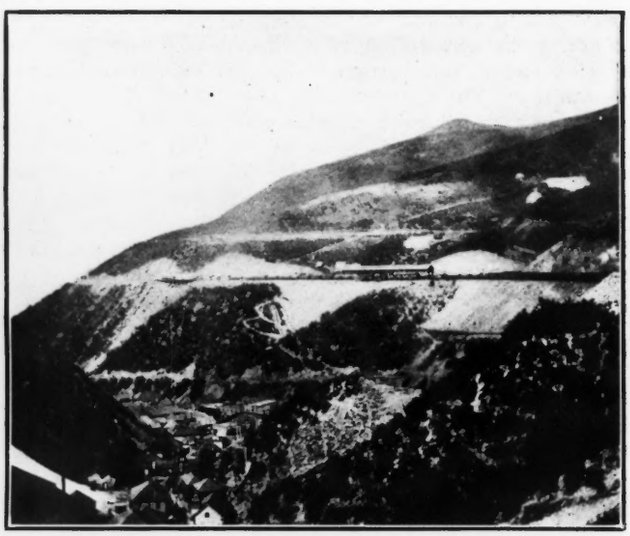
[1] The actual width of the drifts is about 5 ft., but of course only one-half of that is changeable to any particular block.



STEAM-SHOVEL WORK, BOSTON CONSOLIDATED



HEADQUARTERS OF THE PORPHYRY MINE, BOSTON CONSOLIDATED



ASSEMBLY YARD OF THE RAILWAY AT UPPER BINGHAM

ORE BINS OF THE UTAH COPPER COMPANY AT UPPER BINGHAM

CHARGING DEEP BLAST HOLES, BOSTON CONSOLIDATED

highly desirable to avoid the use of timber in these developments, merely as a matter of expense, and in the Utah mine it is considered that 5 ft. is as wide as it is desirable to make the drifts. Anyway, drifting in this mine is cheap, 5x7-ft. drifts costing only $3 per foot, and raises $2. Scarcely any timber is used. Now let us suppose that four raises, 5x7 ft., each 33 ft. long, have been put up into the block, the excavation in this way is $4 \times 5 \times 7 \times 33 = 4620$ cu.ft. Assuming then that 25,000 cu.ft. of stoping are done in the block, the total excavation by drifting, raising and stoping per block is 32,945 cu.ft., or about 40 per cent. of the total (82,500 cu.ft.). John McDonald, the foreman of the Utah mine, informed me that 40 per cent. of the ore was about the proportion of the extraction in the above way in that mine. On that assumption, 40 per cent. of the ore is subject to the regular mining costs, while on the remaining 60 per cent. which is caved down substantially the only cost is that of drawing it off from the chutes, tramming to the main chutes and thence removing to the surface.

STEAM SHOVEL IN OPERATION, UTAH COPPER COMPANY

KEYSTONE DRILLING RIG, BOSTON CONSOLIDATED

STEAM SHOVELS IN OPERATION, BOSTON CONSOLIDATED

Cost of Mining by the Caving System

The estimates which I shall give are purely tentative, but will serve to illustrate the general conditions. The mine is opened by large adit levels through which the ore is drawn in trains of side-dumping cars by means of electric locomotives. The haulage is comparatively short. The ore is comparatively soft and breaks easily. In driving a 5x7-ft. drift, two shifts (eight hours each) with a 3½-in. Ingersoll drill advance about 7 ft. The mine is quite dry and the ventilation could hardly be surpassed. Scarcely any timber is required. The ore stands about 15 cu.ft. to the ton. The scale of wages is: machinemen, $3.25 per eight hours; helpers, $3; hand-steel miners, $2.75@3; muckers, $2.75; timbermen, $3.25; hand trammers, $2.75. (This scale was established Dec. 1, 1906, being an advance of 25c. per shift all around, and is to be in effect so long as copper is at or above 18c. per lb. at New York.) Under these conditions the mining in the regular way should be done for something less than $1.20 per ton. The caved ore can probably be removed for 15c. per ton. If then four tons of ore were mined at $1.20 per ton, or $4.80 and six tons at 15c. per ton or 90c., the total for 10 tons would be $5.70, or 57c. per ton. It would not be proper to estimate that figure as the probable cost of mining by the caving system in the Utah mine, because a considerable part of the development work has already been done (approximately 17 miles having been done). As a matter of fact the caving at present is said to be costing a few cents per ton less than I have estimated. The cost will be somewhat reduced by drawing directly into the railway cars. However, it is evident that the cost of mining by the caving system, economical as it is, will be a good deal higher than by the steam-shovel work.

Further Points Respecting the Caving System

It is obvious from the previous analysis that the caving system as practised at the Utah mine, and indeed any form of the system, becomes more economical the more development work can be reduced. In the Utah mine the sub-levels were originally driven only 16 ft. apart. The interval was then increased to 33 ft., which, of course, cut down the amount of driving to one-half. Why not then increase the interval further? The answer is that as the blocks become larger the control of the process becomes more difficult and among other things there is danger of increased loss of ore. As practised at present in the Utah mine it is expected that 90 per cent. of the ore will be extracted, but upon this point there is considerable difference of opinion among the caving experts. The ore is drawn off until waste begins to appear, but naturally the line of division is not sharp and, there is inevitably some mixture of crushed cap-rock as the latter follows down.

With respect to the main adits which are now being enlarged to full standard-gage railway size, the cars are to be operated underground by electric locomotives. The adits have several branches which take the cars to convenient chutes, everything being arranged like a system of spur tracks on the surface. There is a large, straight tunnel into the Pilares mine, at Nacozari, Mexico, into which narrow-gage railway cars are pushed from the main line from the mill, but so far as I am aware the mine of the Utah Copper Company is to be the first one into which the large cars of a standard-gage railway are to be run. There is no particular boldness about this, but the expedient is certainly novel and illustrative of the broad scale upon which these mines are being developed.

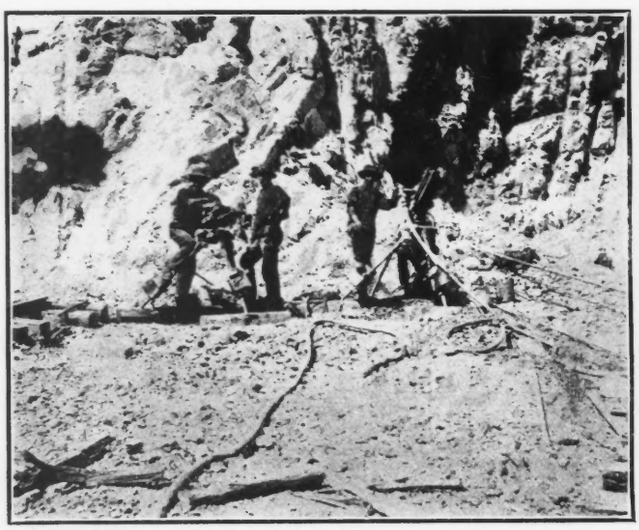
Cost of Steam-shovel Mining

I do not suppose that as yet anyone knows very closely what the cost of the steam-shovel mining is going to be. The method is being applied under new conditions and construction is going on side by side with the actual mining, making it difficult to separate precisely the expenses. The bulk of the primary construction will have been completed this fall and in 1908 the companies will have a straight operating year, wherefore by Jan. 1, 1909, some reliable figures ought to be available. In the meanwhile it may be said that the preliminary estimates of the respective managements appear to be amply conservative. The managements of both companies ad-

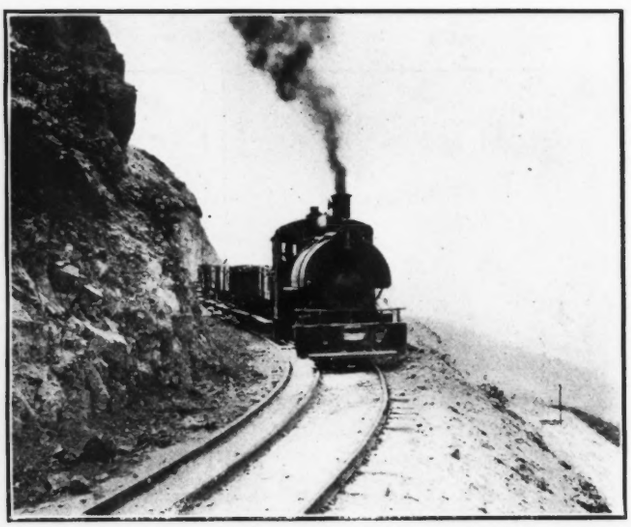
vised their directors that the cost of mining would be 40c. per ton. Actually the Boston Consolidated is now mining the overburden for about 25c. per ton. However, this is being done with entirely new equipment and the account for repairs and renewals is doubtless somewhat below what eventually it will be. The wear and tear on a steam shovel (which costs $12,000 f.o.b. works) is extraordinarily severe and the life of the machine is only three or four years. The wear and tear on the locomotives and cars is equally severe. On the other hand, it is certain that a good deal of anticipatory work is being charged up in the present cost of mining. It is probable that the average cost of mining and removing material will come down to 20c. per ton. On that basis the cost of mining one ton of cap-rock would be 20c. and two tons of ore 40c., a total of 60c., which would be 30c. per ton of ore.

On the whole it appears likely that the cost to the Utah Copper Company will be about the same, possibly a little less, in so far as the steam-shovel work is concerned, because, although the cost of digging alone by its system may be a little higher and the cost of removing cap-rock will doubtless be considerably higher, the proportion of cap-rock to be removed is materially less, the proportion where work is now being done being probably not more than 1 : 5. If, then, the cost of digging cap-rock were 20c. per ton, removing the same 7c. per ton and digging ore 20c. per ton; and if 0.2 ton of cap-rock were removed per ton of ore, the cost per ton of ore would be 25.4c. per ton. The final cost per ton of ore delivered to the mills will depend naturally upon the relative proportion of the whole ore won by caving and by steam shoveling. In view of the necessity for extracting a certain proportion by the former and more costly system, it would appear that on the whole the ore of the Boston Consolidated will be extracted somewhat more cheaply than that of the Utah Copper Company, at least until the latter is able to abandon the caving system.

I spent only two days on these properties, which are of such magnitude and complexity of conditions that a month's study would be none too long to arrive at a thorough understanding of the working conditions, and it is therefore to be understood that the estimates which I have made are nothing more than hasty approximations. I have felt, however, that a better understanding of the problems involved in the mining of this gigantic orebody, the differences in the methods adopted by the two companies, and the conditions which will affect the profits from their exploitations would be reached if the various conditions, methods, etc., were represented by figures. In a subsequent article I shall discuss the transportation of the ore to Garfield and the milling operations to be conducted there.



INGERSOLL DRILLS, UTAH COPPER COMPANY



ORE TRAIN, BOSTON CONSOLIDATED

Mineral Exports from New South Wales

The Under-Secretary for Mines has furnished a return showing the quantity and value of silver, copper, tin and coal exported from New South Wales during six months ended June 30, 1907. The figures are as follows: Silver, ingots and matte, 167,330 oz., value $108,815; silver-lead concentrates, 202,591 tons, $8,328,760; copper, ingots and ore, 5979 tons, $2,682,930; tin, ingots and ore, 1506 tons, $1,324,670; coal (to Australasian and other ports), 2,675,672 tons, $6,129,955. The total value of exports is $18,575,130. These figures indicate a net increase for the half-year of $5,378,070, as compared with the corresponding period in 1906. The largest advance occurs in the value of the production of the silver-lead mines, and amounts to $2,442,105. Coal is responsible for an increase of $1,725,210, and the quantity exported is greater by 533,852 tons. The oversea trade continues to exhibit a marked expansion, and the quantity of coal shipped to places outside Australasia during the six months totals 1,521,095 tons, having a value of $3,745,460. The outlook of the coal industry for the balance of this year is excellent. Very extensive orders have been placed with Newcastle collieries by the Southern Pacific Railroad Company and other large users on the Pacific coast in addition to the large naval contracts for the coaling of the large Pacific battleship fleet. In connection with the production of copper and tin, an increase in value of $823,730 and $387,025 is respectively indicated. A comparison of the figures of the second quarter of this year with those of the first quarter shows that the mining industry continues on the up-grade. The exports for the June quarter are valued at $9,447,855, as against $9,127,275 for the March quarter, or an increase of $320,580. The value of the copper and tin ore imported into the State during the half-year for treatment here is $259,385 and $444,910 respectively.

The mines of Cobalt have shipped up to July 1, 1907 13,862 tons of ore of an estimated value of $10,000,000. From statistics collected by the *Toronto World*, it is calculated that the production of the present year will probably reach $11,000,000. The output for 1904 was 158 tons, valued at $136,217; in 1905, 2144 tons, valued at $1,473,196; in 1906, 5129 tons valued at $3,900,000. The production of the first six months of the present year was 6431 tons having an estimated value of $4,890,017, or more than the entire output of last year and nearly half the total production during the life of the camp.

The Question of Riffles

SPECIAL CORRESPONDENCE

The readers of the JOURNAL are all more or less familiar with the various pamphlet catalogs issued by the manufacturers of the different types of riffled-top concentrating tables, in which the advantages of some form of gradually sloping groove are substituted for the rectangular cross section of the Wilfley type of riffle, as for instance, the spiral plane. It is undoubtedly true that the Wilfley form of riffled surface, as well as all the other modified forms of riffled or grooved table tops, tends to destroy the stratification of the different minerals and gangue, in their passing over riffles. The gently slanting grooves and slanting-sided riffles have for their aim, the modifying of the disturbing features of the riffle or rectangular section. Obviously the extreme limit of this modification would be a perfectly smooth table top without any riffles, or grooves, or unevenness whatever. Upon such a top, the stratification would not be disturbed by the passing over the riffles or grooves. This, however, is practically impossible in any form of wet concentrating table. It has actually been accomplished, however, in a new form of top as now provided in the Sutton, Steele & Steele dry table.

In this table, the air under constant slight pressure passes up through the pervious top, causing the ore to move or float evenly. The riffle effect in this new form of top is obtained by narrow, tapering, diagonally terminated strips of paper upon the under side of the muslin top. These impervious strips of paper cause a series of dead lines, corresponding to the position of the riffles, which present no unevenness of the surface, do not upset or destroy the stratification of mineral, and yet the slight retarding is sufficient to give all the separating effect of riffles so that when the table is in operation, it has exactly the appearance of a riffled table, but when the table is stopped, the entire covering of ore is in stratification, and with the streaks of separated metals. So nearly perfect is the action of this table that carbonates of lead and copper are saved satisfactorily, even the azurite and malachite separating into blue and green streaks.

The accompanying diagram shows the great capacity—44 tons per day on coarser sizes, down to 15 tons on fine dust. The almost incredible saving shown is undoubtedly assisted by the degree of sizing, but in all cases, the separations are much sharper than upon any form of wet table. The great capacity is due to the greater mobility of material and great speed of table movement.

The interesting point is that finally, upon a dry concentrating table, is found the ideal form of riffled top, the riffles being below a smooth and unobstructed deck.

In the accompanying sketch, Fig. 1, *A* is the pervious cloth top; *B B*, impervious paper strips; *C C*, supporting ribs; *D*, bar, or open cloth to support paper strips. The table upon which the diagram, Fig. 2, is based is given here.

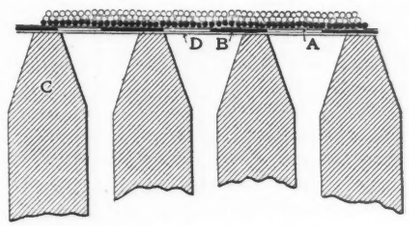


FIG. 1. SECTION OF RIFFLES

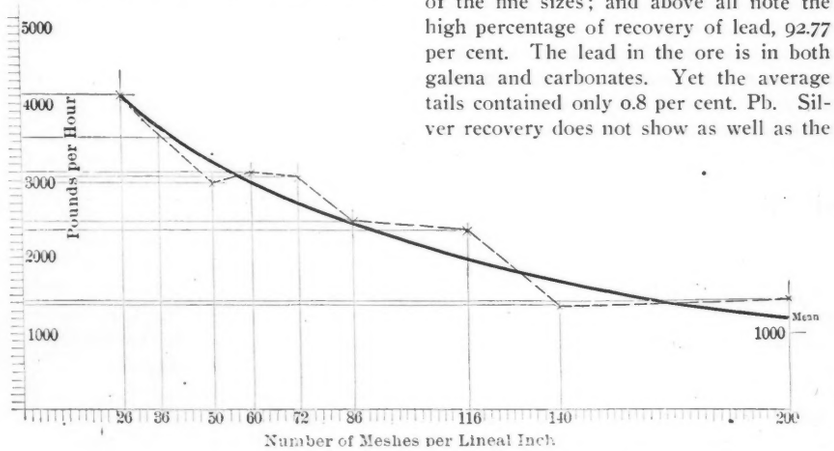


FIG. 2. EFFICIENCY DIAGRAM

TABLE II.

No. Assays.	Mesh.	Weight, Concentrates.	Pb. Assay, Concentrates. Per Cent.	Pb. Content, Concentrates.	Lead, Per Cent. Saving.	Weight, Heads.	Pb. Assay, Heads. Per Cent.	Pb. Content, Heads. Lb.	Per Cent. Weight, Heads.
18	26	23,946	47.96	11,487	92.08	181,944	6.85	12,475	47.54
12	36	7,886	59.98	4,730	94.79	54,972	9.07	4,990	14.35
10	50	8,157	60.61	4,944	93.10	49,709	10.68	5,310	13.00
8	62	4,794	65.25	3,128	94.60	24,341	13.54	3,298	6.35
8	72	3,658	66.35	2,417	96.68	17,678	14.14	2,500	4 62
7	86	3,007	63.48	1,909	94.50	15,150	13.33	2,022	3.95
9	116	3,935	63.40	2,494	94.10	17,743	14.82	2,630	4.64
6	140	3,159	58.46	1,847	93.28	11,021	18.05	1,980	2.88
6	173	2,817	62.58	1 763	79.45	10,218	21.71	2,219	2.67
84		61,359	56.58	34,720	92.77	382,776	9.77	37,424	100.0

TABLE I.

Mesh.	Lb. Cons.	Lb. Heads.	Time, Min.	Cons. per Hour.	Heads per Hour.
26	12,896	89,955	1,315	588	4,104
36	3,345	23,715	400	502	3,561
50	3,128	17,278	350	536	2,963
62	2,615	13,119	265	615	3,087
72	2,827	14,213	280	607	3,050
86	1,883	10,157	250	452	2,441
116	2,069	9,643	245	506	2,361
140	1,706	6,623	290	253	1,371
200	968	3,808	160	364	1,432
Totals..	31,437	188,511	3,555		

3,555 min. = 59.25 hr.

$\frac{31,437}{59.25}$ = 530 lb. cons. per hr. (all sizes mixed).

$\frac{188,511}{59.25}$ = 3,181 lb. heads per hr. (all sizes mixed).

Total average Pb. loss in tails, 0.8 per cent.

Table II, from the Cactus Ore Company, Eureka, Utah, is a tabulated statement made from a total of 84 assays made while a carload of concentrates was being turned out on a Sutton, Steele & Steele dry concentrating table from ore sized in a Keedy dry ore sizer. The memorandum is as follows: "Total concentrates 61,359 lb. Average assay of heads 9.77 per cent. Pb. Weight of heads 382,776 lb. Tails difference. Average assay of tails 0.8 per cent. Pb. Average assay of concentrates 56.58 per cent. Pb. Average recovery of lead contained in heads 92.77 per cent. Note tendency to concentrate by sizing; 26-mesh stock assayed 6.85 Pb. while 173 mesh shows 21.71 per cent. Pb. Note also the course of grinding. System of grinding granulates the ore—it does not tend greatly to sliming. Note the small percentage of the fine sizes; and above all note the high percentage of recovery of lead, 92.77 per cent. The lead in the ore is in both galena and carbonates. Yet the average tails contained only 0.8 per cent. Pb. Silver recovery does not show as well as the lead owing to the fact that the silver in the ore is not all combined with the lead. It is largely in chloride form showing in the cleavage of the quartz. Also some free silver finely disseminated in the quartz. The saving of the silver was about 70 per cent. of the total content.

During 1906, the North Wales lead mines produced 8347 tons of dressed ore valued at £102,197, as compared with 8249 tons valued at £76,910 during 1905, the rise in the value reflecting the increase in the market price of the metal. The chief increase in the output was in the Montgomery district where it rose from 752 tons to 1537 tons. On the other hand, the product of the Flint and Denbigh mines decreased from 6911 tons to 6201 tons.

Influence of Iron in Copper Electrolysis

By E. L. Larison *

The metal most frequently associated with copper is iron, and the separation of these two is the commonest which the analyst must make. Qualitatively the separation presents no difficulties by electrolysis; that is, in depositing copper by an electric current there is no danger of contamination by iron, and the separation is complete. An examination and comparison of current densities, voltages, and time required for the deposition of a given quantity of copper in the presence of varying amounts of iron, shows that quantitatively its influence is a considerable matter.

The following results show the retardation of varying amounts of iron. The materials used were $CuSO_4 - 5H_2O$ and $FeSO_4 - 7H_2O$. The iron was oxidized by nitric acid in each case and after neutralization with NH_4OH, 2 c.c. each nitric and sulphuric acids were added.

No.	$CuSO_4$, Grams.	$FeSO_4$, Grams.	Amp.	V.	Time, Minutes.	Cu, Grams.
1.	0.5	....	0.7	3.1-3.5	15	0.0870
2.	0.5	0.25	0.8	3.3	15	0.0822
3.	0.5	0.50	0.75-0.8	2.9-3.0	15	0.0766

The following on 1-gram samples of two grades of matte and a heavy sulphide ore:

No.	Material.	Fe, Per Cent.	Cu, Per Cent.	Amp.	V.	Time, Minutes.
1.	Matte.	25.23	47.07	1.65	3.0	100
2.	Matte.	46.38	19.65	1.70	3.2	85
3.	Ore.	33.43	2.45	1.35	3.5	54

These latter results were obtained with rather high current density and using a stirrer. They show the effect of high iron percentages in practical daily determinations. It is striking to note that in No. 1 0.4707 gram Cu was deposited in a little less than double the time required for about 1/20 of that amount in No. 3.

It is usual and almost essential to effect decomposition, and solution of copper, by means of nitric acid. The iron present will always exist then as a ferric salt when the solution is put on the battery. The following results, obtained with salts, show quite clearly that it is iron in the ferric state that retards the operation.

No. 1 contained no iron. No. 2 contained iron in the ferrous condition. In No. 3 the iron was oxidized to the ferric state by nitric acid. After making neutral with ammonia, 2 c.c. each nitric and sulphuric acids was added to have conditions the same as in practice. This small amount of nitric acid added to a cold solution of volume 200 c.c. can exercise scarcely any oxidizing action.

No.	$CuSO_4$, Gram.	$FeSO_4$, Gram.	Amp.	V.	Time, Minutes.
1.	1	..	1.3	3.5	60
2.	1	1	1.3	3.1	65
3.	1	1	1.3	2.9	90

The current apparently must reduce a certain amount of the ferric iron to the ferrous condition before all the copper can be deposited. A solution going on the battery usually contains at the start $CuSO_4$, $(Fe)_2(SO_4)_3$, H_2O, H_2SO_4, HNO_3 and possibly small amounts of other salts which can usually be neglected.

At the cathode copper is deposited and hydrogen set free. The solution is very ready to use hydrogen however, and few bubbles of it can be seen. It probably reacts mostly with the ferric sulphate and slightly with the nitric acid. Ferric sulphate is reduced to ferrous

$$Fe_2(SO_4)_3 + 2H = 2FeSO_4 + H_2SO_4$$

Nitric acid is reduced to ammonia which is immediately neutralized by the excess of nitric and sulphuric acids.

$$HNO_3 + 8H = NH_4OH + 2H_2O$$

In time this reaction may proceed so far as to make the solution alkaline. Hydrogen bubbles also appear in increasing numbers as the reduction proceeds.

At the anode, in a solution like the above, oxygen is given off freely from the start. It is due both to a decomposition of water by the current, and by the SO_4 ions set free in the breaking up of $CuSO_4$. Very often the anode is slightly covered with manganese or lead oxides.

The process of electrolysis exercises in the main a reducing influence on an electrolyte such as the above. Further reduction, and probably the retardation of the deposition of copper, comes about through some such reaction as the following:

$$Cu + Fe_2(SO_4)_3 = CuSO_4 \times 2FeSO_4$$

That is, copper already deposited or on the point of being deposited is attacked by the ferric sulphate and dissolved, thereby also reducing the ferric to ferrous sulphate. When the process has gone on for a time, the electrolyte becomes so dilute with respect to the ferric sulphate that the last of the copper is able to keep its place upon the cathode. This accounts for the difficulty of, and comparatively great time necessary for, the removal of the last few milligrams of copper from a solution high in iron. When using a stirrer and high currents, a very small reduction in the current density is quickly followed by the re-solution of much of the deposited copper. It seems as if the copper is able to keep its place on the cathode only with a certain electrical, or reducing tension.

A frequent occurrence with solutions high in iron is the formation of a "brown ring" similar to the characteristic test for nitric acid and nitrates. This indicates re-oxidation of the ferrous salt by the nitric acid and usually means a slow deposition of copper. If the solution be stirred after this brown ring appears a large part of the deposited copper will be quickly dissolved.

In order to determine the extent of reduction, whether there is any uniformity about it, and the effect of stirring, the following figures were obtained. The solution in each case contained 2 c.c. each nitric and sulphuric acids and the volume was 200 c.c. The amount of iron reduced was determined by titration with permanganate, after all copper was deposited.

Solution Stirred.

No.	Material.	Fe, Per Cent.	Fe, Red.	Fe, Rem.	Amp.	V.	Time, Minutes.
1.	Matte.	25.23	19.39	5.84	1.65	3.0	100
2.	Matte.	46.38	40.13	6.25	1.70	3.2	85
3.	Ore.	33.43	26.62	6.81	1.35	3.5	54
4.	0.2g.Fe.		0.15g	0.05g	0.1	2.6	100

Solution Stationary.

No.	Material.	Fe, Per Cent.	Fe, Red.	Fe, Rem.	Amp.	V.	Time. Hr.	Time. M.
1.	Matte.	25.23	16.10	9.13	0.3	2.4	13	
2.	Matte.	46.38	37.5	8.88	0.3	2.5	10	45
3.	Ore.	33.43	23.49	9.94	0.3	2.5	5	45
4.	0.2g Fe		0.057g	0.143g	0.1	2.5		100

In each of these cases only a small part of the iron is not reduced. There seems to be a fairly uniform amount remaining too, at least, in each group taken separately. In the stirred solutions from 5 to 6 per cent. of the iron remains in the ferric state, while if they are left stationary from 9 to 10 per cent. remains. This reduction cannot be considered as merely incidental, because of the very obvious retardation of copper deposition, also because of the uniformity of the reduction. It is to be expected that it would have to proceed farther in the stirred solution for the reason that a solvent is always more effective if circulated.

Circulation of the solution not only allows the use of higher current densities and thereby more rapid work, but it gives the current greater efficiency as the above results show. Less ampere-hours are necessary to deposit a given amount of copper if a solution is stirred, than if it is stationary. This is due not only to the fact that the solution is kept uniform and the copper deposits more rapidly, but also the reducing effect on the iron is much greater and consequently the dissolving power of the solution is decreased much sooner. The retardation when using a stirrer, while distinctly noticeable, is not so important as when the solution is stationary. A very rapid method of reducing iron before applying the current would save time. The ordinary methods

*Chemist, Ducktown Sulphur, Copper and Iron Company, Isabella, Tennessee.

of reduction all have objections or take too much time to be of advantage.

The influences of iron in copper electrolysis may be summed up as follows:

1. High percentages of iron in the ferric condition materially retard copper deposition. Ferrous salts have little or no effect.

2. The effect of the electric current in the usual solution is to reduce ferric salts to ferrous. This reduction must proceed to a certain point before all the copper will remain on the cathode. This point is about the same whatever be the iron and copper percentages, but it varies some as the solution is circulated or stationary.

3. Rapid circulation of the solution by a stirrer permits the use of high current densities without sponging, thereby making deposition faster. The current also is more efficient for both depositing copper and reducing iron.

Mining in Western Australia

In a recent speech the Premier of this State said that the mining industry of the State employs over 20,000 men, of whom, on Dec. 31 last, 15,111 were employed in mines, and the balance in digging and prospecting. The Government has given every possible assistance to prospecting parties, of which during last year it fitted out no fewer than 22. The high prices ruling for copper and tin have stimulated the search for those minerals. From Kimberley to Phillips river copper deposits are being prospected and opened up. The copper production for the first three months of 1907 at Phillips river alone is valued at £20,989, while for the whole of 1906 it was valued at £25,270. In the Mt. Morgans district the Anaconda mine, for the first three months of 1907, reported copper ore to the value of £18,454, while the total reported production for 1906 amounted to £21,934. Mining has never been more prosperous in the history of the State. During the first four months of this year the State produced copper to the value of £86,735, and tin to the value of £59,992. The output of coal has slightly increased. During the coming year it is proposed to construct water works for the mining and domestic supply of Leonora and district, and to make an ample supply of salt water available for the Norseman district, and at the same time deliver fresh water stores in the recently constructed tank for boiler purposes. An effort will also be made to keep pace with, and possibly go ahead of, the prospector, and sink wells, cut tracks, and generally open up the country, particularly in the far northern districts.

A great objection to certain water-gas producers is that when steam is turned on it quickly cools the red-hot coke, but by blowing air in with the steam in the right proportions this trouble is obviated.

Values in Gold Sludge Dust

A few particulars concerning the working of a device for saving values lost by dusting during the preparation of zinc-box precipitates for smelting are given by the *Journal of Mines of Western Australia* (June 29, 1907). A hood, suction fan and mechanical dust-collector system was installed in the clean-up room at the Great Boulder Perseverance mine at a cost of $300 and subsequently operated as required during the period from Oct. 1, 1906, to June 8, 1907. All screening and mixing of sludges was done under a pyramidal-shaped hood, fitted with side curtains reaching to within a few inches of the floor level. By means of the fan the dust was drawn upward, sucked away through an opening in the top of the hood, and delivered to the dust collector, from which the recovered material was removed at the end of the period indicated. The quantity of dust recovered was 16.3 lb., containing 29.756 oz. of fine gold valued at $615. The total weight of sludge handled during the eight months' period was 20,784 lb., and from this 46,790 oz. of fine gold were recovered by smelting. The recovery of gold from the dust, though insignificant when compared with the total values handled, justified the cost of installation of the system.

South African Quicksilver Deposits

According to *South African Mines* (July 13, 1907) there are fairly extensive quicksilver deposits in the Transvaal, which promise to be capable of supplying the needs of the gold-mining interests with whatever amount of quicksilver they require. Quicksilver claims in the eastern Transvaal and near Hector Spruit on the Delagoa Bay line, have been worked to a small extent. The most promising deposits, however, consist of two blocks of claims belonging to the Campbells Mercury, Ltd., and are located about 18 miles from Hector Spruit. On the northern block of claims is a creek in which native quicksilver has been found.

The native metal assays three to four ounces gold and two days' sluicing yielded 40 lb. of quicksilver; but it is not stated from how much material this came. There are really two creeks which contain native quicksilver and at their intersection the amount present is greatest. This occurrence of native metal in such quantities is unique and will doubtless result in considerable discussion and investigation in mining and geological circles.

The position of Russia as the leading producer of manganese ores is now seriously threatened by the extensive development of deposits of manganese ore in India.

The Detection of Mercury in Explosives*

By W. A. Hargreaves and W. T. Rowe

The use of a very small quantity of mercuric chloride (one part in 200,000) in explosives is sufficient to mask the qualities of the explosive when subjected to the Abel heat test, and will increase the time of reaction many minutes. The authors have devised a method of demonstrating the presence of merucuric adulterants by extracting the mercury in metallic condition and use their process in the government laboratory of South Australia.

One hundred grams of the substance to be tested is ground up in a mortar with an equal amount of purified French chalk, the grinding being done in small quantities at a time. The mixture is put in a flask in a water oven and attached by glass tubing passing out of the oven to a Woolff's flask or other absorption apparatus containing 50 c.c. of water, with 0.75 c.c. of strong sulphuric acid. Aspiration is applied gently to the whole system, while the flask is heated to the temperature of boiling water. In about two hours' time the mercuric chloride will be transferred to the dilute sulphuric-acid solution in the absorption apparatus.

Electrolysis of the solution with a gold cathode and a platinum anode, using a current of about 0.5 amp. at 2 volts, will yield an amalgam on the cathode which may be weighed and the experiment made quantitative where the quantity of mercury is large. With the small quantities usually present, no decided deposit will be visible on the gold. The gold foil is removed from the electrolyte while the current is still running, washed in distilled water and alcohol, dried, rolled into a cornet and inserted into a small glass sealed tube, 6 mm. in diameter and about 35 mm. long, which has its expanded mouth ground flat to fit snugly against a microscope glass slide. The glass tube is fitted in the hole in a stout brass plate and then very gently heated, after a dry microscope slide has been placed on the top. A sublimate will be obtained on the glass slide, and care must be taken not to raise the temperature sufficiently to re-volatilize this. The slide on being examined under the microscope (about 250 diameters) by transmitted and reflected light will show globules of metallic mercury of large or small size, according to the skill with which the heating has been conducted. If the globules are very small they may not be readily recognized as mercury, but under the conditions of the method any small opaque dots, showing brilliant specks by reflected light, must be mercury, and a repetition of the test willl probably show larger globules.

Journ. Soc. Chem. Ind., July 31, 1907.

The Lordsburg Mining Region New Mexico

By Fayette A. Jones*

Of the many older mining regions of the Southwest that have remained quiescent for a number of years, by reason of the greater attractions at Cripple Creek, and in Alaska and Nevada, few possess as much interest in the history of pioneer mining as is centered about the old camp of Shakespear, now included in the region of Lordsburg, New Mexico.

Geography and Environs

The Lordsburg mining region lies immediately south of the village of Lordsburg and embraces the low, short Pyramid range of mountains. This mountain range extends approximately 18 miles in a north and south direction and is about 8 miles across from east to west.

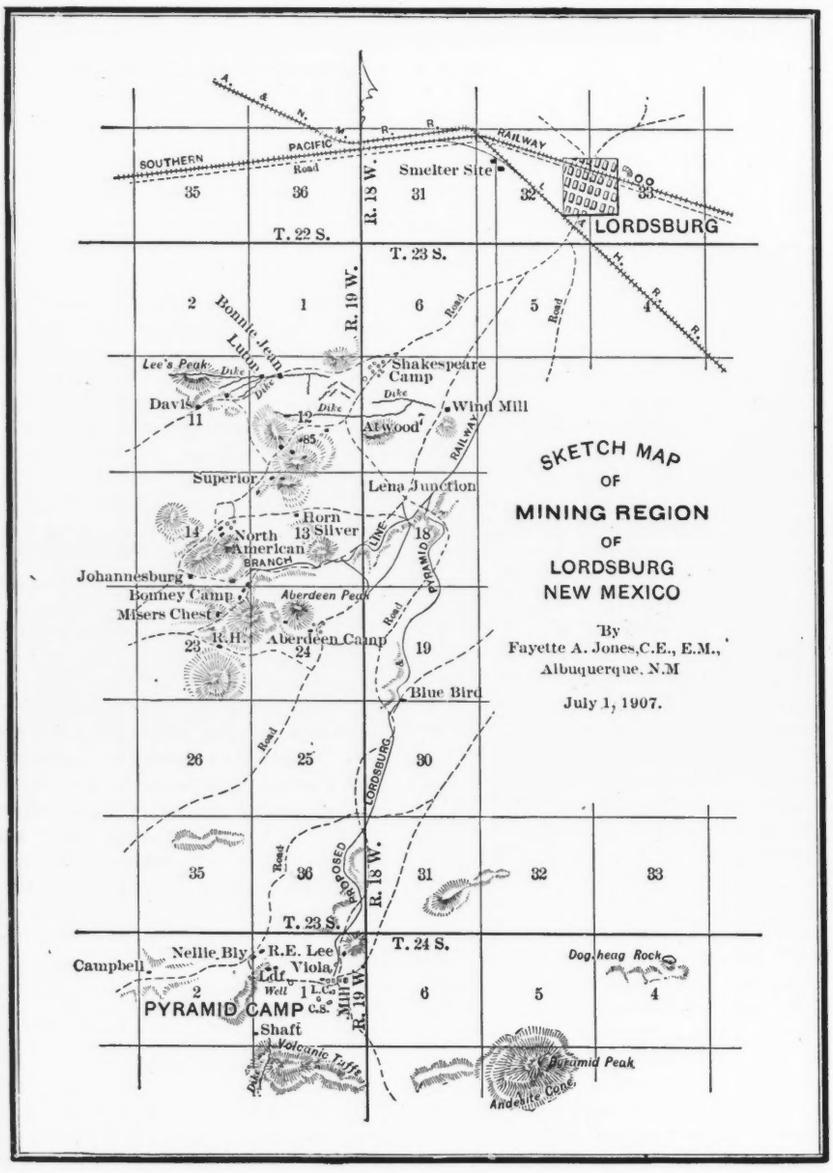
This region has better transportation facilities than is found in most mining districts. It lies between the main line of the Southern Pacific railway on the north and the El Paso & Southwestern system on the south; the Lordsburg & Hatchita railroad connects with the other lines at Lordsburg and Hatchita. This latter branch extends along the east side of the district and terminates in the copper camps of Clifton and Morenci to the northwest. The village of Lordsburg is a division point of the Southern Pacific railway where extensive machine shops are located, and contains about 1000 inhabitants. The general elevation of the region is approximately 4600 ft. Most of the district is accessible to vehicles, being traversed by a system of good roads.

History

This region was first invaded by prospectors about 1870. These consisted of the overflow of the more adventurous characters from the gold camps of Elizabethtown and Pinos Altos to the north, and from the silver mines at Chloride Flat, near Silver City, New Mexico. These pioneers suffered many hardships from lack of water and from the continued harassing of the Apache Indians. A few years later a stampede for this new "Eldorado" took place.

Prominent among the earlier arrivals was a man by the name of Ralston, who founded the old camp of Ralston, afterward called Shakespeare (see sketch map). Ralston was a man of much energy, wealth and influence, being a banker in San Francisco at the time. Later on financial disaster overtook his mining ventures and he was supposed to have committed suicide by drowning, since his body was found in San Francisco bay. Most all the substantial development of the district in the early days was done by Ralston. Unscrupulous persons at the time of the first excitement circulated stories that the great quartz dikes, that traverse the district in the vicinity of Shakespeare, were almost solid masses of gold and silver. On top of this extraordinary announcement came the report of the discovery of diamonds near Lees peak. In an incredibly short time the original hamlet of Ralston had grown to be a city of 3000 inhabitants, and it assumed the name of Shakespeare. As soon as the falsity of the reports became known, the exodus of fortune hunters from this camp was more rapid than their ingress. The period of greatest activity was in the year 1880, at the time when the construction of the Southern Pacific railroad had reached Lordsburg.

In the latter part of the seventies an attempt was made to smelt the ores of the district on the ground, as evidenced by an old slag dump a short distance north of Shakespeare. During the year 1902 a California stock-jobbing concern erected a small water-jacket furnace on the north side of the Southern Pacific tracks at Lordsburg, ostensibly to smelt the ores of the region. The construction of this plant was simply a ruse to fleece the public, as it was blown in but once. In 1883, what is known as the Leidendorf mill was erected at a cost of $125,000, to treat the silver ores from the old Viola (now Venus) mine. This plant is a 20-stamp pan-amalgamation mill, and ran spasmodically, with more or less success, until it closed down indefinitely in 1893. A small Woodbury concentrating plant with one 3-ft. Huntington mill was erected in 1894. to treat the low-grade copper-silver ore of the Robert E. Lee mine; this mill shut down in 1898. Two or three attempts were made at concentrating and milling the ores of the region at various points, but without any apparent success. The last



*Mining engineer and economic geologist, Albuquerque, New Mexico.

and most disastrous of these ill-advised projects was the mill erected in the village of Lordsburg to work the ores from the Lena mine; this plant was completed in the spring of 1902 and ran only a few months.

The Lordsburg region has produced to date from the time of its discovery, approximately $750,000 in silver, copper, gold and lead. Their importance is shown by the above order.

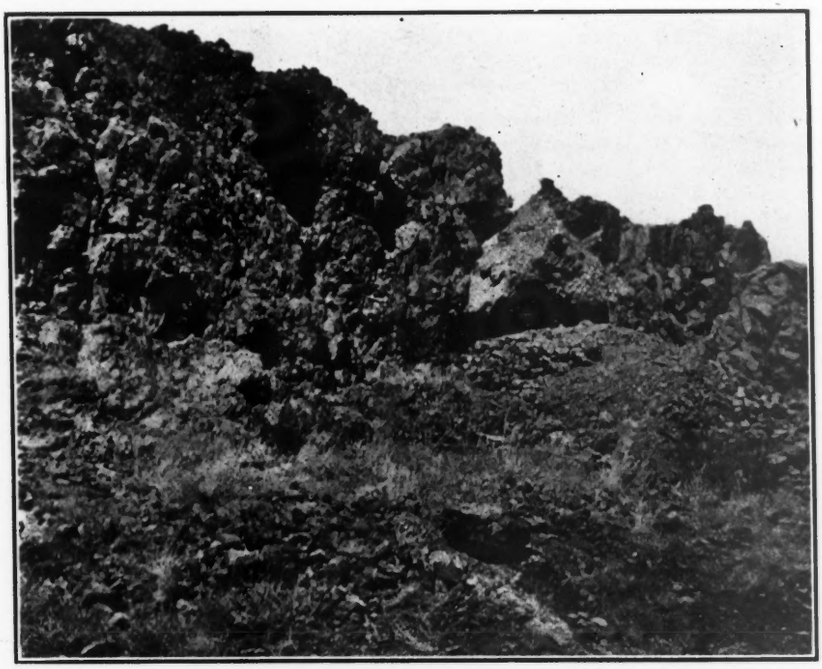
Geology and Ores

The Pyramid range of mountains appears to have had its birth at the close of the Tertiary. The focal point of dynamical energy was centered about Pyramid peak, from which the range of mountains took its name. The principal eruptives forming the chief country rocks of the region are, generally speaking, andesite porphyries, verging into dacite in the north-central part. Hypersthene-andesite seems to be the most prevalent type, and is, at times, chrysolitic in character. Augite-andesite occurs rather more sparingly, oftentimes having a crystalline and granular texture, passing into aphanitic ,and fluidal phases. Andesite breccia, rhyolite tuffs and basalt are other lithologic features existing in certain localities. At the southwest and southeast sides of the range remnants of the upper series of Carboniferous limestone yet remain, having survived the effect of the enormous erosion that has taken place since the region was elevated. This limestone is the only stratified rock observable in the region.

Owing to the great depth of Pleistocene wash and later alluvial deposits in the surrounding valleys, filling up the adjacent primitive lake basins to a depth of several hundred feet, the Pyramid range has necessarily been materially reduced from its original hight. A proof of this statement may be seen in the massive quartz dikes that stand conspicuously above the surface in the vicinity of Shakespeare and also at Lees peak. These dikes are striking in their magnitude and persistence, and are genetically related to the ore deposits of the region, since they are themselves mineralized. Other dikes of a more basic character exist in the central and southern parts of the region. The general strike of all the dikes and veins is confined, generally speaking, to a northeast and southwest direction.

The veins of the region may be divided into two general types: (1). True fissure, as the Eighty-five mine; (2). Sheared or shattered zone, as the Nellie Bly and Robert E. Lee.

The mineralized vein filling of the first type is chiefly quartz; and in some instances there are brecciated aggregations of the original quartz filling and wall-rock, recemented with silica, indicating a subsequent disturbance by the reopening and additional filling in of the original fissure.



QUARTZ DIKE CROPPING

In the locality of the Nellie Bly, a lateral crushing and subsequent movement has taken place along the principal fault-planes, the movement being toward the southwest. Mineralization in this instance permeates the altered andesite rock, indicating that metasomatic action has taken place.

Ascending magmatic vapors and waters, following lines of least resistance, have doubtless played the most important role in the distribution of the primary types of mineral deposit. Subsequent action of descending oxygenated waters has altered the primary sulphides near the surface and re-deposited the metallic compounds at greater depths, forming zones of secondary enrichment, as found in almost every instance in the deposits throughout the region. Closer study of these deposits tends to the belief that the ores have been dissolved and re-deposited, perhaps more than once, before reaching their present position, thus receding in direct ratio as encroachment by erosion advances.

This process is unquestionably still in operation. A noticeable and interesting feature occurring along and near the shear zones, in the vicinity of Pyramid camp, is the epidotization of the andesites, indicating an advance in their alteration.

It might be remarked that the Lordsburg mining region is conspicuous in its surface features of mineralization. No deep mining has ever been done. The uniformly favorable results attending the deeper workings, at something like 300 ft., indicate that the ultimate success of the region would lie in deep mining. A further favorable consideration in this section, rellative to its future possibilities in copper, is that it lies well inside of the great copper belt of the Southwest.

Beginning at the north end of the district and passing to the south longitudinally with the range, the occcurrence of the ores encountered in the various sections, taken in the order of their importance, are: (1). Copper, silver and gold (Shakespeare section; (2) Lead, silver and copper (Aberdeen section); (3). Silver and copper (Pyramid section); (4). Silver and lead (Silver Tree section).

The following is a list of minerals, so far as is now known, that exist in the Lordsburg mining region:

Silver Ores—Argentite, ceragyrite, pyrargyrite(?), stephanite, sternbergite, proustite(?), embolite(?), and native silver (sparingly).

Copper Ores—Chalcopyrite, bornite, malachite, azurite, chalcosite, covellite, tetrahedrite, melaconite, cuprite, chrysocolla and native copper (sparingly).

Lead Ores—Galena and cerussite.

Gold Ores—Free gold, and gold in associated ores.

Miscellaneous minerals — Pyrite, hematite (specular iron, brown and red oxide), rhodochrosite, psilomelane, sphalerite and smithsonite (sparingly).

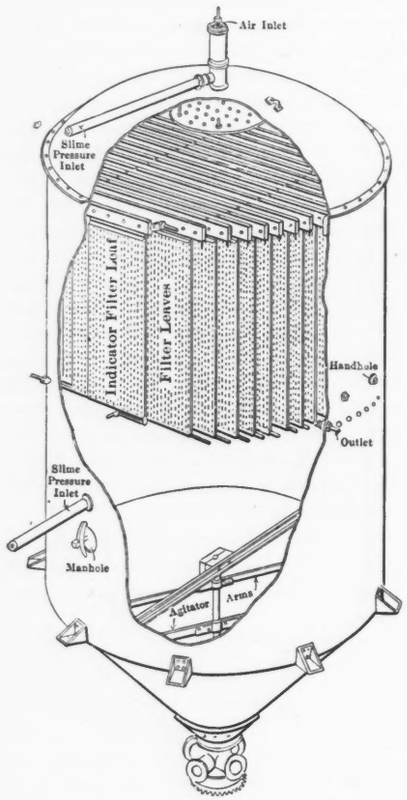
Non-metallics in Vein Fillings—Quartz, calcspar, baryta, fluorspar, talc and clay.

What is declared to be the oldest pig of lead in the State of Missouri is in possession of the Granby Mining and Smelting Company, at its smelter in Granby, Mo. It was smelted in 1860 by Blow & Kennett, who began the operation of a lead smelter in Granby in 1856. The bar is 19 in. long, 4½ in. wide at its widest side, 1¼ in. at its narrowest, and 4 in. thick. It weighs 80 lb., and shows the brand almost effaced by the marks of time.

The Blaisdell Pressure Filter

Recently a pressure filter has been devised by the Blaisdell Company of Los Angeles, Cal., designed to supersede the present vacuum systems of separating slimes from water and extracting cyanide solution from pulp. Reference to the accompanying figure will indicate the essential features of the apparatus. A steel cylinder contains a series of filter leaves, the number of which is varied according to the capacity desired; connections are provided for vacuum and pressure pumps and for slime, water and solution.

The filter leaf consists of a series of non-porous columns provided with drainage grooves, on each side of which is a covering of canvas large enough to overlap the entire frame, and stitched so that no leakage can take place to the interior of the leaf. Charging tanks holding slime, wash water and wash cyanide solution empty into the filter by gravity and receiving tanks below the cylinder take the discharge. In operation the slime from the agitator vats is forced in to the pressure cylinder, where the clear solution passes into the filter leaves and out through the discharge pipes to gold-solution tanks for precipitation, the slime remaining as a cake on the outside of the filter leaves. When the cake is about 2 in. thick the flow of pulp is cut off and the surplus remaining in the cylinder is returned to the storage tank. Wash solution is then introduced and forced through the cake, surplus solution being returned to its tank when washing is complete.



BLAISDELL PRESSURE FILTER

While these transfers of liquids are taking place, a partial vacuum is kept within the leaves, so as to make the cake adhere, and when washing is over, air or water under pressure supersedes the vacuum and causes the cake to drop off and be discharged through the bottom of the cylinder.

One of the filter leaves is supported by a weighing device, which shows the progress of formation of the cake, and an indicator connects with an electric bell when the proper thickness is reached. Seven different sizes of filter are constructed, with rated capacities varying from 12 to 500 tons of dry slime per 24 hours.

Hydraulically Operated Copper Converter

The converter equipment now being installed by the Mammoth Copper Company, Kennet, Cal., consists of two hydraulically operated stands and eight shells, 96 in. in diameter and 150 in. long, built by the Allis-Chalmers Company. The shells and the stands are of the type recently described and illustrated in the JOURNAL, except that the tilting of the vessel is performed by hydraulic means. Each stand is provided with a pressure cylinder 18 in. in diameter having a stroke of 7 ft., sufficient to rotate the shell through 180 deg. The piston is fitted with four metallic packing rings. The upper end of the cylinder is secured to a flange on the bottom of an A frame and at each end are bolted independent heads. The upper head is fitted with a brass neck bushing and a stuffing box. With this arrangement it is possible to take the piston and rod out through the top. The driving stand is a cast-iron box-section A frame with bearing surface at base, arranged for securing to foundation with four 1½-inch bolts. The upper portion of the driving frame is designed to receive the turning mechanism, which consists of a cast-steel rack and shrouded spur gear. The rack is connected at the lower end to the piston, and opposite to center line of shaft at the upper end a guide is arranged, with a sliding surface. The gear is keyed to a hollow steel shaft which has fitted to its driving end a universal coupling, arranged so that the shells will rest true on the rollers. On the head of the shell is a groove, which matches a tongue on the universal drive; the main gear is turned around until the tongue is vertical, when the shell is placed, and there is clearance enough on each side of the tongue for keys. There is a sheet-steel housing for each frame, which covers the driving gear to prevent dirt from getting into the operating parts.

"Depreciation of Gold" *

BY J. PEASE NORTON†

The necessity of a thorough investigation by a Congressional Commission covering the economic conditions governing the production of gold, the cost of production, the probable output of gold for the next decade, the supplies of money as well as the question of adequate currency supplies, and the course of wholesale and retail prices with recommendations as to remedial legislation, is again emphasized by the extraordinary conditions now prevailing throughout the business world.

PRESENT CONDITIONS

The extraordinary conditions prevailing at the present time—on the one hand violently declining security prices, time discount rates at record figures, political attacks threatening every form of business activity through its effects upon that subtile element which for a better name has been termed in its disastrous aspect "lack of confidence;" and on the other hand, a continued advance, but slightly checked as yet, in commodity prices, an increase in the cost of living which is becoming grievous to the laboring and middle classes, showing its results in strikes and discontent, and above all, the development of a radical, impatient spirit among the populations of the earth—all these characteristics of an era of great inflation. In nearly all periods of inflation arising from progressive changes in one direction of the standard of value, whether gold or silver, these characteristics have been marked.

The true condition of affairs was perhaps first emphasized by Robert J. Goodbody, but the great importance of the depreciation of gold failed to impress the business mind until the publication of a series of articles in *Moody's Magazine*, which were afterward edited for a symposium under the title of "The Gold Supply and Prosperity" by Byron Holt. In 1905, Frank A. Vanderlip wrote, "When we remember that in 1885, the production of gold was but $115,000,000; when we remember, further, that the entire monetary stock in the world is about $5,700,000,000, we can calculate that the output for the mines in the next 14 years promises to equal a total as great as the present monetary stock of gold. These figures are startling. They perhaps suggest the possibility of a disturbance in values." How seriously values have been disturbed, the business world now recognizes. Yet, as Mr. Holt succinctly stattes: "It has been seen that a rapidly increasing output and supply of gold does, for a time at least, give an artificial stimulus to indus-

*Slightly condensed from an article entitled "Necessity of a Congressional Commission on Gold Depreciation," in *Moody's Magazine*, September, 1907.

†Assistant professor of political economy, Yale University, New Haven, Conn.

try that has the appearance of genuine prosperity. That it is not real and wholesome, because not founded on a just distribution of products, has been shown. In fact the prosperity superinduced by rising prices has many dark sides to it at all times. Some of these are: speculation in stocks, commodities and real estate; increased cost of production and of living; labor troubles; general unrest; inability of workers to purchase, at the high prices asked, the total products offered and needed; glutted markets; closed mills; and, if an increase of gold is not always forthcoming, a decline in prices that will result in depression and panic." The phenomena which these financial experts predicted have since developed to some extent. The seriousness of the disturbance and its far reaching effects have not yet begun to be appreciated.

Weak Points in the Situation

If the country today is standing on the verge of one of the greatest commercial and industrial crises in its history, only by clearly appreciating the extreme gravity of the conditions, can we hope to escape the most disastrous effects. Already, the financial markets are approaching a chaotic state. The stock market, which represents so accurately the prosperity and hope of the investing community, now, with demoralization in the ascendency and hope abandoned, is really not at all the weakest point. Stocks are made for purposes of oscillation. Bonds and land mortgages are not. A 60 per cent. decrease in the value of shares is borne with more or less fortitude by the holders. But when bonds and land mortgages decline 30 per cent., it generally means bankruptcy for the corporation. The weak points in the situation are five.

The real estate boom has collapsed in New York and the vicinity. This collapse will spread throughout the country. There is no short selling in real estate speculation. Millions of dollars will be lost in the contraction which will follow. Many banks of the $50,000 class in the West which loan indirectly on mortgages will necessarily go to the wall. Nothing can check the real estate collapse. It must be allowed to take its course.

Next to real estate is the situation of the underwriting syndicates. Hundreds of millions of dollars of bonds are held under underwriting agreements by the banks and by the officers of the banks, and the unpleasant feature is that many of these syndicates have been twice extended. The conditions of probable profit prevailing two and three years ago, when these syndicates were formed, were far different from the conditions prevailing today. The ratio of capitalization was then in many cases 150 per cent. of a cost or value of property for bonds alone. Bonds could at that time be sold to the insurance companies and to the banks. It is doubtful now whether the bonds, especially of the specialties, can be marketed without reorganization of the corporations before selling. The reasons for the extraordinary conditions are two. (1) The legal conditions have changed within two years. Often 40 per cent. of the value has disappeared because the Government frowns upon corrupt corporation practice. The alliance between railroads and industrial concerns in the old days made many of the industrial railroads extremely prosperous. The firm course taken by the Government destroys the value for all time. Consequently a large value which was then reckoned upon has been eliminated. The Government is, of course, to be congratulated upon enforcing the laws, and it is possible that the wealth destroyed will be many times returned in the advantages hitherto denied competing companies, the whole resulting in a great gain for the consumer. But this does not help the predicament of those unfortunate persons who are tied hand and foot by the underwriting contracts. They must face their losses, losses which are growing continually greater with the lapse of time. For in addition to the changes in the legal condition, the investors have learned to avoid bonds as an investment. The depreciation of gold has made bonds a very disastrous form of investment.

Losses of Investors

For the investor, who purchased at par for $1000 a five-year bond paying 4 per cent. five years ago, now finds that the $1000 which is returned to him will only purchase $600 worth of commodities, on account of the rise in prices due to the fall in the value of gold. It is probable that this condition will prevail for several years. How extreme are the losses of those who possess bonds few even now fully realize. A man who purchased at 111 a New York Central 3½ per cent. bond now finds at the end of a few years his bond worth only 90 in the market, a loss in dollars of nearly 25 per cent. In addition to the loss, $90 will only purchase now what $55 would when he purchased at 111. As a result, he has lost, measured in purchasing power, one-half of his total capital. Few investments in stocks would show a worse result. What is true of New York Central 3½'s is true of practically the entire bond market, and this applies especially to the specialties such as coal, iron and the industrial properties.

In addition to the plight of the underwriting syndicates, banking conditions are notoriously weak in the United States. At New York, the bank statements have ruled for this time of year the weakest in 16 years, with the exception of 1893, the crisis year. Moreover, time discount notes are nearly the highest of record at this season of the year.

The rate of foreign exchange continues to rule high, and any fall in discount rates at New York is immediately reflected by every exchange rate, resulting in gold exports, thereby holding time discount rates at a high level. In 1903, a parallel year, the foreign exchange rate ruled high until November, and even then fell only to $4.84½ per pound sterling.

Credit Markets of the World

Throughout the world, the credit markets are greatly strained. Already financial difficulties have arisen in Egypt, and more recently in Japan. The continually occurring new low records for British consols indicate not only the credit strain, but also the tremendous demand for more capital at high rates. On account of the intimate connection of the world's financial markets, one danger which confronts the United States situation is that some financial accident will occur at one of the financial centers abroad, precipitating disturbances at many markets and spreading to the United States.

An historical parallel remarked by *Moody's Magazine* to the present situation is to be found in 1857. Fifty years ago the large increases in gold production in 1849 provoked a period of inflation, over-speculation, and severe credit strains, finally culminating in the great crisis of 1857, which commenced in the last two weeks of August in that year. Dating the present boom from 1899, eight years have passed without a very serious trade reaction.

Possible Results

When we consider that the alarming conditions prevailing are such as are common in periods of inflation caused by derangement of the standard of value; that we stand upon the threshold of a political election with the nominations of presidential candidates less than nine months remote; that a spirit of unrest, social disturbance and class discontent is rampant in the land, the mere possibility of thousands of men out of work in our cities during the next eighteen months contributing to the growth of the radical spirit, such as is apt to occur in times of great crises, is not to be captiously ignored. We should endeavor to correct the fundamental causes accountable for these conditions.

Minerals in Uruguay

Uruguay is said to be rich in minerals. So far this source of wealth has been almost entirely neglected. With the exception of granite quarries in various parts of the country and four gold mines at Cuñapirú, in the department of Rivera, the mineral deposits have not been worked. In the past year, however, according to a recent consular report, great interest has been manifested by mining men in the possibilities of various goldfields. Several mining engineers and prospectors from South Africa and elsewhere have reported on the prospects.

Concrete Overcasts in Coal Mines

Use of Overcasts in Ventilating Coal Mines. Methods of Construction, and Advantages of Concrete and Steel over Wood for the Work

BY JOHN H. HAERTTER*

No other subject in mining affords so much opportunity in the continued efforts to prevent the loss of life and property as does the efficient ventilation of a gaseous mine, and probably no other subject receives so much thought and attention from the mine foreman, who, besides all the other duties required of him, shoulders the responsibility of maintaining a good ventilating system which will at all times amply provide for the health and safety of those under his care, and who always bears in mind the value of the property intrusted to him for proper development and the best possible returns. The destruction of life and property accompanying a mine explosion or fire is so great, and has been of such frequent occurrence, that the subject of ventilation in modern mining receives detailed consideration on the part of mining officials, and we find them promptly taking every chance to improve the ventilation, however slight the improvement may appear. The subject is now also considered along the line of possibilities, or what might happen, and we note on all sides the precautions being taken in consequence. If mine explosions cannot be entirely prevented, they can at least be reduced in number by improving the ventilating system wherever possible, and then maintaining it by promptly repairing leaky doors and all batteries and stoppings, not overlooking for a moment, however, the care of the ventilating machinery.

Deeper mining is increasing yearly, and in many of the newly opened territories, gas is encountered in larger quantities than it was some years ago when the veins being worked were not so deep and the area of openings was less extensive; consequently a greater circulation is required to sweep away the increased quantities of gas and maintain the necessary safe condition of the mines; it is also essential to have a greater number of splits and for longer distances.

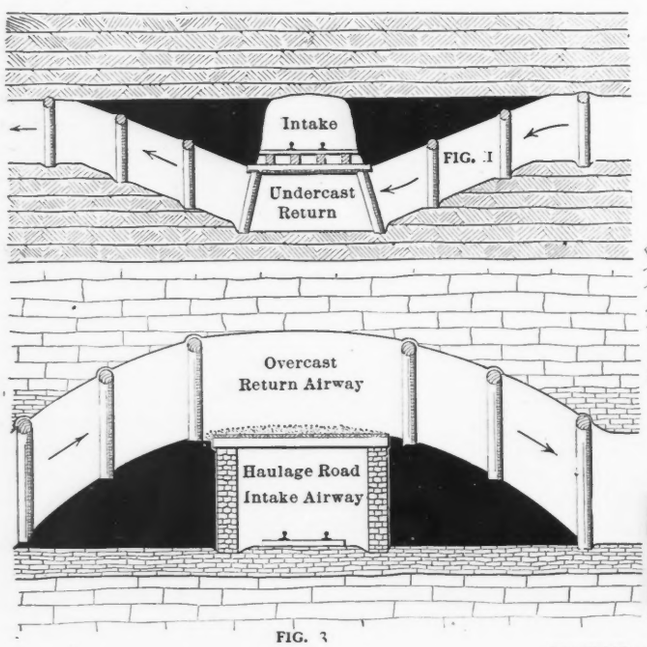


FIG. 1

FIG. 3

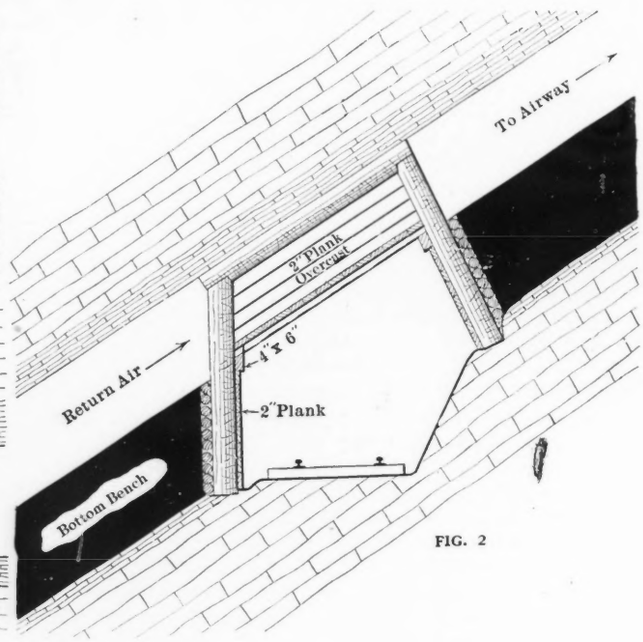


FIG. 2

CONCRETE OVERCASTS

One of the best methods of improving the ventilating current is by splitting, the prime object of which is to ventilate all the different working districts of the mine with fresh air, so as to prevent the dangerous gases collected in one district being carried by the current into another; and to reduce the frictional resistance by reducing the velocity of the ventilating current. For splitting the current the air-bridge or overcast is a necessary adjunct.

Introduction of the Overcast

Like many other improvements in mining devices, the discovery of the air-bridge, as regards the real benefits derived from its use, was accidental, while its advent into mine ventilation as a component part was brought about by a change in the methods of working the coal in the north of England. Briefly told, in the early part of the present century, John Buddle conceived the idea of opening out his coal on the present panel system, up to that time unknown. In laying out plans for his new method of opening and working his mine, he found that he could not ventilate a sufficient number of panels or districts without dividing the air current, and to do this it would be necessary in some way to conduct the return air-current across the fresh current entering the panels. The method which presented itself to him was the construction of an air-bridge or overcast. Buddle did not foresee, or at least did not intend, that it would improve the ventilation by reducing the frictional resistance in the airways, and remove the gases collected in each separate district to the main return; and he was surprised to find that it not only furnished a fresh supply of air to each panel, but yielded also the benefits just mentioned. In the course of time undercasts came into use and air-bridging being something new, we naturally find that the overcast and undercast had their respective advocates, also that the arguments for and against came from those who had experience entirely with the overcast or *vice versa*. At any rate the undercast soon fell into restricted use, having no ad-

*Mining engineer with Lehigh Valley Coal Company, Wilkes-Barre, Penn.

vantages whatever, but rather a lot of disadvantages. Fig. 1 shows a very common construction of an undercast.

Undercasts Not Satisfactory

The space for the undercast is formed by excavating the rock under the vein immediately below the intake airway, the floor of the undercast being below the level of the seam a distance equal to the hight of the airway. Stout timbers support the wooden beams and planks which form the intake airway. The first disadvantage of such a construction is its liability to fill with water. If located where it will fill slowly, obtaining its water from feeders, it must necessarily be drained at intervals. While it is filling, the transverse section of the return airway is diminished and is therefore a source of constant annoyance. Furthermore, should a sudden outburst of water take place, the depression would fill rapidly and immediate danger would result, for the space filled with water would form a barrier to the return current as secure as a solid brick stopping.

Another disadvantage lies in the fact that the haulage road or intake airway lying directly over the undercast is sure to be destroyed by an explosion. Then too, if haulage is done over the wooden construction over the undercast it is always becoming loose and the two currents mingle through the crevices.

Again there are few cases where an undercast can be constructed cheaper than an overcast and, all in all, the undercast has little to recommend it.

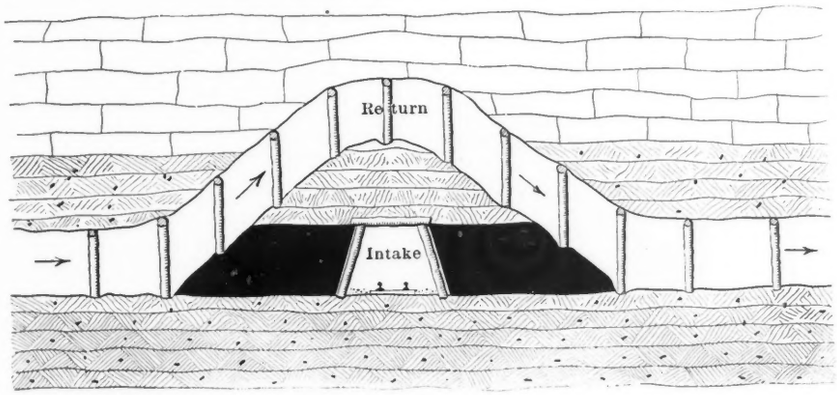


FIG. 4

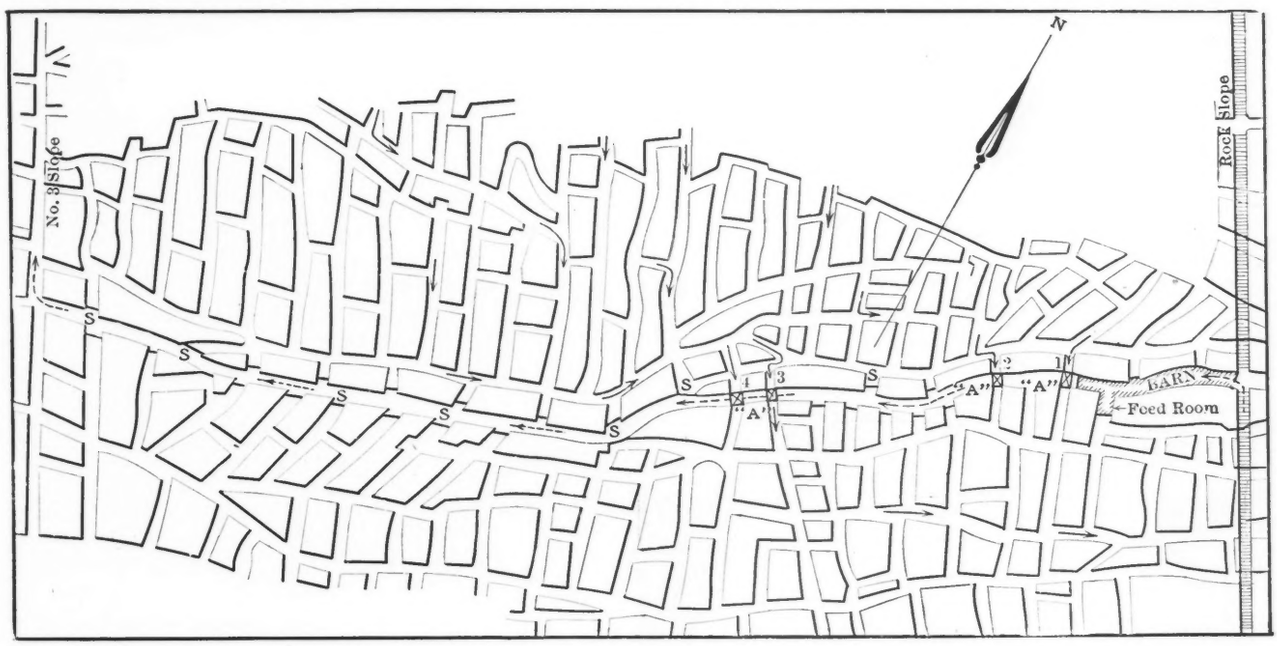


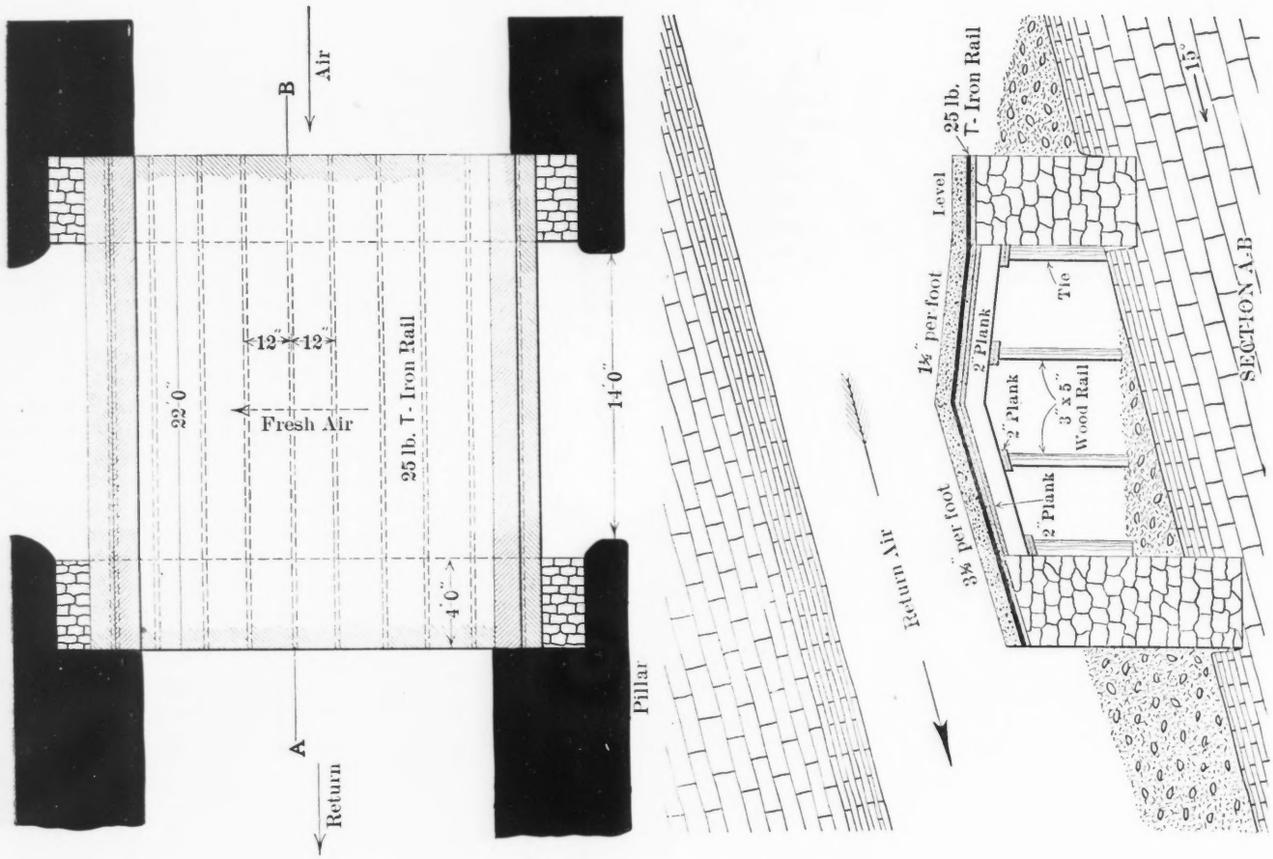
FIG. 5

Construction of an Overcast

The construction of an overcast is shown in Figs. 2, 3 and 4. Fig. 2 shows the common form of the overcast in highly inclined seams as in the Lehigh and Schuylkill anthracite regions. The construction is entirely of wood and consists of 2-in. or 3-in. planks nailed to 4x6-in. sticks spiked to the regular gangway timber. The joints between the planks are covered with 1x3-in. strips and all crevices between the ends of the plank and ribs of coal are filled with clay or mortar. In some instances the planks are covered entirely by a thickness of matched lumber while the overcasts entirely in other cases are constructed of matched boards double thick. The opening for conducting the return air to the main return current is made by removing the top bench of coal as shown in the figure.

Fig. 3 shows the common form of an overcast in a slightly inclined or flat seam. The rock is excavated arch form to a hight above the top of the seam sufficient for the airway. Two masonry walls built on the haulage road or intake airway support the wooden beams to which are spiked the planks forming the roof of the intake or floor of the overcast. Fig. 4 shows an overcast through solid rock. The length, breadth, and hight can be made as desired, dependent of course on conditions and the amount of money to be expended.

The wood construction is much cheaper than that through solid rock, and we find therefore, that, owing to the expense of the latter, where a sufficient number are required, too few are built and the ventilation is impaired. The wooden overcast is frequently located in a damp or even wet part of the mine, and its decay is very rapid, requiring frequent repairs and renewals. Then too, the return currents, heavily charged with the impurities gathered along their routes, have a disastrous effect on the wood. New props stood in a place where standing gas exists will yield to dry rot in very short time. Furthermore, if air-bridges are located in the vicinity of heavy blasting, they soon become loose and crevices are consequently formed through which the fresh air mingles with the return. Where the floor of the overcast carries the track of the haulage road, the constant heavy vibration due to traffic opens crevices as fast as they can be closed. Should a trip



END VIEW

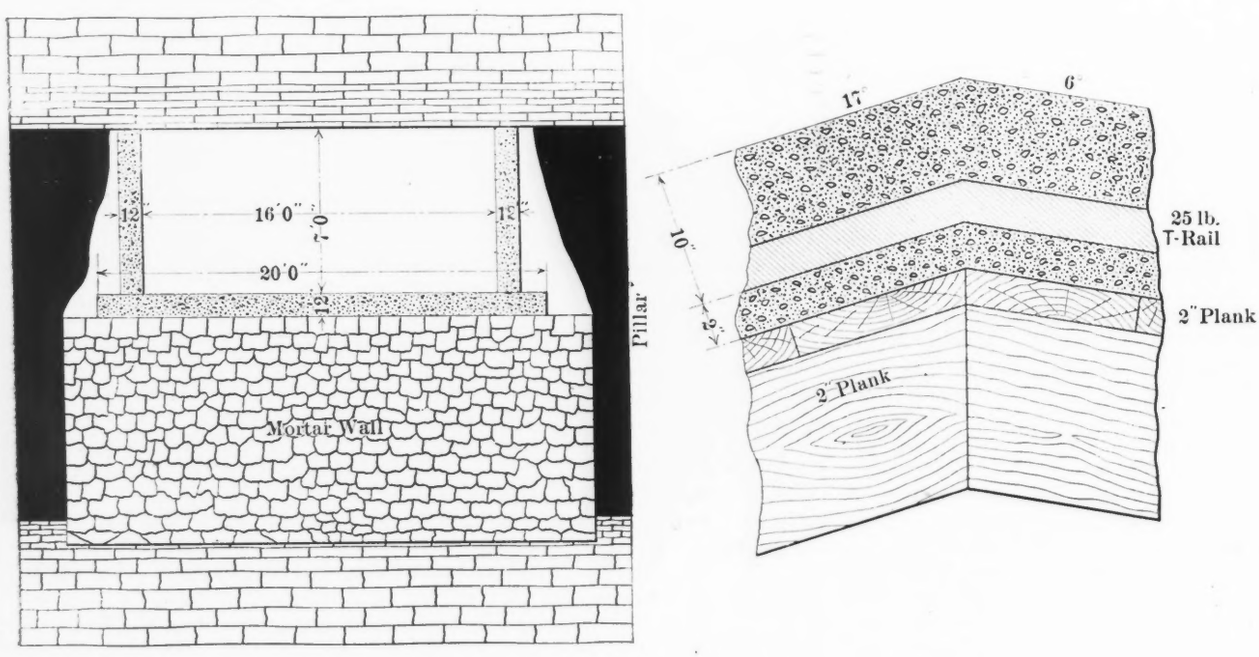


FIG. 6. CONCRETE OVERCASTS

of loaded cars be derailed at the point of the overcast the destruction of the wooden floor often results. Even the frequent walking of men or mules over the wooden floor will cause cracks in it by loosening the boards.

Taken as a whole, the wooden air-bridge is not the most satisfactory form of construction. For the reasons mentioned we can readily see that in a gaseous mine of extensive area, where a number of overcasts are necessary, repairs, renewals and frequent examinations are necessary to keep them in the necessary condition for properly conducting the return currents to the fan and producing an uninterrupted efficient ventilation.

Concrete and Steel Overcasts

The Lehigh Valley Coal Company, at its collieries in the Wyoming region, is substituting for the wood overcast one of concrete and steel wherever and whenever an additional one is needed to improve the ventilation. Besides a number already built at several collieries, four are now under course of construction at its Dorrance colliery. The location of these four is shown in Fig. 5 at the points marked *A*, immediately west of the barn in the Baltimore vein. The drivers employed in the workings to the west take their mules to and from the barn along the old road between the rock slope and No. 3 slope, as shown by the dotted arrows. At the present time the return air, shown by the solid arrows, circulates through the old chambers and crosses this road in its course to the fan. While safety lamps are used exclusively by the drivers and all employees, extra precautions against possible accident led to the construction of the four overcasts at the points shown. By this means a split of fresh air will be taken from the main current going down the rock slope and conducted through the barn and along the road underneath the air-bridges to No. 3 slope and down the same, while the return current will pass through the overcasts to the fan along its usual course. This will abolish the present practice of men and mules traveling in the return current and will avoid any accident which is always possible where a return air course is used as a traveling way. After the overcasts are completed, masonry walls or solid stoppings will be built at all openings on either side of the road, as shown at *S*, Fig. 5. These overcasts will be permanent and substantial, their destruction only being accomplished by a squeeze, in which event all other construction would be destroyed as well.

Details of Construction

The construction of the overcasts is shown in Fig. 6. Being located in an old portion of the mine, much gob and other refuse is found on both sides of the road and must be cleared away at the immediate location of the bridges. After this trenches for the masonry walls to carry the bridge are dug and carried to sufficient depth below the bottom slate of the vein to obtain a solid foundation. The walls are then built 4 ft. thick, consisting of rock and bone of sufficient size selected by the mason from the gobbed refuse made and packed in the chambers during mining. Lime mortar is used and the faces of the wall are almost entirely surfaced off with a coat of mortar after completion.

Next in order, timbers for carrying the concrete are placed by the "shaft timberman," and consist of second-hand 3x5-in. wooden rails taken from old chambers and of second-hand mine ties and props for uprights, on which are laid 2-in. planks double thick, which in turn carry 2-in. planks on edge. To these planks are nailed the 2-in. planks which carry the concrete.

The time consumed is somewhat greater than one might consider and an explanation is necessary. The clearing away of the refuse accumulated is very laborious and progress is slow, and in excavating for the trenches considerable heavy rock and bone must be removed. The work being done in the return current makes it warm for men to work, and less is accomplished than if the same were located in a fresh-air current. Again, the rock and bone constituting the material for the masonry wall are all collected in the old chambers in the vicinity and taken to the location for the wall. The broken stone used in the concreting is obtained from a chamber some distance away, the stone having been dumped there during the driving of the rock slope. The mason selects what material is fit for use. At the same time sand suitable for concreting is gathered from the same place, having been made during the blasting in the slope and loaded out with the rock.

As will be seen by the end view, Fig. 6, two concrete walls form the sides of the overcast and become necessary where the entire vein has been mined out. The Baltimore vein, which in this particular location is one seam, more frequently splits into two distinct seams, the top split known as the Cooper or Upper Baltimore, and the bottom split known as the Bennett or Lower Baltimore vein. At the location in question the dividing slate is only about 1 ft. thick and in most instances both splits have been removed. At the location of No. 4 overcast only the bottom split was mined and it was necessary to take down the top vein to get sufficient hight for the roof of the overcast. In taking down this top coal, or split, the ribs were neatly dressed and the concrete floor of the overcast was carried high enough to dispense with the walls. At the location for Nos. 1, 2 and 3 overcasts the total vein has been mined and concrete side walls will become necessary.

The two masonry walls are built 4 ft. thick, the walls on the up-pitch side being on an average 7 ft. high, the one on the down-pitch side averaging 10 ft. high.

The concrete floor is 12 in. in thickness and 22 ft. long by 20 ft. wide, consisting of a 1-2-3 mixture. The breadth and length will of course be greater or less depending on the dimensions of the openings through the coal at the different locations.

The T-iron rails are spaced 12 in. center to center, the bottom or base of the rail being embedded 2 in. in the concrete. During concreting the rails are supported by blocking under the head of the rail.

For the side walls a 1-2-5 mixture will be used, the walls being 12 in. thick and cement worked well into the crevices of the coal and top rock.

Itemized Cost of Overcasts

No. 4 overcast has been completed and the details of cost below, while not absolutely correct, are nearly so. The day's work consists of nine hours and the hourly rate includes the strike percentages and sliding scale. The proportions for the concrete mixture were 1-2-3. Sand and stone for the concrete and walls do not appear in cost for material, the only cost on these items being included in the labor.

MASONRY WALLS

60.5 Cu.Yd.

LABOR

Clearing away refuse, digging trenches, getting stone, mixing mortar and building two walls, 2 masons, 20 days each, or 360 hours at 25.4c	$91.44

MATERIAL

25 bushels of lime at 30c	7.50
	$98.94

CONCRETE OVERCAST

16.5 Cu.Yd.

LABOR

Getting lumber for supporting concrete work and placing same, 3 men at 2 days each, or 54 hours at 25.2c	$13.61
Placing 2-in. plank for concreting, 1 man 2 days or 18 hours at 25.2c.	4.54
Getting broken stone, mixing and placing concrete, 2 masons at 14 days each or 252 hours at 25.2c	63.50
Bending and transporting rails, approximate	5.00
	$86.65

MATERIAL

120 bags portland cement at 45c	$54.00
1000 ft. 2-in. hemlock plank at 22c	22.00
20 lb. 20d. nails at 2½c	.50
1850 lb. (8/10 ton) second-hand 25-lb. T-iron rails at $12.50 a ton	10.00
	$86.50

The total cost per cubic yard for the masonry wall is therefore $1.63. The cost for labor and material is about equal for the overcast. or $5.25 per cu.yd. for each, a total of $10.50 per cu.yd. The two walls needed for Nos. 1, 2 and 3 overcasts make an additional 11.5 cu.yd. at a somewhat smaller rate per cu.yd., say $8, so that the entire cost of the overcast, including two supporting masonry walls and two concrete side walls, in a vein of this thickness will be about $365, and about $270 without the side walls.

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

To cement iron and stone, mix 10 parts of fine iron filings, 30 parts of plaster of paris, and one-half part of salammoniac in weak vinegar to a consistent paste, and apply at once.

Records show that during four years (1902-1906) the production of bituminous coal, by compressed air, in Pennsylvania increased 49 per cent.; by electricity the increase was 29 per cent.; while by pick mining the increase was only 9 per cent.

There are many different compounds prepared for removing scale from boilers, nearly all of which are effective in certain kinds of water, but the simplest and best thing to use is kerosene oil, which will do what the prepared compounds will not do, that is, to make and keep a clean boiler.

A good method for treating ordinary drills so as to produce an exceedingly hard point is to heat the drill to a dull cherry red and submerge the point in about ⅛ in. of sulphuric acid. In case the point breaks it can again be reharddened by submerging in the acid, less acid being required the second time.

In building wood doors in mines it must be remembered that they should be self-closing. The space around the door-sill should be boarded up, or better still, closed with masonry to prevent leakage of air. A piece of brattice cloth can be tacked to the bottom of the door to reduce leakage. All doors should be hung to open against the air current.

The reports of mine inspectors show that during 1905, the number of men killed by roof falls in the anthracite fields of Pennsylvania was 295, while the number killed by gas was 43. These figures show that roof falls were nearly seven times more dangerous than gas explosions. In the Pennsylvania bituminous fields, 298 men were killed by roof falls and 39 by gas explosions.

In locating an underground pump room it is well to place the pump as near the sump and as low as possible, so that the pump runner will have easy access to the sump and can watch the water supply, which should be uniform and constant. In case the supply is short, the pump should be stopped before all the water is drawn from the sump, so that the feed pipe can be charged while the pump is not running.

Files clogged with tin or lead should be cleaned with strong nitric acid. For iron filings blue vitriol should be used first, then the file should be rinsed in water and dipped in nitric acid. Dip the file several times in nitric acid for copper or brass. Diluted sulphuric acid should be used to cleanse a file clogged with zinc. After cleansing, the files should be rinsed in water, thoroughly brushed and dried in sawdust or by burning alcohol on them.

It has been found by experience that wood pipe carries from 10 to 20 per cent. more than iron pipe of the same diameter when both are new, and from 30 to 50 per cent. more after 10 years' use. When used in connection with district steam-heating installations to return condensed water to the boiler house for feed water, the wood pipe is better than any other pipe as it is not affected by the condensed water, and requires no other insulation than its own thickness of shell and no expansion or anchorage devices are necessary.

From numerous experiments and the actual data obtained from plants in operation it has been found that by using producer gas made from anthracite or a good grade of bituminous coal the engine develops one brake horse-power per 1 to 1¼ lb. of coal. In using the term "brake" power" it must be understood that it is that power which performs the work of one horse-power after deducting all internal losses. These losses generally amount to from 15 to 20 per cent. of the indicated horse-power of an engine.

When the coal is hard, the gangway roof good and the ventilation and mine conditions such that the gangway timbering will stand a number of years without repairing, or where very little timbering is required, it is often cheaper to mine coal lying three or even four miles from the slope and haul it through the gangway than to make a new opening. But where the coal is soft, the roof poor and heavy timbering required to keep the gangway open, it may be cheaper to open a new slope than to attempt to keep even one mile or less of gangway open.

The grade of powder to be used for blasting depends on the character and hardness of the coal and the thickness of the seam. In firing soft coal a larger grained or slower powder should be used while a quicker powder is better adapted to hard coal. The diameter of the drill hole varies from 2 to 2½ in.; but a 3-in. hole, under ordinary circumstances is too large as it permits too great a pressure on the tamping and the charge is more concentrated, while in a smaller hole there is less total pressure on the tamping and the explosive force is more evenly distributed through the seam.

France has recently passed a new law governing the use of life-saving apparatus in mines. All mines employing 100 men underground at the same time must have not less than two sets of portable respiratory apparatus for each pit. The apparatus must be ready for immediate use, must be capable of allowing a miner to remain at least one hour in a non-breathable atmosphere and must be placed in charge of an inspector or engineer familiar with its workings and accompanied by 10 picked men, trained in the use of the apparatus. This corps of life savers together with their life-saving apparatus are to be held in readiness to be sent immediately to the seat of danger whenever the necessity arises.

The quality of cylinder oil is very important in lubricating cylinders. Such oil should be free from sulphur compounds. Whether the oil contains such ingredients or not may be determined by heating a small quantity to a temperature of 300 deg. F. and keeping it at that temperature for about fifteen minutes, then allow it to cool and compare the color with that of the original oil. If any darkening has taken place, it shows that the oil has not been properly refined and is not fit for use in steam cylinders or on bearings which are likely to "heat." Another simple practical test which can be done at collieries is to take a bright steel needle and immerse it in oil, which should be maintained at a temperature of about 100 deg. F. for two or three days. If at the end of this time the needle shows the slightest signs of rust the oil is impure and should not be used.

Blasts in bituminous mines are properly fired either by fuse or by squibs. If fuse is used it is important that a good quality of double tape should be employed, the single tape fuse (which is less expensive) is often the indirect cause of accidents owing to the fuse having been injured by the tamping bar in tamping, thus causing a misfire. An injured fuse will sometimes cause a shot to hang fire, perhaps for several hours, or it may be for a few minutes only. The miner returning to relight the fuse, which he thinks has gone out, many times reaches the face as the explosion takes place. Accidents have also been occasioned by the irregularity with which the fuse burns. As a means of firing blasts squibs are safer than fuse. The squib does not hang fire as often as a fuse and in case of misfire the shot can generally be prepared for re-lighting with greater ease and security than when fuse is used.

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Contents

Increase in Gold Production and Scarcity of Money

The article on the financial situation by Professor Norton in *Moody's Magazine* for September, which we publish elsewhere nearly in full, is a curious mixture of sound reasoning and evident fallacy. In forecasting the effects of over-speculation in real estate, too much underwriting of new enterprises (especially the watered kind), and the international banking transactions, Professor Norton reasons logically, but we do not follow him at all in his argument that the frowning of the Government upon corrupt corporation practice has caused often 40 per cent. of the value to disappear. In such cases the "value" must have been of so poor a quality that another term, say "gold brick," would be more fitting. However, Professor Norton's chief fallacy is the harping upon the idea that because the production of gold has increased, its purchasing power has diminished—in other words, the prices of commodities have risen. But, as a matter of fact, prices have lately been falling—in the case of many of the metals materially and rapidly.

It is far simpler to account for commercial fluctuations by the old, well-proved law of supply and demand than by economic fads and fancies. The present situation, in the United States at least, is the normal consequence of well-known industrial laws, and it is not so bad that the country is going to the dogs, as many would have us believe. On the contrary, the trouble is due to too much prosperity. This has led to the undertaking of more new enterprises than temporarily we are able to finance. The St. Paul extension to the Pacific coast, the building of the Western Pacific, the improvements of the New York Central and Pennsylvania at New York, and many great mining and metallurgical developments, of which those of the Guggenheims are preëminent, are types of the new work that has been, and still is, requiring immense sums of money; similarly the Panama canal and the rebuilding of San Francisco. Let it not be forgotten also that the San Francisco earthquake and the Japanese-Russian war destroyed a vast amount of wealth and caused financial derangements, which perhaps are still of effect.

The fact is that work is still going on at a huge scale. In the West the complaint is everywhere that there are not men enough. This, of course, is one of the roots of the trouble. The work that is in progress has outrun our resources of capital. The increased production of gold may have been originally instrumental in developing the present situation. The more gold in reserve, the more credit based upon it. The more credit, the more work undertaken. The more work, the more demand for commodities and labor; and, consequently, increases in the prices for them, which multiplies the strain on capital, until finally the pendulum begins to swing backward. It is difficult to prove any other connection between the production of gold and the prices for commodities and labor. The hypothesis of an over-production of gold implies too much money, but everyone knows that the present trouble is too little money. The complaint of merchants and manufacturers is the difficulty of making collections.

The encouraging feature of the situation is the general soundness of the projects that have been absorbing so much money. The St. Paul and the Western Pacific, for example, are not likely to experience the fate of the Santa Fe in waiting many years for the country to grow up to them. The great mining enterprises that are on foot are developing resources that are certain and capable of comparatively quick realization. We have not been engaged in over-much wild-catting, wherein great sums of money would have been irreclaimably sunk. The Cobalt excitement, which might have led to the inflation of many bubbles, was ruthlessly and effectively squelched. We are now in a stage of salutary readjustment, not in an alarming condition, as Professor Norton would have us believe.

The Price of Copper

Although the hysteria over the price of copper is undeniably serious, nevertheless it has an amusing side. Just two years ago the price was about 15c. and everyone thought that was good. We have before us the prospectus of one of the best of the new enterprises that figured prominently at that time, in which one set of estimates was based on that figure, with another set based on 13c., and showing that a handsome profit would be realized at it—as, indeed, we believe would be the case. A few months later, when the price

rose to 18c., there was jubilation and skepticism as to the long continuance of the good thing, because it was feared that consumption would be restricted. But even before the price receded to 18c., as it did last month, there were long faces and bewailment over the deplorable condition into which copper production had fallen. It was only about 18 months ago that the great rise above 18c. began. Conditions have not changed in the meanwhile, so that the producers who could make a great profit then can still do so now, or even at 15 cents.

Doubtless it would have been better in the long run if the price had not gone above 18c. The market has simply returned to a more normal and more healthy position. The consumption of copper is not going to cease, even though the attitude and actions of the manufacturers for several months have lent some color to that belief. The trouble has been uncertainty and lack of confidence; but when knowledge as to the real statistical position is available—absence of which is one of the greatest unsettling factors—confidence will be restored and business will be resumed on normal lines. We believe that this will not be delayed much longer.

When this consummation is reached it is to be hoped that the market will no longer have the sky-rocket features that have characterized it during the last two years. It is to be hoped, moreover, that investors in copper shares will make up their minds to disregard the mischievous practice of various public advisers of computing earnings per share and percentage on going market price on the basis of temporary high quotations for the metal, which is a constant temptation to the unwary and inexperienced. The shares of good copper-mining companies are among the safest and most profitable forms of investment, but purchases should be made on the basis of the probable price for the metal over a series of years, and due allowance should be made for the gradual exhaustion of even the biggest mines.

The Miners' Eight-hour Bill in Great Britain

As mentioned recently, the British government has introduced a bill for legalizing the eight-hour day for miners, reckoned from bank to bank. Though there is no chance of its being discussed in the present session of Parliament, it nas been printed and circulated in political and industrial circles, and already representatives of the miners' association and of the coal owners' association have met to discuss the proposals.

The bill proposes to limit the time spent below the surface by each man to eight hours, which includes the time occupied by descent and ascent and progress along the levels to and from the working face. The exceptions to this general rule are the debatable part of the bill. It is proposed that during 60 days each year the owners shall have the right to increase the hours from eight to nine. This exception is presumably provided to enable the owners to cope with special demands for household coals. It is further proposed that the King in Council, that is, the government, without consulting Parliament, may at any time extend the hours indefinitely and for an indefinite period "in the event of war or of imminent national danger or great emergency, or in the event of any grave economic disturbance due to the demand for coal exceeding the supply available at the time." This provision about economic disturbances is not at all acceptable to the miners' association. It is a very vague provision and would be liable to considerable misuse, if the political party in power were in sympathy with the owners. The miners' association also objects to the owners having the power to enforce a nine-hour day during one-fifth of the year, and the miners rightly argue that the owners would enforce it always, that is, as long as there might be a sufficient demand for the coal.

In this bill and in the discussion upon it, as well as in the report of the Royal Commission on the subject, it appears to be taken for granted that if the hours of work are decreased from nine to eight, the output of the mine will be decreased in the same proportion. The experience in the United States, and in other countries, has often been that the curtailment of hours of work has not decreased the output, or added to the cost of operation. Apparently it is not supposed possible for the English coal miner to work at a higher speed during shorter hours.

It must always be remembered, when discussing this question, that in British coal mines it is very seldom that more than one shift a day is worked, and that it is impossible for the owners to obtain sufficient labor to duplicate the shifts. In the metalliferous mines the shifts are duplicated, and at the present time the shift is 10 hours.

Indiana's New Drill Law

The chief mine inspector of Indiana says that there is no possible chance for the miners to evade the law governing the size of the drill bit, not even by the use of the one-jawed bit, for the reason that the diameter of the latter bit would be measured from the center. He also states that the new law is a measure of safety for the miners, and that the size of the bit being limited to 2½ inches is essential in bituminous coal. In block coal, however, a larger bit could be used with safety. Some believe that the legislature could have reasonably made an exception in the case of the block coalfield, but if such is necessary the oversight can be remedied by the next general assembly. We believe that the new law is a fair one, both to miners and operators, and one which the general welfare of the mining industry has demanded for some time. We are glad to hear that all evasions of the law, either by miners or operators, will be followed by immediate prosecutions.

New-Old Districts in California

No small part of the recent development of mining in California has come from the reopening of old districts. Lately numerous prospectors have gone to the Minaret region in the high Sierra of Madera county, in the belief that the mineral deposits of Nevada extend into that section. These prospectors are from both California and Nevada. It has long been known that the Minaret section, which is in a rough, mountainous country, has deposits of iron and copper, but no attempt has ever been made to utilize them, owing to the distance from a railroad, the rugged character of the region and the deep snows which cover the ground well on into the summer. The prospectors are staking claims in all directions, but little or no development work has yet been done.

This is another of the many cases where old locations are being made the basis of new prospects. Improved methods, better transportation and other factors make the old, deserted camps once more attractive, and bring prospectors and miners back.

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

Suggestions for Mining Engineers

The following suggestions are offered to the younger mining engineers. The writer claims no special credit nor originality for the ideas advanced, as they come, in fact, from more experienced mining men.

PURPOSES OF THE ENGINEERING DEPARTMENT

There are two distinct lines of work to be carried out by the engineering department. First and foremost is that of assisting in the operating of the mine; secondly, the making of records of what has been done. The latter is all too frequently regarded as the sole function of this department. The ways in which the engineering department can assist a progressive manager are numerous and varied, even from week to week. Maps showing the mine workings right up to date and indicating the proposed work some days in advance; stope longitudinal sections showing the progress right up to date, will well repay the cost of maintaining them in the added intelligence with which the operating can be directed. This does not mean that the accurate mine survey must keep pace with the development work to within 24 hours, but at least a good grade of sketch mapping should keep close pace with the development work. The methods of approximate mapping by pocket compass and pacing, by straight lines and offsets, may well be put into more active use.

From the assay department we demand frequent and prompt determinations even though they be of but approximate accuracy—as the daily cyanide titrations for copper—followed at intervals by the more accurate electrolytic determinations. Why then should not the engineering department furnish corresponding prompt approximate information?

The mine map or a copy of the same should be conveniently accessible to the mine foreman. It is for use and the mine foreman is one of the men to whom it is the most useful. The geological features should be represented in great detail on the mine map by separate tracing-cloth sheets for each level which can be exactly and quickly superimposed. Many cross sections should be made, accurately and carefully detailed, and with no confusion of observed and theoretical structure. This principle should be closely followed, that actual observed facts be prominent on the map and hypothetical structures be indicated in radically different ways, so that no possible misinterpretation may arise from the confusion of these two classes of data.

SYSTEMATIC METHODS

That it is possible to have system without red tape, is up to every young mining engineer to prove. It can be done. Look over the work in every feature in detail. Examine each kind of work. See whether you do the same work always in the same way. If not, choose the best way and stick to it, all the time. It will be found in many cases that it will be necessary to determine by experiment which of various ways is best. If so, do this with the definite purpose of settling on the best way, and not with an indefinite idea of letting it settle itself.

Then for progress. In the same close, critical way examine wherein your methods are open to improvement. It is sometimes in the details, sometimes in the general plan, that improvements can be made.

Invite criticism, whether friendly or otherwise, and when it comes give it your most careful, unprejudiced, thoughtful consideration.

DATA

Put all the information of your department in shape to be available to the manager. Have everything clearly indexed and explained. Make your maps clear. Have figures marked to show what they mean to the man not on the inside of every detail of your work. Figures showing elevations should be so denoted. On the geology sheet there should be a plain statement of the meaning of each sign and color used. Availability of data is what gives the greatest value.

CROSS-REFERENCES

Clear cross-referencing is a thing for the mining engineer to specialize on. Cross-referencing is telling just where to look for additional information on the feature under immediate consideration.

ORIGINAL NOTES

Original notes, taken on surface or underground, should have appended to them, soon after taking, an explanation sufficiently full to make them entirely clear to another person. If this practice is carried out the engineer will soon find himself taking more intelligible notes, as it is no pastime to explain fully some of our hieroglyphics. G. W. COREY.

Butte, Mont., Aug. 10, 1907.

Practical Points in Mine Surveying

I have recently read the article by L. C. Hodson, entitled, "Some Practical Points on Mine Surveying," printed on page 113 of the JOURNAL of July 20, 1907. In his insistence on accuracy and cleanliness I heartily concur; but in details of equipment my experience has been at variance with his suggestions. I will take up our points of difference in the order in which they occur in his article.

In selecting a transit for general work it must be appreciated that accuracy and extreme light weight are not compatible. Especially is this true in underground work and in leveling. A U-frame transit, with 5-in. horizontal and vertical circles, both circles being graduated to minutes, is the most satisfactory instrument. Finer graduation is unnecessary, and seriously interferes with speed in reading angles. A degree of accuracy giving an error of closure of 1 in 10,000 to 15,000, is possible with reasonable care with such an instrument. Both surface and underground work require a rather high magnifying power, which is obtained with a large field and plenty of light by the use of a telescope with inverting image. In mine work where there are any steep, inclined shafts or raises to be surveyed, an auxiliary telescope is practically indispensable, and it should always be included in the general equipment.

As for tapes, I have found a 150-ft. tape, graduated to tenths and hundredths, and a 300-ft. tape, graduated to feet, to be the most convenient outfit. An open, four-arm brass reel, as made by the Lufkin Rule Company, is very satisfactory for the 150-ft. tape.

In mapping all work should be plotted by coördinates, and the coördinates should be laid off on the map in 4-in. squares. In this way small portions of large maps can be located accurately with no difficulty. I have found 50 ft. to the inch the best scale for underground maps and for most surface maps, large areas being plotted best on a scale of 200 ft. to the inch. Maps should be made on paper mounted on muslin, Keuffel & Esser's "Extra heavy paragon" by preference, and should be inked in and titled. Only two sets of mounted maps are necessary, surface and underground. Underground maps should have only one level on each sheet, except in small propositions or where the levels do not overlap. Geology,

analyses, etc., can be kept on separate tracings.

I have never tried the card system of note-taking, but my experience has been that loose sheets in any form are undesirable. A few simple expedients will enable almost any man to keep even his underground notebook clean. Put a paper cover on the notebook before going underground, and change it for a clean one before calculating. Hold the pages together on each side of the working page with rubber bands, and keep a piece of blotting paper under the band on the page not in use. In taking notes hang the candlestick on the left shoulder. This wears out the jacket, but gives an excellent light and prevents grease from dropping on the book.

In regard to accuracy, I thoroughly agree with Mr. Hodson. As it is usually impossible to close an underground survey, all important work should be checked by another survey. LUCIEN EATON.

Iron Bolt, Wis., Aug. 5, 1907.

Refining Metals in Canada

In the JOURNAL of Aug. 17, in the Toronto special correspondent's letter, the following occurs: "Owing to there being no smelters in Canada capable of purifying ore sufficiently for coinage purposes, the new Canadian mint will have to look to the United States for refined metal. . . . It is stated that 1,000,000 oz. of silver will be wanted at the mint in November. The ore will have to be shipped across the border for treatment and brought back as refined metal."

These statements are entirely erroneous. A press despatch from the East similarly in error, was recently published in daily newspapers in British Columbia. In Victoria the daily *Colonist* promptly published a correction, communicated by myself, to the following effect: The Consolidated Mining and Smelting Company, of Canada, owns a lead and silver refinery, as well as a copper and lead smelter, situated at Trail, British Columbia. I was shown through these works in the fall of 1904, and was then informed that the refining of silver and gold there, as well as of lead, the last metal by the electrolytic process, had been in successful operation for some time.

"The Betts Process at Trail, B. C.," was the subject of a thesis submitted by A. G. Wolf, to the Colorado State School of Mines. This was read before the April, 1907, meeting of the Western Association of Technical Chemists and Metallurgists, Denver, Colo., and has since been published in several technical journals. From this it is learned that the lead refinery was erected in 1902. It has since been enlarged from time to time, until now lead, gold, silver and copper sulphate are its refined products. The silver and gold by-products from the refining of lead are produced to the extent of, approximately, 150,000 oz. silver and 2000 oz. gold per month, or 1,800,000 oz. silver and 24,000 oz. gold per year. I have the assurance of the manager of the works that the silver produced is always better than 998 fine, and that the greater portion goes as high as 999 fine, which he claims to be equal to any refined silver on the market. The Trail silver product is sold to the United States for coinage purposes, also to the Chinese and Japanese governments.

May I add, in conclusion, that Dr. A. P. Low, deputy minister of mines for Canada, who is in Victoria today, in the course of a newspaper interview yesterday, said: "The talk about the inability of the government to get silver at home for the new mint at Ottawa is all nonsense. A supply is available from Trail, B. C., where a refinery is in successful operation." E. JACOBS,

Editor *B. C. Mining Record.*

Victoria, B. C., Aug. 27 1907.

[The statement referred to is undoubtedly incorrect. Its publication in the JOURNAL was due to an oversight, such as will occasionally happen in an editorial room in a period of unusually strenuous work. References have been made in the JOURNAL several times to the works at Trail and their production of metals.—Editor.]

Who Is a Mining Engineer?

A controversy has arisen and it has been agreed to abide by the decision of the JOURNAL.

(1) *A* claims that it is perfectly "square" for a man not a graduate from a school granting an E. M. degree to use "Mining Engineer" on his professional cards and letter heads. Said man is supposed to have spent the major part of his life in mining, as miner and up the grades to superintendent. *B* claims that no man without the degree of E. M. has the right to use "Mining Engineer." In your opinion, who is right?

(2) A specific example came up. A young man spent four years at one of the Eastern mining schools, but at the end of the fourth year had some conditions to make up, which, in a term of years in which he worked at different properties as surveyor, assayer and underground foreman, he failed to make up. Is he entitled to use "Mining Engineer"? C. G.R.

Boise, Idaho, Aug. 18, 1907.

[This subject has been repeatedly discussed in the columns of the JOURNAL. As the inquiry is put in paragraph (1) of the above communication, *A* is right, providing the man has the attainments that an engineer is supposed to have. Anyway, *B* is wrong.

Any man has the right to call himself a mining engineer, just as another man may call himself a mechanical engineer, a metallurgical engineer, etc., if he be one; otherwise he is dishonest. (We shall not here go into any definition of what constitutes an engineer.) Some of the best engineers we know are not graduates of any technical school and have no degree of any kind. They have an inalienable right to call themselves what they are. This right has not been lost by the assumption by certain college faculties of the title "mining engineer" as a degree to be conferred. The new graduate is seldom an engineer at all. He is simply started on the road to be one.—EDITOR.]

Hotel Accommodations at Joplin, Mo.

Below is a statement signed by the architect, contractors and superintendent of construction of the Connor hotel, assuring the public that this hotel will be finished and ready for occupancy on the first day of November, 1907.

We would appreciate it very much if you would publish this in your paper.

COMMERCIAL CLUB OF JOPLIN.
Clay Gregory, Sec'y.

Joplin, Mo., Aug. 28, 1907.

"To whom it may concern: At the request of the American Mining Congress committee we take pleasure in assuring you that the Connor hotel will be absolutely finished on the first day of November, 1907.

No doubt remains that the delegates of the American Mining Congress will be entertained in this hotel. The furniture is all bought, to be delivered Oct. 1 next.

"BARNETT, HAYNES & BARNETT,
Architects.
"DIETER & WENGEL, Contractors.
"EMIL E. HALLENBERG,
Supt. of Construction."

Mines in Great Britain were first made open to inspection by government officials in 1842 when an act was passed prohibiting the employment of female labor in them. In that year an inspector was appointed solely to see that the law was carried out. In 1852, the number of inspectors was increased to six and their powers were considerably extended. Six more inspectors were appointed in 1855 and the salaries attached to the office made sufficiently high to induce men of attainments to enter the service. Up to that time the inspection dealt with coal mines only but in 1872 metalliferous mines were included, and two more inspectors were appointed. Since that time the duties have been increased and rearranged and many assistant inspectors have been appointed. Now there are 12 head inspectors in charge of separate districts and 26 assistant inspectors who are doing very much the same work as their chiefs and are equally responsible.

New Publications

BIBLIOGRAPHY OF THE GEOLOGY OF CONNECTICUT. By Herbert Ernest Gregory. State of Connecticut, State Geological and Natural History Survey, Bulletin No. 8. Pp. 123, 6x9 in., paper. Hartford, Conn., 1907: Hartford Press.

For several years Mr. Gregory, as he states in his preface, has had occasion to examine critically geological literature relating to Connecticut. The list of papers read, and the notes made are here presented, with the hope that they may be useful to students interested in the subject. The list of titles is believed to be practically complete to January, 1906, and a few papers of more recent date have been added. Articles in local newspapers, and descriptions in text-books have been omitted. In preparing the notes an effort has been made wherever practicable to give the author's main conclusions, instead of describing the table of contents. This is not attempted with the larger and more general works. With the exception of a few instances, no attempt has been made to estimate the value of the various papers, and some have been included because of their historic interest. A list of geological maps, including those used as illustrations accompanying reports, follows the list of papers. The articles cataloged are numbered serially.

BIENNIAL REPORT OF THE INSPECTOR OF COAL MINES OF THE STATE OF MONTANA FOR THE YEARS 1905-6. Joseph D. McDermott, Inspector. Pp. 224, illustrated, 6x9 in., cloth. Helena, Mont., 1907: Office of the Inspector of Coal Mines.

In the production of this report the Montana mines department has endeavored to confine itself strictly to the limits of its official sphere—the coal industry. And in doing so, a presentation of the coalfields, with its subdivisions, its classification of their coals and their quality and comparative efficiency, is given with a view to calling the attention of the outside world to this great natural resource of the State, and to the possibilities it affords for the profitable investment of capital at this time. Though the coal output shows a rather satisfactory and steady increase, foreign coal to the estimated amount of over a million tons was imported during the present year, these importations being largely from Lethbridge, the coal being brought to Great Falls over the Great Falls & Canada railway, and thence distributed to Helena, Butte, Anaconda and other points, by the Montana Central railway; Wyoming coal brought in by the Oregon Short Line railway and distributed to Butte, Anaconda, Helena and points west; and large importations by the Burlington railway that are distributed each way from Billings. At the same time there has been an irritating shortage in the supply that at times has almost amounted to a "coal famine" in the domestic market. The report considers first the general geological conditions briefly; then the composition and value of Montana coals; and then takes up the mines and their output by districts and counties. Other chapters treat of accidents in Montana mines, of the work of the inspectors and of the condition and efficiency of the mining laws.

JOURNAL OF THE IRON AND STEEL INSTITUTE, Vol. LXXIV, No. II, 1907. Edited by Bennett H. Brough, Secretary. Pp. 247; illustrated. 5½x8½ in.; cloth. London, 1907: E. & F. N. Spon. New York: Spon & Chamberlain.

Contents. Copper steels, by Pierre Breuil. Cast iron as cast and heat treated, by W. H. Hatfield. The non-metallic impurities in steel, by E. F. Law. The geology and origin of the Lapland iron ores, by Otto Stutzer. Boron steels, by Léon Guillet. The effect of air and moisture on blast furnaces, by Joseph Dawson.

This volume is devoted almost entirely to reports on research work carried out during 1906-7 by holders of Carnegie research scholarships. These reports are five in number, and are here published in a separate volume, in order to prevent the ordinary volume of proceedings for the year from becoming unwieldy. There is included also a reprint of a rare and interesting essay on "The Effect of Air and Moisture on Blast Furnaces," written in the year 1800, by Joseph Dawson, of Lowmoor.

SHAFT SINKING UNDER DIFFICULT CONDITIONS. By J. Riemer. Translated from the German by C. R. Corning and Robert Peele. Pp. 176; illustrated. 6x9 in.; cloth, $3. New York, 1907: John Wiley & Sons.

Contents. Shaft sinking by hand. Shaft sinking by the boring system. The freezing process. Drop-shafts.

The operations described in this book have to do with exceptional difficulties only, with conditions rarely met by the average working engineer. Yet the bold and often daring methods which have been successfully employed when conditions rendered access to the mineral apparently impossible never fail to interest the ordinary mine manager whose achievements are not of the spectacular sort. The work consists of detailed descriptions of specific operations mostly in Germany and the tables, illustrations and sections have been prepared, arranged and classified with German thoroughness.

AN EXTENSION OF THE DEWEY DECIMAL SYSTEM OF CLASSIFICATION APPLIED TO ARCHITECTURE AND BUILDING. By N. Clifford Ricker. University of Illinois, Bulletin No. 13, Nov. 1, 1906. Pp. 101, 6x9 in., paper. Urbana, Illinois, 1907: The University of Illinois.

ANNUAL REPORT OF THE CITY ENGINEER OF THE CITY OF PROVIDENCE FOR THE YEAR 1906. Otis F. Clapp, city engineer. Pp. 85; illustrated. 6x9 in; paper. Providence, 1907: Snow & Farnham, city printers.

Gold Production in Australasia

Returns have been received from all the principal States of Australia and from New Zealand, which make possible a comparison of the gold production of Australasia for the half-year ended June 30 with that of the early part of 1906. It has been necessary to estimate the output of South Australia and Tasmania, but the amount from these two States does not seriously affect the totals.

The production for the first half of the present year, compared with the corresponding period of 1906, is reported as follows, in ounces of fine gold:

	1906.	1907.	Changes.
New South Wales.	133,150	138,489	I. 5,339
Queensland.....	251,986	227,077	D. 24,909
South Australia...	9,200	8,300	D. 900
Tasmania.....	30,100	28,500	D. 1,600
Victoria.....	381,681	336,110	D. 45,571
Western Australia	904,864	838,253	D. 66,611
Total commonwealth.....	1,710,981	1,576,729	D. 134,252
New Zealand.....	252,001	213,043	D. 38,958
Total.....	1,962,982	1,789,772	D. 173,210
Total value.....	$40,574,838	$36,994,587	D. $3,580,251

New South Wales is the only State of the Commonwealth which has made a gain this year. This came chiefly from the copper mines, at Cobar and elsewhere, where gold is a by-product. In the gold mines and placer workings there was little change.

In Queensland the loss this year was in the smaller quantities of ore mined and the smaller amounts of gold iron in two of the principal fields, Charters Towers and Gympic. In Victoria there were heavy declines in the Ballarat and Bendigo fields, with no compensating gain from other districts. No new producers of importance were developed during the half-year. Western Australia also reported no new discoveries, while the Kalgoorlie mines, the most important producers in the State, continue to show lower grade ore and smaller recoveries. South Australia and Tasmania, the small producers, the output of both being estimated, failed to come up to that of last year. In Tasmania, some of the larger mines did not do well. In New Zealand the loss was chiefly in gold from the dredges, both in Otago and the West Coast district. The Waihi and other large mines kept up their production well.

The total reduction in output for the half-year was 8.8 per cent. The causes above briefly referred to indicate that there is little probability that this loss will be made up in the second half of the year. The production of Australia for 1907 will hardly come up to that of last year.

Personal

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

Walter Hovey Hill, of New York, is on his way to Nevada.

M. T. Chestnut & Son, Rico, Colo., have opened an office in the Century building, Denver.

A. Floerter has been appointed construction engineer for the Tamarack Mining Company.

Hon. George P. Graham, of Brockville, Ont., has been appointed Canadian Minister of Railways.

H. Mortimer Lamb, of Montreal, Quebec, secretary of the Canadian Mining Institute, is in British Columbia on business for that institution.

T. Furukawa and M. Otagawa, mining engineers from Japan, have returned to New York after visiting the mines in the Sudbury and Cobalt districts.

Frank C. Loring, late consulting engineer for the Trethewey Mining Company has resigned and is removing to Toronto where he will open an office.

C. M. Henretta, formerly manager of the Canadian-American Coal and Coke Company's colliery at Frank, B. C., is in Ohio engaged in coal mining.

Frederick J. Pope, of New York, recently examined the Big Interior group of claims, situated in Alberni mining division, Vancouver island, British Columbia.

O. W. Barber, of Wiggins, Sask., has been engaged by the Provincial government of Saskatchewan to superintend government mining operations in the Eagle Lake district.

Erasmus Haworth is building a cement mill for the U. S. Portland Cement Company at Yocemento, Ellis county, Kansas. The mill will produce 1000 bbl. per day and use oil for fuel.

John C. Gwillim, professor of mining engineering at the School of Mines, Kingston, Ontario, is visiting mining properties on Vancouver island and neighboring parts of British Columbia.

John D. Ryan, managing director of the Amalgamated Copper Company, visited the Keweenaw and Ojibway properties in the Michigan copper country while on his way from New York to Duluth.

Dr. U. Oguwa, professor of civil engineering in the university of Kyoto, Japan, is visiting Canada in the course of an extended tour for the purpose of studying hydraulic and sanitary engineering.

William C. Mullen, superintendent of the H. C. Frick Coke Company's plant in the Morgan valley, has been placed in charge of the Continental No. 1 plant of the same company at Uniontown, Penn.

Dr. A. P. Low, deputy minister of mines for Canada, and Hon. Wm. Templeman, the ministerial head of the department in Ottawa, late in August visited several of the chief mining sections of British Columbia.

Dr. U. S. Grant, professor of geology in Northwestern University, has been appointted acting dean of the College of Liberal Arts of that institution for one year during the absence of Dean T. F. Holgate, who will spend the year in England.

Obituary

Capt. David J. Kennedy, for many years a prominent man in Cape Breton mining affairs, died in Sydney, N. S., on August 27 of cancer, at the age of 76 years. He was manager of the Sydney & Louisburg Coal and Railway Company, until its merger with the Dominion Coal Company in 1893. Of late years he had been residing in Louisburg, N. S. He had a distinguished record in India during the mutiny of 1849.

Societies and Technical Schools

Missouri School of Mines—Geo. E. Ladd, director of this institution at Rolla, Mo., has issued a collection of photographic reproductions showing the interesting and attractive features about the campus and buildings, including a number of views of the shops, the ore-dressing plant, etc.

Iron and Steel Institute—The autumn meeting of the Iron and Steel Institute, of Great Britain, will be held in the house of the Austrian Engineers' and Architects' Society in Vienna, Austria, Sept. 23 and 24.

The following is a list of papers that are expected to be submitted:

1. "On the Development of the Iron Industry of Austria since 1882." By W. Kestranek.
2. "On the Styrian Erzberg Iron Ore Mines." By Prof. H. Bauerman.
3. "On Steel and Meteoric Iron." By Prof. F. Berwerth, Vienna.
4. "On the Determination of the Quantity of Blast Furnace Gas for a given make of Pig Iron." By Prof. Josef von Ehrenwerth, Leoben.
5. "On the Application of the Laws of Physical Chemistry to the Metallurgy of Iron." By Baron H. von Jüptner, Vienna.
6. "On Case Hardening of Mild Steel." By C. O. Bannister and J. W. Lambert.
7. "On a New Blue-Black Paint as a Protective Coverning for Iron." By F. J. R. Carulla, Derby.
8. "On the Hardening of Steel." By L. Demozay, Unieux, France.
9. "On the Structure of Hardened Steel." By Percey Longmuir, Sheffield.
10. "On Case Hardening." By G. Shaw Scott, Birmingham.
11. "On the Ageing of Mild Steel. Further Notes." By C. E. Stromeyer, Manchester.
12. "On the Economical Distribution of Electric Power from Blast Furnaces." By B. H. Thwaite, London.

Industrial

The California Ore Testing Company, San Francisco, Cal., announces the completion of its new plant which replaces the testing works of A. A. Hanks and F. L. Bosqui, destroyed by fire in April, 1906. The success of the old plant led to the incorporation of the new company and the building of a new and larger plant to replace the one destroyed. The business will be carried on under the general management of A. A. Hanks with F. L. Bosqui as consulting engineer and metallurgist. The new building at Bay and Jones streets, San Francisco, covers a ground space of 45x137½ ft., and the equipment includes the following machinery: Blake crusher, sampler, 5-stamp battery of 1050-lb. stamps, 3-stamp battery of 350-lb. stamps, crushing rolls, copper plates, concentrating table, Frue vanner, slime table, tube mill, leaching tanks, slime agitators, vacuum filters, zinc boxes, grinding pans, and the usual laboratory and experimental apparatus. A reverberatory furnace is to be added at once.

Trade Catalogs

Receipt is acknowledged of the following trade catalogs and circulars:

Allis-Chalmers Company, Milwaukee, Wis. Book No. 5004. Directions for Erecting Gates Elevators. Pp. 12, illustrated, paper, 6½x9½ in.

The J. George Leyner Engineering Works Company, Littleton, Colo. Bulletin No. 512. Model Six Water Leyner Drill. Pp. 48, illustrated, paper, 6x9 in.; 1907.

The Westinghouse Machine Company, East Pittsburg, Pa. Catalog S-2, No. 7008. The Westinghouse Storage Battery for Stationary Use. Pp. 40, illustrated, paper, 6x9½ in.

International Metallurgical Company, El Paso, Texas. The W. Townsend Smith Patent Improved Metallurgical and Cyanide Process and Apparatus. Pp. 16, illustrated, paper, 6x9 in.

Construction News

Boundary Falls, British Columbia—The Dominion Copper Company has had plans prepared for a two-stand copper converting plant to be installed shortly at its smelting works at Boundary Falls, in the Boundary district of British Columbia. W. C. Thomas is the resident manager.

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

August 28—The Executive Committee of the Anti-Debris Association is stirring up another hydraulic mining war. It has agreed to arrange for a guard of 40 to 50 watchmen (called "spies" by the miners) who shall go fully armed into such sections of the county as Gold Run and Dutch Flat, to resent any resistance the miners may offer when they wish to inspect the mines. Some of these watchmen have reported to the Anti-Debris Association that certain hydraulic miners were violating the law and conducting illegal mining operations, and that though working behind dams, when the dams were filled they are blown up to allow the accumulated debris to reach the rivers. When these watchmen have sought to visit the ground they have been met by armed men who tell them to leave. The Association says it is determined to exercise its "rights" and will arm its men. The fact is these watchmen are not in any manner officials, but are acting for a private organization. They are enemies to the miners and are so recognized. The projected move to arm these watchmen will be certain to arouse strife again in the hydraulic regions of the mountains. If any watchmen of the commission have been denied access to the mines, it is very likely that the miners had reasons for being sore against them individually and not as agents of the Anti-Debris commission. Ever since the suppression of hydraulic mining the miners of some of these districts have been a long-suffering people. They have submitted to the mandate of the law and closed down their mines and secured employment in other lines of industry. Those who have had the fortitude to go ahead and build dams in accordance with the law have found in many cases that after building them in accordance with specifications they would not be accepted unless they were rebuilt upon other lines. It is nonsense to talk of expensive dams having been blown up.

The Anti-Debris Association committee on dredge mining also reported that the Pennsylvania Mining Company at Oroville had not complied with its agreement with the association to completely landlock its dredges, and the attorneys were notified to send an ultimatum that unless they comply with the agreement without further notificaation, a suit should be commenced at once to stop them and all other mines similarly violating the agreement. So the Anti-Debris Association has a chip on its shoulder not only for the hydraulic miners, but for the dredge miners as well.

A large restraining dam to comply with the Caminetti law is being built across the Greenhorn, Nevada county, near You Bet. With the completion of this great barrier, hydraulicking will commence at the Red Dog gravel mine, owned by J. S. Goodwin & Co. A temporary dam is to be built and a flume will carry a stream around the big barrier. It will be necessary to excavate to a depth of 10 ft. through slickens and gravel to reach the bedrock. To accelerate operations a bucket pump will be put to work, operated by an undershot water wheel. A space of the bed rock 26 ft. wide will be cleared for the base of the dam. Firmly planted and bolted into the rock the great log cribbing will rise to a hight of 35 ft. It is expected that hydraulicking will begin when the winter rains set in. Some of the gravel banks at this place are 200 ft. high.

Salt Lake City

August 31—The problem of ore transportation, which has for months past seriously handicapped producers in the camp of Bingham, is to be solved by the building of a new railroad. Such a scheme has been under consideration by F. Augustus Heinze and his engineers for some time and the filing of the articles of incorporation of the Bingham Central Railway in the office of the clerk of Salt Lake county on August 28 indicates that plans are about to mature. The proposed road will be about 50 miles long, including main line and branches. It is to be electrically equipped and will be operated in competition with the Gould, or Rio Grande system, for both passenger and freight traffic between Salt Lake City and Bingham, as well as between the mines and smelters. It is believed, also, that traffic arrangements agreeable to the Harriman railroads will result and that passenger trains will arrive and depart from the depot to be erected shortly within the business district of Salt Lake City and to be used for suburban electric lines operated by the Utah Light and Railway Company, which is now controlled by Harriman.

The Rio Grande has had Bingham as exclusive territory heretofore by reason of an old agreement entered into between it and the Oregon Short Line Railroad Company, through which the latter agreed to leave the Rio Grande alone, the consideration being that the Rio Grande would keep out of other territory. But the Rio Grande has not kept pace with the development of the country, while the road presents today the rather unusual spectacle of being utterly unable to meet the demands of patrons by lack of equipment. When F. Augustus Heinze took over a control of the Bingham Consolidated Mining and Smelting Company, more than a year ago, he was not long in arriving at the conclusion that present transportation facilities were inadequate. It is proposed to enter the camp and reach the various mines through the Mascott tunnel of the Dalton & Lark mine. This tunnel will soon be completed and equipped to the Ohio Copper mine (another Heinze enterprise). It is claimed that ore from this mine will be delivered to the mill now being built by this company at a cost of from 4 to 5c. a ton; while the output of other mines, it is claimed, can be handled much cheaper than is possible with present facilities.

Duluth

Sept. 2—Strike conditions on the Mesabi range remain as they have been, with the center of the disturbance at Eveleth, where there have been some rather severe beatings of strikers by deputies the past week, necessary doubtless, for the preservation of order and for endueing the strikers with a respect for law. The underground mines are gradually getting to work again; at the Adams-Spruce, at Eveleth, there are 950 men out of a usual 1500, and elsewhere the number is improving gradually, but many of the new men coming in are induced by the Western Federation to leave without going to work. Shipments are steady and Minnesota should send forward this month about 4,600,000 tons of ore, which is good enough, considering. There is a sharp curtailment of schedules by many independents, especially of non-bessemer mines, as an instance of which may be noted the Kinney of the Republic Iron and Steel Company, which started out for 400,000 tons and is now down to an expectation of 135,000. Of course, this is exceptional and is due to physical conditions as much as to any other cause.

Several new shippers, on various ranges, are getting started. The Wacouta, near Mountain Iron, is one which should produce a very considerable tonnage this fall. It made its first product last week, from steam shovels. The St. James, an underground mine on the eastern Mesabi belonging to Corrigan, McKinney & Co., is about ready to begin production. It is well equipped with electric underground

trams, large skips and ample pumping and hoisting capacity.

The Minnesota State tax commission is calling on mine-owners of the State to appear before it on Sept. 5, to show true values of their mines and to answer if their properties are not scheduled at a rate less than other real property. Many mine-owners believe that this is preliminary to a stiff advance in tax valuations and a very heavy increase of taxes. More probably it is a step toward equalizing mine values, which are now glaringly unfair in some cases. There are a few companies that have been able to maintain taxes at far less than the proper proportion. It is only right to state that this does not refer to the Oliver Iron Mining Company. A very considerable raise in the taxable valuation of mines will have little effect on taxes themselves, for there is just about so much money to be used in running the iron range towns, the mines have to pay most of this, and if the valuation is increased the rate will be cut almost commensurately. In the matter of the State and county taxes an increased valuation will correspondingly increase the tax, but these are very small parts of the total tax, and it is very likely that the State tax will be practically wiped out in Minnesota in another year.

The Foundation Company, of New York, which a short time ago completed a concrete shaft on the Syracuse property, has just completed another on the Bangor, both mines near the shores of Embarras lake, eastern Mesabi. The ground through which these have been sunk is quicksand and boulders, etc. The Syracuse shaft was completed to bedrock by the company and then turned over to the mine operators. Now, after sinking 20 ft. in rock a very large flow of water has drowned out the men and raised in the shaft so that large pumping capacity is being installed. It is supposed to come from the lake through the rock, and elaborate preparations are being made to care for it. These shafts have been very costly and no less than three were sunk on the Syracuse before one was ledged. The mines are not large and the cost of development is such as to make ore mining a very costly undertaking.

Sunday work at stock-piles and in railway yards at Old Range mines has been stopped since the Mesabi began shipping once more in quantity. These Old Range shipments were so heavy as to tax the roads and clean out stock-piles that have not been forwarded in many years. Such mines as Chapin, Norrie, Ashland, Lake Superior and other large producers, whose stock-pile grounds are almost never cleared off, are now empty.

The Michigamme river is to be diverted by the Loretto Iron Company so that any danger of its breaking into mine workings and flooding them will be averted. This river did once break into the Mansfield mine, drowning nearly 30 men, and it is quite close to the Loretto and other mines near by.

Corrigan, McKinney & Co. are equipping their Crystal Falls district mines largely, and are developing extensively there. During the past two years they have practically opened and equipped six properties there, and the work is not yet over.

The two chief drilling firms of the Lake Superior region, Cole & McDonald and E. J. Longyear, have about 130 drills running at present, most of them on the Mesabi, but a number, especially of diamond drills, on other Lake ranges, and even in the copper regions. Several are in the Cuyuna district and some in what is called the "Hiago range" lying between Minnesota and Wisconsin, south of St. Paul, where work of exploration has been under way for some years on a small scale.

The new Empire mine, Cascade range, south of Marquette, has begun shipments of ore and will continue for the remainder of the season. It is a silicious property and is operated by Oglebay, Norton & Co. Operations preliminary to mining have been under way for 18 months or more.

Vastly increased ore deposits have been found recently in section 9, 58-17 and surrounding lands where the deposits of the Franklin, Bessemer, Victoria, Union and other properties were supposed to have been pretty well exhausted some time ago. The ore of the Oliver group is quite likely to connect through to the Franklin group and make a single deposit, partly separated by horses and intrusions of rock. Owing to the change in conditions there railway grades are maintained with great difficulty, and an enormous amount of stripping and surface development is under way now.

Toronto, Ont.

Aug. 23—Several important discoveries of gold in northern Ontario have recently been made. A rich find reported to have been made near Night Hawk lake, lying west and slightly south of Abitibi lake, by two Swedish prospectors is causing much excitement and has resulted in a rush to the district. The deposit of gold-bearing rock is said to be 130 ft. wide and traceable for two miles. The fact of gold having been found in this locality is officially confirmed by Deputy Minister of Mines T. W. Gibson, who has received several good samples of the ore, which show visible free gold. The department has also been advised of the discovery of gold at the headwaters of the Black river, a tributary of the Abitibi river. Prof. W. G. Miller will investigate these discoveries.

Another locality where a find has been made is near Fort Matachewan, about 80 miles up the Montreal river from Latchford. Near the apex of what is known as the South Bend of the river, two miles west of Willison township, W. H. Fletcher and Joseph L. Garvin and party have located 15 gold claims, having discovered many large milk-quartz veins, carrying good gold value. J. T. Carmody, a well known Cobalt mining engineer, has made an inspection of these properties on behalf of a financial institution and confirms the importance of the discovery. One vein, when stripped, was found to be 35 ft. wide; the claims show free milling gold on the surface.

London

Aug. 17 — Most welcome news comes from Cornwall to the effect that Carn Brea & Tincroft, Ltd., has been able to pay a dividend as the result of the last half-year's working. This is the first time that these mines have made a divisible profit since they were registered as a limited-liability company in 1900. The amount of rock treated during the half-year, January to June, inclusive, was 28,820 tons, producing concentrates amounting to 339 tons, realizing £37,924. The average production was 26.42 lb. of concentrates per ton of rock crushed, and the average price of concentrates was £111 11s. 5d. Copper ore produced £404; arsenic, £2097; and wolframite, £2200; other receipts brought the total income to £46,295. The working costs were £39,387 and lords' dues £2390, leaving a net profit of £4518. Out of this £3860 has been distributed as dividend on the preferred shares, which is at the rate of 20 per cent. per annum. The ordinary shares still get nothing. The manager's report is encouraging, for it shows that in several parts of the mine good bodies of ore are being opened up.

Several of the English lead companies are doing well at present. One of these is the Weardale Lead Company which has been working deposits in the limestone district of county Durham for a good many years. During the year ended June 30, the company mined 4331 tons of ore producing 3230 tons of pig lead which realized on the average just over £19 per ton. This is a considerable increase over recent years. Two years ago the output of lead was 1691 tons and a year ago 2370 tons. The sales of lead for the past year brought in £63,658 and sales of fluorspar £3559. Working costs were £36,668. The profit for the year, after adjusting the accounts for stock in hand, was £30,193. Out of this, £14,687 has been paid as dividend being at the rate of 17½ per cent. on the paid up capital. In addition £10,000 has been used to extinguish the debenture debt, £2500 has been placed to reserve, and £2500 allocated to extra exploration work. In looking through the records, it is noticeable that the working costs have been considerably reduced during recent years, which is some indication of good management on the part of Errington Thompson.

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

Alabama

ETOWAH COUNTY

Red Ore Mining Company—This company, Gadsden, owning 20,000 acres of iron and coal lands in Altoona and Greasy Cove districts will begin the development of several iron and coal mines. Obal Christopher, Gadsden, Ala., is superintendent.

Crudup Iron Ore Company—This company has been formed in Chattanooga, Tenn., to develop iron ore deposits near Crudup and Attalla.

Arizona

YAVAPAI COUNTY

DeSoto—The mine at Middleton, and the mill at Humboldt have been closed down indefinitely. The only reason given is lack of ore.

Knight Copper Company—This company has cut 42 ft. of manganese ore in its mines near Humboldt. The ore is said to run high in copper.

Mount Tritle—A new hoist and a concentrating plant is being installed at these mines, 12 miles south of Prescott. Some high-grade ore has been shipped during the past two months.

Parker—Five stamps are being added to the mill at these mines, near Cherry. The ore is mostly free milling, about 70 per cent. being caught by amalgamation.

Spec—This group of mines near Mayer, was purchased less than one year ago by Alfred Popkess, for the sum of $2,500. He has just disposed of the same for $100,000 to Los Angeles capitalists. Development work disclosed large bodies of copper ore. A large amount of ore is ready for stoping.

California

BUTTE COUNTY

Midas—O. B. Lefurgey has made arrangements for a 20-stamp mill on this property at Enterprise. A 450-ft. tunnel has been run.

CALAVERAS COUNTY

Reid—From this mine near San Andreas, recently sold to Alaska men, some gravel is being taken which yields $20 per cu.yd.

EL DORADO COUNTY

Isabel—Ore from this mine, Garden valley, is being shipped to the Selby smelter. The vein is about 10 ft. wide.

INYO COUNTY

Casa Diablo—The mill machinery, including 10 stamps, concentrators, etc., is in place and work has commenced on a cyanide plant. About 50 men are employed.

Four Metals Mining Company—This San Jose company is opening a number of claims at Cerro Gordo.

Union—A 5-ft. ledge of high-grade galena has been found in a new drift south from the 900 level of the new shaft on this old mine at Cerro Gordo. Some zinc ore is also being shipped.

MODOC COUNTY

North Star—At this mine, Fort Bidwell, the men are working on a small vein of rich ore. The ore is sorted and piled awaiting the erection of a mill.

MONO COUNTY

Pittsburg Liberty — This company, Masonic, is putting in a cyanide plant and a new hoist.

NEVADA COUNTY

Banner—The 700-ft. level has been reached in the unwatering of this mine, Nevada City.

Canada Hill Consolidated—At this mine, Nevada City, formerly known as the Charronat, a 6-ft. ledge has been found in the 1400-ft. level.

Gold Flat Consolidated—Jos. Weissbein will resume work on this mine near Nevada City. There is a good plant on the property.

Gravel—J. S. Goodman and others are about to put up a hoist and a mill on the blue lead gravel channel near You Bet. The old workings are being cleaned out.

Starr—This mine near Washington, some time idle, is to be reopened by Wisconsin men who have bought it.

Union Hill—This mine near Grass Valley after being closed down for 15 months, has resumed operations. The unwatering was recently completed. The mill is running on a good quantity of ore.

Yuba—The mill at the mine above Washington, which has recently been enlarged, has begun crushing ore.

PLACER COUNTY

Carlisle Mining Company—At this mine above Cisco an 8-stamp mill is in place and a 20-stamp mill is being put up.

Three Queens—The vein is being opened by three tunnels at intervals of 1000 ft.

RIVERSIDE COUNTY

German-American Mining and Milling Company—This company has been organized in Los Angeles to open certain mines at Indian Camp, Pinon district, in the desert section of the county. The directors are F. C. Longnecker, S. L. Kistler and A. N. Hamilton

SHASTA COUNTY

Brackett—This mine in Lower Springs district has been bonded to H. O. Cummins, who is also working the Milton mine and installing a new electric hoist.

Martin—This mine on Grizzly gulch has been purchased by E. & O. Sherk and John J. Downey of Nebraska, and a 5-stamp mill will be put up.

SAN BERNARDINO COUNTY

Gold—Gold ore has been again discovered on the summit of Old Baldy, above the head of San Antonio cañon.

Kelso Mining and Milling Company—This company, owning seven claims nine miles from Kelso on Providence mountain, is sinking a 300-ft. shaft and will then crosscut.

SIERRA COUNTY

Osceola—This mine at Alleghany has been leased by James Freeborough of Poker Flat, who has commenced reopening the old works.

Von Humboldt—This old mine near Alleghany has been acquired. by William Wheeler and associates of San Jose, and is to be reopened at once. The Fourth of July property near by has also been taken over by San Jose men.

SISKIYOU COUNTY

Dredge—A new mining dredge is being built on the South Fork of Scott river at Callahans, for which the Risdon Iron Works has the contract.

TRINITY COUNTY

Golden Jubilee—At this mine a new cyanide plant of 20 vats and a 20-stamp mill are nearing completion.

Headlight—This property has been bonded to a Philadelphia company and work is being done to ascertain its true value.

Yellow Rose of Texas—This mine has been leased and bonded to the Balias Company of Montana.

TUOLUMNE COUNTY

Kanaka—Operations will be resumed on this mine, Groveland, as soon as men can

be procured; a new 10-stamp mill will be installed. Geo. De Sallier is superintendent.

Soulsby—At the 500 level in the Pennsylvania shaft of this property at Soulsbyville, a 24-in. ledge, supposed to be the old Soulsby chute, has been struck.

Eureka—T. & W. Cochran have commenced work on the mine near Jacksonville, and have put in a gasolene hoist.

Nonpareil—Grading for the new 20-stamp mill of this mine, Big Oak flat, has been completed.

Colorado

LAKE COUNTY—LEADVILLE

American—This mine, on the south side of Fryer hill near the Tip Top, is shipping 25 tons daily of a good grade of silicious ore. The property is under lease to Thompson, Collins & McKeen.

Big Sunflower Mining Company—This company has secured a lease on the Nisi Prius group, Rock hill, and work has been begun. The old Shadbolt shaft, now down 200 ft., will be sunk deeper. The property will be operated by an electric plant.

Deer Lodge—Work has been resumed on this property at Fryer hill, which has been idle for 20 years. The shaft is down 100 ft.; it was filled with ice which preserved the timbers. It is now being cleaned out and when this work is completed work will be commenced at the bottom. The shaft will be sunk 50 ft. deeper.

Dolly B. Group—After years of expensive litigation P. K. Connolly at last secured his title to this group of claims—Big Evans gulch. The Resurrection Gold Mining Company withdrew its last protest and the local land office made the formal entry dismissing the protest. Connolly filed his locations on the group in 1893 and sunk the shaft on the Dolly B. to a depth of 900 ft. In 1894 the Resurrection company, then operating on Little Ellen hill, sought to prevent Connolly from securing title to the Dolly B. group. The case was carried to the different appellate courts and to the supreme court.

International Mining Company—This company, operating at Robinson, Summit county, has opened the famous Robinson ore shoot in its deep shaft. The ore, a lead sulphide, was caught at a depth of 1100 ft., and it is now all over the bottom. The old Robinson mine was first opened in 1878; the ore shoot was followed for 2000 ft. and in that distance yielded several million dollars worth of ore.

Morocco Company—This company, operating at the foot of Harrison avenue, is shipping 500 tons of manganese ore per month to the steel works at Pueblo. In addition considerable prospecting is being carried on in the lime porphyry contact. The manganese ore shipments pay the expenses of operating the property.

Indian Territory

CHICKASAW NATION

Grahamite Company—This newly incorporated company controls extensive tracts of land containing deposits of grahamite and gilsonite which it intends to develop. Henry Dorsey, Dallas, Tex., is secretary.

Kentucky

HOPKINS COUNTY

Searchlight Coal Company—This company has been organized in Indiana to develop a tract of 2000 acres of coal lands in Hopkins and Christian counties.

PERRY COUNTY

Sale of Large Coal Tracts—G. S. Beckwith & Co., of Cleveland, Ohio, representing syndicates of foreign and American capitalists, purchased more than 100,000 acres of coal lands in Kentucky and West Virginia. The tract bought for the American syndicate includes 80,000 acres in Leslie, Perry, Knott and Letsher counties, Kentucky. That purchased for the foreign syndicate comprises 25,000 acres of coal lands in the New River district, West Virginia. The transactions involved large sums, many of the properties purchased being in operation.

Michigan

HOUGHTON COUNTY—COPPER

Arcadian—The new vertical exploration shaft on this property has reached a depth of about 40 ft. The shaft is being sunk 3500 ft. east of the present Arcadian vein. It is intended to sink to the 200-ft. level and crosscut east and west to the sandstone formation. This will give a cross section of about 5000 ft.

Calumet & Hecla—The steel frame work for the large re-crushing mill is nearly complete. The steel frame work for the new engine house at No. 16 shaft is about complete and the new pattern storage building is ready. The wires have been strung from the substation to No. 5 shaft which is to carry current for the new installation of electric pumps.

Trimountain—The concrete and steel work in No. 2 shaft has been completed and both compartments are in commission. It was necessary to put in concrete walls from the surface to the ledge, a distance of about 90 ft.

Missouri

JOPLIN—ZINC-LEAD DISTRICT

Ino—Joplin is to have a daylight mine if the plans of C. M. Sheldon, owner of this mine on the Taylor land, are carried out. The ground is hard to hold and in order to make it safe for the men to work the mine will be caved, and the dirt all taken out to the surface. An incline tramway will be built from the bottom to the hopper for hoisting dirt, and along this incline steps will give entrance to the mine.

Mexico-Joplin Land Company—A 500-acre tract of land located near Toms station, on the Frisco north of Joplin, owned by this company, is being developed and fair productions are made regularly. The Amazon Lead and Zinc Company purchased this land about three years ago and paid a part of the purchase price, but a disagreement among the stockholders caused the property to revert to the original owners, who are now pushing developments.

New Century Company—This company, operating in the Galena district, has completed and started its concentrating plant. The dimensions of the building are 154x28 ft., and the equipment includes two 12-in. crushers, five sets of 30-in. rolls, one set of 14-in. rolls, four 3-cell roughers, two 6-cell cleaners, one 6-cell sand jig, two Kirk sludge tables, nine elevators, and several screens, one 150-h.p. Bessemer gas engine. The building and machinery represent an investment of $20,000. The company has four shafts in ore on the lease. P. H. Puckett, of Galena, is superintendent of the property, which is owned by New York and Connecticut capitalists.

Montana

BUTTE DISTRICT

Anaconda—Five feet of 3½ per cent. copper ore was struck a short distance above the 2800-ft. station of the High Ore mine while the shaft was sinking. This proves that the orebodies are still going down. The Neversweat mine is entirely closed on account of the strike of machinists, and the Gagnon, owned by Trenton of the Amalgamated, is running only half capacity by reason of insufficient air.

Barnes-King—Affairs are now in the hands of Butte men, five of the eight directors being selected in Butte. The directors will meet in a few days and elect John Gillie, manager of the Amalgamated mines, president. Superintendent Brule resigned and will be relieved within two weeks.

Boston & Montana—The West Colusa mine is still closed down. The East Colusa has been producing 200 or 300 tons a day, for some time.

Colusa-Leonard Extension—The company cut a 2-ft. vein of commercial copper ore at 810 ft. today. The ore is of the same character as that found in the big mines of the hill.

Davis-Daly—On account of a shortage of air at the Original mine, work in the crosscut from the 1800-ft. station has been suspended pending a settlement of the machinists' strike. Operations in the Smokehouse have also been stopped, the pumps having been pulled and the wires taken from the pulleys of the head frame.

North Butte—Sinking in the main shaft

has been resumed. The output is about 1300 tons a day.

Parrot—The company has begun raising ore from the Little Mina, which had been closed down seven years, and mining Clear Grit through the shaft on Little Mina.

Nevada

ESMERALDA COUNTY—GOLDFIELD

Combination Extension—A large vein has been cut in the north crosscut at the 400-ft. level. The ore is of milling grade. The mine is making a large amount of water and will shortly require better pumping facilities.

Florence Extension—The No. 2 shaft is down 220 ft. The ore in the 155-ft. level is chiefly of milling grade.

Jumbo Extension—This company has extended the leases of the Jumbo Extension Leasing Company until July 1, 1908.

Kavanaugh—The shaft on this mine, which is out in the eastern portion of the field near the Rochester and Etawanda, is down 75 ft. A good quartz vein has been cut and arrangements are being made to drift on it.

St. Ives—The main shaft has reached the 350-ft. level and has been connected with the St. Ives Leasing Company's shaft. Some very high-grade ore is being broken in the 100-ft. level. The 3-ft. vein in the 300-ft. level is badly broken up, but good specimen ore is visible.

Simmerone—A good vein has been cut in the east drift at the 265-ft. level.

NYE COUNTY—BULLFROG

Gold Bar—A contract has been let for the building of a 10-head mill. Operations are confined to development work.

Golden Grotto—The tunnel has been extended a distance of 240 ft. and has already intersected several small gold-bearing veins that yield good assay values.

Golden Sceptre—A new tunnel is being run with the view of cutting the Hobo vein.

Montgomrey - Shoshone—Shipments of ore are being made at the rate of 150 tons per week. The new mill will be running within a week or two.

Swanhilda—Work has been resumed on this property and the shaft will be continued from the 100-ft. level to the 500-ft. level.

Homestake King—A rich ore shoot is being opened between the 300- and 400-ft. levels.

NYE COUNTY—MANHATTAN

Big Mogul—The shaft has cut a rich vein at a depth of 50 ft. Some of the seams are of shipping grade.

Bonanza Copper—The shaft has reached the 145-ft. level and is in a well mineralized formation.

Buckboard—This property has been opened to lessees and many claims have already been taken up. Several of the lessees are already on good ore.

Mustang Sedan—Work has been resumed under the management of Frank P. Davis, formerly of Tonopah. The company has been reorganized and a large sum has been placed in the bank as a working fund.

NYE COUNTY—TONOPAH

Midway—A shipment of 143 tons of high-grade ore has been sent to the smelters. Development is being carried on in the lower levels with gratifying results. In addition to the chutes of rich shipping ore large quantities of ore of milling grade are being developed.

Montana—The new mill has been successfully started by the designer, F. L. Bosqui, of San Francisco. It is a 40-head mill, but owing to lack of electric power, only 20 stamps will be dropped for some months. The stamps are of 1050-lb. weight and the mill capacity is 200 tons per day.

West End—A good grade of ore is showing in the vein in the 275-ft. level. The new 55-ft. gallows frame has been erected over the new shaft and is being connected with the hoisting plant.

New Mexico

GRANT COUNTY

Burro Mountains—At present Leopold is the most active camp in the Territory. The Burro Mountain Copper Company has shown the orebody of its famous Sampson mine to be 800 ft. long, 300 ft. high and 100 to 200 ft. thick. On the Boston claim, about 800 ft. north of the Sampson, the new shaft has penetrated 60 ft. of ore. Manager Wayne, of the Copper Gulf Development Company, has installed pumps in the Virginia and Copper Gulf shafts and will sink them below water level. The Virginia since its recent reopening is sending 3 cars a week to the Calumet & Arizona smelter at Douglas, Ariz. The Chemung Company, which is operating the mines of the Tyrone Development Company, has brought in a new double-drum hoist, with which it will do sinking; it has three shafts, all showing ore and over 300 ft. deep. Four claims, near the Copper Gulf mine, have been purchased by F. L. Kreider, of San Francisco, and incorporated as the Leopold-Tyrone Copper Company. A contract has been let to G. A. Easton to sink the Leopold-Tyrone shaft to 200 ft. depth.

Lordsburg—The new machinery at the shaft of the "85" mine, in the Shakespeare district, is about ready for operation. The owner of the White Signal mine, 30 miles northeast of Lordsburg, has installed a new air compressor and is developing the property.

SANTA FE COUNTY

Cerrillos District—The present demand for zinc ore has caused the reopening of some of the old silver-lead mines that ran into zinc with depth. A contract has been let for developing the Bottom Dollar mine by its new owners; a new shaft is being sunk on the Fairview, and both the Grand Central and Cash Entry are working a few men.

Madrid District—Six coal mines have been reopened and more than 100 miners are at work getting out the various grades of coal that the field affords. Part of the output goes in wagons to the Santa Fe Company at San Pedro.

San Pedro District—Superintendent Wm. Tudor, Jr., of the Santa Fe Gold and Copper Company, resigned on July 1 and was succeeded by B. H. Case. The new air compressor is now furnishing air for 15 rock drills, which are run by Mexican machine men with good results. Production has increased to 115 tons of sorted ore a day, carrying 5 per cent. copper. The blast furnace will be lengthened so as to double its capacity, to handle the increased output when the new mill is built. The mill will raise the second-class ore from 2 to 15 per cent. copper. This ore is chalcopyrite in a gangue of garnet and quartz, and it will be given a magnetic roast and the chalcopyrite then picked out on Wetherill separators. Laboratory experiments have shown a saving exceeding 80 per cent. of the copper by this system. About 350 men are now employed by the Santa Fe Company in mining, smelting and teaming.

Oregon

BAKER COUNTY

Currey Placer—Dr. H. E. Currey and partners have stopped work on their placer mines, near Unity, for lack of water. The final clean-ups showed a profit for the season.

Eagle Mountain—About 1000 tons of ore of average grade is being shipped to the Sumpter smelter for a test. Shipment of ore from the Peacock, in the Seven Devils country, has already begun by way of Council. A 3½-mile tramway will be built from the Peacock to Snake river on the Oregon side, so as to take advantage of the new Northwest Railroad. Webb & Carroll have sold the company 320 acres of patented land adjoining claims already owned.

Indiana—The manager of this mine, situated 20 miles east of Baker City on the copper belt, has renewed sinking in the main shaft and will proceed from the 400-ft. level perhaps as deep as 1000 ft. Cross cutting will be done at the various levels.

Poorman & Sovereign—The new shaft is well down on the Sovereign and the tunnel on the property is in about 110 ft. Machine drills are being installed.

South Pole—Manager P. A. Brady is shipping ore to the Sumpter smelter. Some of the ore shipped assayed $367.20 per ton.

South Dakota

LAWRENCE COUNTY

Branch Mint—President Hardin has arrived from New York to start the 800-ton cyanide mill at Galena.

Connie May Morris — William and Henry Brasch and James Connors sold, after 31 years of development, this property adjoining the Clover Leaf at Roubaix, to eastern men for $35,000.

Dotson—Surface operations have disclosed free-milling gold ore 29 ft. wide with footwall of granite.

Echo—Officers of the company have authorized over 2000 ft. of crosscutting and drifting.

Gold Eagle—The annual meeting resulted in new management: A. M. Masters, president; John S. Sheppard, vice-president; G. M. Luttrell, secretary, all of Jacksonville, Ill. The stock has changed hands to local, Illinois and Nebraska people. Mr. Masters will be superintendent, and has ordered the shaft sunk another 40 ft.

Utah

IRON COUNTY

Jennie Gold Mining Company—This company is arranging to increase the capacity of its mill and to install a cyanide department.

JUAB COUNTY

Crown Point—Machine drills are used in the development of this property.

Iron Blossom—A hoisting equipment is being installed.

Yankee Consolidated—The company is sinking a new permanent working shaft; it has been completed to a depth of over 400 ft.

SALT LAKE COUNTY

Yampa—Good progress is being made with the construction of the new aërial tramway in Bingham which is to operate between the mine and smelter in the lower part of the camp.

Utah Consolidated—Developments made during the past two months have resulted in opening extensive new orebodies which have added several years to the life of the mine. If the company is not more seriously handicapped for the lack of transportation facilities the production of copper metal from the mine will equal that of last year.

Canada

ONTARIO—COBALT DISTRICT

Ore Shipments—Shipments of ore from Cobalt for the week ending August 24, were as follows: Buffalo, 60,000 lb.; Coniagas, 128,140; Foster, 64,000; Kerr Lake (Jacobs), 63,780; Nipissing, 247,055; Townsite, 66,000. Total 628,975 lb.

Calverley-Weltlanfer—This property, in the southern part of the Cobalt area, is being developed by a company in which Buffalo capital is largely invested. Camp buildings have been put up and over a mile of trenching done unearthing some promising veins.

Coniagas—Concentrating machinery is being installed consisting of a 90-h.p. engine, 100-ton crusher, three belt elevators, three jigs, two 50-ton rolls, two vanners, three tumbles and one Huntington mill. The plant will have a daily capacity of 100 tons and will treat low-grade ore, a quantity of which is on the dump.

Silver Queen—The report of an assay of a recent strike shows 7000 oz. to the ton.

Trethewey—F. C. Loring, manager, reports that much first-class ore is being taken out in addition to quantities of low-grade, the company having nearly 8000 tons of 40-oz. ore on the dumps. A car of between 19 and 20 tons recently shipped to the Copper Cliff smelter yielded $29,000.

Kerr Lake (Jacobs)—A new plant comprising two 100 h.p. boilers, with a 14-drill compressor and steam hoist, has been installed. A tunnel has been run in on vein No. 7 from the shore of Kerr Lake for a distance of about 250 ft. A shaft is being sunk on this vein near the shore and at 40 ft. depth a junction of two branch veins has been found.

Mexico

GUADALAJARA

Electric Power for Etzatlan—The transmission of electric power from Guadalajara to the Etzatlan and Hostotipaquillo districts is again under consideration. Negotiations are under way between the Compania de Tranvias, Luz y Fuerza de Guadalajara and a number of mining companies in the district named for a supply of about 2000 h.p. at a price between $100 and $120 per h.p. year.

Etzatlan Smelter—This copper-smelting works has been sold by W. R. Ramsdell and associates to Carmack Bros., of Mexico City, and M. E. Raines; the latter is to superintend the plant and to assume the management.

Mexican Western Development Company—This company, which recently purchased the old Rosario, La Luz, Delicias, Valenciana, Santa Eduviges and Restauradora mines in the Bramador camp, is making plans to develop the mines by a tunnel driven below the old workings. A road is to be built from Bramador to the Pacific port at Chamela for the transportation of machinery and supplies.

JALISCO

Jalisco Mining Company—Capitalists of Los Angeles, Cal., have purchased the mines of this company in the San Sebastian district.

Europe

RUSSIA

Advices from Ekaterinburg, Russia, report the recent discovery of a platinum deposit in the Northern Ural district, on the Koiva. The platinum was discovered on the border of Prince Abamelek-Zararieff's, Count Schouvaloff's estates, and the Treasury domains, in the form of ore. It is added that it is found at no great depth from the surface. Platinum has also been found in the Zlatoustoff mining district, on the River Upudje, on the Treasury Estate of Artinsk. Mining parties are now on their way to these districts to investigate the value of the discoveries. The discovery in the Artinsk district has caused particular surprise, since in that part neither platinum nor gold has been known to exist up to the present time. The report says further, that claims and allotments of platinum deposits continue to be made in increasing numbers in the northern Verchotursk circuits, near the Bogoslov factories. Among others, one Gerke made 50 claims, and transferred his rights thereto by sale to the Platinum Producing Company, Ltd., which held the platinum mines of the Nijni Turinsk Treasury estate (in the southern Verchotursk circuit) up to this year. Now that company is transferring its activities to the northern Urals.

Australia

NEW SOUTH WALES

Cobar—With the view of doubling the output of copper from the mines, the Great Cobar Company is erecting an annex to the smelter at Cobar at a cost of $500,000. The new plant will consist of three blast furnaces, with an output each of 500 tons per day. There will also be two compound air compressors, each capable of driving 25 rock drills, while electrical machinery will drive a number of motors about the mine and supply electricity to three automatic conveyers. Two 25-ton electric locomotives and some electric winches will also be employed between the mines and smelter. The ore will be delivered into two rotary breakers, each capable of breaking 120 tons of ore per hour, and thence delivered into tray conveyers electrically driven. These conveyers deliver into an ore-storage bin of about 1500 tons capacity. From these bins ore will be loaded into 30-ton trucks and drawn by an electric locomotive to the main storage plant. A sampling house will be installed in connection with the bins, to sample 250 tons of ore per day. The metal will be tapped from the fore-hearths into 10-ton ladles, operated by a 40-ton electric crane. The matte will be blown up in 15-ton converters to copper, which will be treated at the company's refinery at Lithgow, as hitherto.

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, Sept. 4—The coal trade in the West continues in good shape, with an unusual demand for the season. Some complaints of car shortage and delays in transportation are beginning to be heard; and these will probably increase as the season advances and the railroads begin to be busy with grain freights. General reports, however, do not indicate any lack of supplies at the principal consuming centers. The Northwest, at least that part of it which receives its supplies by the Lakes, seems to be pretty well stocked; and there will be less rushing of late cargoes than usual.

In the East the bituminous trade is in good condition, and consumers are taking in supplies in good season. The coastwise trade is active, and supplies are not in excess of demand.

In the anthracite trade the summer discounts on large sizes are now at an end, and tidewater sales are at the full list price. The advance of 25c. per ton on steam sizes, which was referred to last week, has been made. It does not seem to check the demand for those sizes, which is still strongly in evidence.

Coal-traffic Notes

Shipments of coal and coke originating on the Pennsylvania Railroad Company's lines east of Pittsburg for the year to Aug. 24, were as follows, in short tons:

	1906.	1907.	Changes.
Anthracite.....	2,776,779	3,640,086	I. 863,307
Bituminous.....	20,321,095	24,711,096	I. 4,390,001
Coke.....	8,150,554	9,040,493	I. 889,939
Total.....	31,248,428	37,391,675	I. 6,143,247

The total increase in tonnage this year was 19.6 per cent.

New York

Anthracite

Sept. 4—The hard-coal trade is still marked by a shortage of steam sizes. The production of small coal has in no way decreased, so that the present stringency, unparalleled at this season of the year, marks either a growing consumption or a great desire to lay in winter supplies. Many of the companies are barely holding their own on their regular contracts, and are refusing orders for new business.

Trade in the prepared sizes is becoming slightly more active, particularly on all-rail business; tidewater shipments show no enlargement, partly because of the present unfavorable freight rates.

Broken remains at $4.65 and egg, stove and chestnut at $4.90. The advance of 25c. on the steam sizes, noted last week, still holds; pea coal now selling for $3.25; buckwheat, $2.75; rice, $2.15@2.25; barley, $1.75@1.85, f.o.b. New York harbor shipping points.

Bituminous

The Atlantic seaboard soft-coal trade continues strong. A heavy production is maintained, but an occasional advance in price is noted. The increased demand is about equally divided between tidewater and all-rail business. Cars are generally in sufficient supply and transportation is good, so that the mines can be worked to the best advantage.

The strong demand for coal in the far East continues, and heavy shipments are going forward in spite of the burdensome freight rates. The Sound is likewise calling loudly for more coal.

Coal in New York harbor is disposed of shortly after arrival, at advancing prices. Good grades of steam coal are now selling for $2.70@2.75, f.o.b. harbor shipping ports.

Vessels in the coastwise trade remain scarce. A few large boats are obtainable at slight concessions in price, but other quotations remain as last week, namely: Boston, Salem and Portland, $1.10; Providence, New Bedford and the Sound, 90c.; Lynn and Bangor, $1.25; Gardiner, $1.30@1.35, and towages.

Birmingham

Sept. 2— Coal production in Alabama is heavy. The Tennessee Coal, Iron & Railroad Company, pending the rebuilding of the tipples and washers at its No. 3 mines in the Pratt City division, placed its convicts in No. 2 mines. The coal output was reduced a little in the Pratt mines divison. The tipples at No. 3 have been rebuilt and the convicts replaced. The demand for coal is strong and every ton that can be mined is finding a ready sale; in fact orders on hand will require all the coal that can be mined for several months to come. Labor is still scarce at the mines; at least five thousand men would be able to find employment in coal mines in this vicinity. Good prices obtain for the product.

Chicago

Sept. 2—Increasing strength marks the coal market. Both eastern and western bituminous—with the exception of western fine coals—are in greater demand, and command prices that show no lowering, but in many cases a raising of market values. Buying has been good, both city and country, for all purposes. Eastern coals are advancing; the prices of several having increased Sept. 1. Anthracite is selling well and has reached its permanent winter price with the coming of September.

Western lump continues to advance, and is 10 to 15c. higher in value than last week. Lump quotations are $1.95@2.45, run-of-mine bringing $1.60@2.10 and screenings $1.10@1.30.

Eastern coals continue active, with no surplus on tracks of any kind. Smokeless has advanced to $3.35@3.50 for run-of-mine and $4.05 for lump. Hocking Valley sells well at $3.30, an advance of 15c. over previous quotations; Youghiogheny at $3.25 for ¾-in. and Pittsburg No. 8 at $2.95 for 1¼-in. are steady and somewhat scarce.

Pittsburg

Sept. 3—There continues to be a good demand, and prices are maintained on ordinary business, while on good tonnages it is believed a little shading could be done as formerly. Regular quotations remain on the basis of $1.15@1.20 for mine-run coal at the mine.

Connellsville Coke—There is a good demand for spot coke and prices are very firm. There is very little inquiry for coke on contract. Production continues heavy, with practically no change from week to week. The *Courier* in its summary gives the production for the week in both fields at 420,883 tons. Shipments aggregated 14,580 cars, distributed as follows: to Pittsburg, 4,863 cars; to points west of Connellsville, 8,751 cars; to points east of Connellsville, 966 cars.

Foreign Coal Trade

Exports of coal and coke from the United States for the seven months ending July 31, are reported as below by the Bureau of Statistics of the Department of Commerce and Labor:

	1906.	1907.	Changes.
Anthracite.....	1,253,411	1,489,511	I. 236,100
Bituminous.....	4,077,236	5,644,219	I.1,566,983
Total coal.....	5,330,647	7,133,730	I.1,803,083
Coke.....	435,477	512,036	I. 76,559
Total.....	5,766,124	7,645,766	I.1,879,642

These figures do not include coal bunkered, or sold to steamships engaged

in foreign trade. The coke exported went chiefly to Mexico and eastern Canada; the distribution of the coal was as follows:

	1906.	1907.	Changes.
Canada	3,878,821	5,335,966	I.1,457,145
Mexico	650,763	654,559	I. 3,796
Cuba	398,677	463,466	I. 64,789
Other W. Indies	204,599	242,493	I. 37,894
Europe	62,102	108,997	I. 46,895
Other countries	135,685	328,249	I. 192,564
Total	5,330,647	7,133,730	I.1,803,083

The exports to Europe were chiefly to Italy; those to other countries, to South America. The exports to Canada—74.8 per cent. of the total in 1907—were, in detail, as follows:

	1906.	1907.	Changes.
Anthracite	1,227,686	1,466,067	I. 238,381
Bituminous	2,651,135	3,869,899	I.1,218,764
Total	3,878,821	5,335,966	I.1,457,145

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

Imports of coal and coke into the United States for the seven months ending July 31, were, in long tons, as follows:

	1906.	1907.	Changes.
Great Britain	76,652	27,361	D. 49,291
Canada	916,812	798,511	D. 118,301
Japan	10,775	74,376	I. 63,601
Australia	112,796	222,495	I. 109,699
Other countries	4,378	5,723	I. 1,345
Total coal	1,121,413	1,128,466	I. 7,053
Coke	79,046	79,735	I. 689
Total	1,200,459	1,208,201	I. 7,742

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

Iron Trade Review

New York, Sept. 4—The iron and steel markets are quiet, so far as new business is concerned. Buyers are evidently waiting to see how affairs will turn, before making any large commitments for the future. The hestitation seems to be spreading to all branches of the trade, though some believe that it is only temporary. The serious point about it seems to be that such offers of lower prices as have been made do not seem to bring out buyers. The lower offers, however, have not been generally made, but come from mills and furnaces which are beginning, apparently, to feel a little anxious about future business. In some lines, such as structural material, there is something doing.

The demand for pig iron seems to be at a standstill for the present, the only sales of any quantity having been in basic pig. Finished material shows hardly any business, except in structural material, for which there has been some call. Light rails show some demand; in standard rails there has been little done.

The failure of the Quebec bridge is calling out a lot of discussion, both as to its causes, and as to the results to the contractors.

Iron and Steel Exports—Exports of iron and steel, including machinery, from the United States for July, and the seven months ended July 31, are valued as below by the Bureau of Statistics of the Department of Commerce and Labor:

	1906.	1907.	Changes.
July	$12,766,712	$17,614,017	I. $4,847,305
Seven months	97,990,478	111,813,066	I. 13,822,588

The total increase for the seven months was 14.1 per cent. The leading items of export for the seven months were, in long tons:

	1906.	1907.	Changes.
Pig iron	46,477	48.035	I. 1,558
Billets, ingots & blooms	146,503	54,269	D. 92,234
Bars	49,717	58,011	I. 8,294
Rails	203,352	180,720	D. 22,632
Sheets and plates	58,683	76,199	I. 17,516
Structural steel	62,710	77,089	I. 14,379
Wire	98,415	89,644	D. 8,771
Nails and spikes	37,716	34,895	D. 2,821

There were decreases in billets, rails, wire and nails, but increases in all other items.

Iron and Steel Imports—Imports of iron and steel, including machinery, in the United States for July and the seven months ending July 31, are valued by the Bureau of Statistics as follows:

	1906.	1907.	Changes.
July	$3,287,916	$4,008,584	I. $ 720,668
Seven months	18.921,011	25,402,412	I. 6,481,401

The increase for the seven months was 34.3 per cent. The chief items of the iron and steel imports for the seven months were, in long tons:

	1906.	1907.	Changes.
Pig iron	184,322	385,829	I. 201,507
Scrap	9.961	16,725	I. 6,764
Ingots, blooms, etc.	11,659	9,178	D. 2,481
Bars	20,547	22,933	I. 2,386
Wire-rods	10,649	10.590	D. 59
Tin-plates	29,128	39,715	I. 10,587

There were considerable increases this year in pig iron and in tin-plates.

Iron Ore Movement—Exports and imports of iron ore in the United States for the seven months ended July 31 are reported as follows, in long tons:

	1906.	1907.	Changes.
Exports	122,039	73,370	D. 48,669
Imports	643,690	726,432	I. 82,742

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

Imports of manganese ore for the seven months ended July 31 were 127,216 long tons in 1906, and 112,819 tons in 1907; a decrease of 14,397 tons this year.

Birmingham

Sept. 2—Despite the fact that quotations for pig iron are off at least $1 per ton over figures which prevailed for several months, the Southern market continues quiet. A few orders are being booked for delivery during the fourth quarter and some inquiry is being received as to capacities during the first half of 1908. The make in the Southern territory has not been improved any of late, though three or four furnaces are being worked on and should soon be nearing completion. The raw material supplies are no better than they were last week, with some companies the ore supply being narrow. The grades of iron being produced are improving slightly.

Quotations for iron are $17.50 for the first half of 1908 and $18.50 for the fourth quarter of this year. Some of the furnace companies do not expect any further drop in quotations and express the belief that there will be a general resumption of old figures during this month.

No changes in conditions are reported at the steel, cast-iron pipe foundry and machine shops and other plants consuming pig iron. Good prices prevail for all iron products and the future prospects are bright.

Railroad transportation facilities in Alabama are still good and the manufacturers believe that their interests will be well taken care of during the whole year.

Chicago

Sept. 2—The market for pig iron continues quiet, with the only business practically in small lots—50 to 100 tons—but no disposition toward demoralization yet apparent. The small lots, of course, are for quick shipment, few buyers caring to venture on a contract for 1908 deliveries.

For quick delivery there is little Northern iron in market. Southern brings $19@19.50 on general last-quarter deliveries, with the iron most available commanding $20, Birmingham. These prices mean $23.35@23.85 Chicago for general last-quarter deliveries, and $24.35 maximum for quick shipment.

Northern iron is perhaps more actively in demand than Southern for the few orders that are being placed on 1908 deliveries, and is quoted for such deliveries at $23.50@24. For the few lots of Northern available to be delivered in 1907, $24.50@25 is quoted.

General trade conditions are good, and the output of melters in the local fields continues heavy, with heavy deliveries of pig iron continuing without a break or a sign of a break. The demand for iron and steel products in nearly every line is large and constant.

Coke continues strong, with 72-hour Connellsville bringing $5.90 and other grades in proportion.

Philadelphia

Sept. 4—Indifference to the course of prices or what consumers may do, or not do, is characteristic of the market. Nowhere can any evidence be found of a desire to push sales. Among buyers there is indifference, but in a number of cases some buying will have to be done this month. Some iron is moving for early delivery and quotations have been asked for late delivery. Forge iron will probably feel the first improvement. The basic pig market may develop surprisingly, it is intimated, the development depending on what prices are likely to be. No. 2 X

Foundry is generally in rather light supply among consumers, and several who are reported to be far seeing express the opinion that No. 2 will be bought at lower money yet. About the only talk is opinions and they have very little to stand on. Basic iron has been quoted at $19.50 and No. 2 X, $20.50.

Steel Billets—The mill representatives are busy and see an abundance of fall business. The quoted price is $32. Forging steel sold in a small way at $35.50.

Bars—There are no developments worthy to be called news. Steel bars are 1.85c. Buyers as a rule order in a small way.

Sheets—While new orders are exceptional there is a good business at stores.

Pipes and Tubes—Demand does not look active, but the larger users of tubes in this territory say they are working up as much material as ever.

Plates—Reports from mills outside our territory show that the plate-mill branch has a busy season ahead. Our local trade is steady.

Structural Material—Construction work is being hurried along on a large amount of building. The mills are busy.

Steel Rails—Rumors prevail as to business being tentatively placed by large eastern and western roads. Some delay is experienced in placing orders for trolley rails.

Scrap—Steel scrap has tumbled back to about $16. Choice railroad is quoted at $18. Next to nothing is being done and the scrap men have nothing to say.

Pittsburg

Sept. 3—The Carnegie Steel Company booked 60,000 tons of standard rails last week for 1908 delivery. The orders are understood to have been from the Baltimore & Ohio and Norfolk & Western railroads, as these roads recently asked the mills to reserve tonnages for them for 1908 delivery. This is the first large business for 1908 for domestic roads which the local rail mill has taken. The Pennsylvania came close to placing definite orders several months ago, but the matter of specifications came up and the final orders were not placed. There is pressure for deliveries this year and the Carnegie Steel Company may have to put the Ohio mill, at Youngstown, back onto rails about Oct. 1 in order to make deliveries. Since midyear the company has not made rails at Youngstown.

Demand for finished steel products shows a slight improvement this week, and the market is hardly as dull as it was. There is still very little new business being placed, but the steel interests are more confident than they were that a real buying movement will set in, and now predict such a movement within 30 days. Prices are being well maintained. An advance of $1 per ton has been made on all wire products, taking effect today.

Pig Iron—The ascertained average selling price of bessemer pig iron during August is reported at $22, Valley furnace, or $22.90, Pittsburg, all the sales reported having been made at this price. The principal transactions included the sale of 5000 tons to the United States Steel Corporation early in the month and the sale late in the month of 6000 tons to the Jones & Laughlin Steel Company. The ascertained average for July was $22.41, Valley, so that there has been a decline of 41c. from July to August. The highest ascertained average was for May, $23.28, Valley. There have been no sales of bessemer pig since last report, but the market is well held at $22, Valley. The supply of ores is scant and bessemer is much firmer than other grades of pig iron. There is no market on basic iron, no open sales having been made for some time, although there is plenty of basic iron available. Foundry iron is very quiet and the market is largely nominal. There is no difficulty in getting $22.25, delivered Pittsburg, on No. 2, this price having been openly quoted, while it is probable that $22, Pittsburg, would be possible and this price might be shaded. Forge is nominal at a dollar below foundry.

Steel—The New Castle plant of the Carnegie Steel Company resumed operations last night after a fortnight off for repairs, and the Ohio works at Youngstown went back to billets, having been putting part of its output into sheet bars while the New Castle plant was idle. The supply of billets is fairly good and prices are not over strong; the sheet-bar market is quite firmly held on the basis of $31, f.o.b. Pittsburg. Bessemer billets can be had at $29, delivered Pittsburg, although perhaps not for the earliest delivery. Open-hearth billets are about $31, delivered Pittsburg.

Sheets—While strictly new business is not very heavy, specifications are excellent on old contracts and the mills expect full operations until nearly the close of the year at least. The leading interest is operating practically all its sheet mills and expects to continue to do so, while the independents are well filled. Prices are maintained at 2.60c. for black and 3.75c. for galvanized sheets, No. 28 gage.

Ferro-Manganese—The market has weakened somewhat and prompt carloads can be had at about $60, seaboard, or $61.95, Pittsburg, while on a round tonnage for delivery over the fourth quarter $58, seaboard, or $59.95, Pittsburg, can be done.

Cartagena, Spain

Aug. 18—Messrs Barrington & Holt report as follows: The sierra has been quiet owing to holidays this week, practically all the mines having stopped work for three or four days. Little new business has been reported lately, iron-masters appearing to hold back from buying with the idea that prices may weaken, but the cost of ore to the local merchants has been in no way reduced. Shipments for the week were 6550 tons to Great Britain; 1800 tons to Rotterdam; 2000 tons to Marseilles; 5700 tons to Philadelphia; 16,050 tons in all.

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

Pyrites—The price of iron pyrites, 40 per cent. iron and 43 sulphur, is 11s. 9d. per ton, f.o.b. shipping port.

Dusseldorf, Germany

Aug. 10—Imports and exports of iron and manganese ores in Germany for the half-year ended June 30 are reported as below, in metric tons:

	Imports.	Exports.	Balance.
Iron ores.....	3,910,240	2,014,968	Imp. 1,895,272
Manganese ores.	174,547	1,862	Imp. 172,685
Iron pyrites....	384,793	8,291	Imp. 376,502
Slag & slag prod.	287,339	21,649	Imp. 265,690

Owing to changes in the form of customs returns, it is not possible to make comparisons with the previous year.

Petroleum Exports

Exports of mineral oils from the United States for the seven months ended July 31, are reported by the Bureau of Statistics as follows, in gallons:

	1906.	1907.
Crude oil.....	64,658,606	45,665,988
Naphthas.....	19,649,621	17,321,363
Illuminating oil.....	455,758,468	463,520,485
Lubricating oils.....	87,960,277	81,041,952
Residuum.....	37,432,287	38,781,394
Total.....	665,459,259	646,331,182

Paraffin is included in lubricating oil. The total for this year shows a decrease of 9,128,077 gal., or 1.4 per cent., from last year.

Salt Lake City

Aug. 28—The Garfield smelter at Garfield is being enlarged and will be in shape to treat about 2500 tons by the end of the year, double its present capacity.

The Gold Chain Mining Company has been organized to operate in the Tintic district and will undertake the development of the Golden Chain group of eleven claims. C. E. Loose of Provo is president of the company.

Suit has been instituted in the district court against the Pittsburg-Salt Lake Oil Company and its officers by W. M. Wantland for 1,315,876 shares of stock in that corporation, said to have a valuation of $1 each. A temporary restraining order has been issued. The plaintiff claims to have been instrumental in the organization of the corporation and that his associates connived to leave him without any interest.

Metal Market

Gold and Silver Exports and Imports

NEW YORK, Sept. 4.

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. 31 and years from Jan. 1.

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week.....	$1,005,263	$ 305,621	$ 1,739,316	$ 271,360
1907.....	32,358,587	7,073,132	33,841,942	1,598,473
1906.....	5,949,673	49,225,884	39,629,697	1,452,141
1905.....	38,247,843	1,226,547	22,701,219	2,470,283

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

The joint statement of all the banks in the New York Clearing House for the week ending Aug. 31 shows loans $1.087,-985,400, a decrease of $166,600; deposits, $1,046,655,400, a decrease of $1,727,800, as compared with the previous week. Reserve accounts show:

	1906.	1907.
Specie.....	$169,341,600	$200,889,500
Legal tenders.	77,634,000	69,530,900
Total cash	$246,975,600	$270,420,400
Surplus.....	$ 1,925,575	$ 8,756,450

The surplus over legal requirements shows a decrease of $1,219,950, as compared with the previous week this year.

Specie holdings of the leading banks of the world, Aug. 31 are reported as below, in dollars:

	Gold.	Silver.	Total.
Ass'd New York	.....	.....	$200,889,500
England.....	$188,342,285	.....	188,342,885
France.....	561,797,400	$193,870,000	755,667,400
Germany.....	183,355,000	50,815,000	234,170,000
Spain.....	77,525,000	129,145,000	206,670,000
Netherlands....	30,163,500	28,065,500	58,229,000
Belgium.....	16,063,335	8,031,665	24,095,000
Italy.....	171,345,000	24,918,500	196,263,500
Russia	585,770,000	34,690,000	620,460,000
Aust.-Hungary.	227,415,000	60,680,000	288,095,000
Sweden.....	21,245,000	.....	20,245,000

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 of 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. 22:

	1906.	1907.	Changes.
India.....	£ 11,488,443	£7,868,424	D. £ 3,620,019
China.....	280,700	.....	D. 280,700
Straits..	1,750	598,700	I. 596,950
Total.....	£ 11,770,893	£8,467,124	D. £ 3,303,769

Imports for the week were £300,000 in bars and £120,000 in Mexican dollars; £420,000, all from New York. Exports were £1,300 to Egypt; £54,500 in coin to the Straits; £113,600 in bars and £48,800 in Mexican dollars to India; £218,200 in all.

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

Gold:	1906.	1907.
Imports.....	Fr. 352,276,000	Fr. 309,056,000
Exports.....	87,172,000	80,157,000
Excess, imports....	Fr. 265,104,000	Fr.228,899,000
Silver:		
Imports.....	96,434,000	102,082,000
Exports.....	94,328,000	101,386,000
Excess, imports....	Fr. 2,106,000	Fr. 696,000

Imports of copper and nickel coins were 63,000 fr. in 1906, and 55,000 fr. in 1907; exports were 149,000 fr. in 1906, and 211,-000 fr. this year.

Prices of Foreign Coins

	Bid.	Asked.
Mexican dollars.....	$0.52¼	$0.54¼
Peruvian soles and Chilean.....	0.48	0.50
Victoria sovereigns.....	4.85	4.87
Twenty francs.	3.80	3.86
Spanish 25 pesetas...	4.78	4.80

SILVER AND STERLING EXCHANGE.

Aug.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.	Sept.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.
29	4.8670	67⅞	31¼	2	.....	....	31 9/16
30	4.8640	68¼	31 7/16	3	4.8625	68⅜	31⅛
31	4 8625	68⅜	31⅛	4	4.8620	68¼	31⅛

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

Other Metals

Aug.-Sept.	Copper. Lake, Cts. per lb.	Copper. Electrolytic, Cts. per lb.	Copper. London, £ per ton.	Tin. Cts. per lb.	Lead. Cts. per lb.	Spelter. New York, Cts. per lb.	Spelter. St. Louis, Cts. per lb.
29	18 @18½	17½ @18	78¼	36¾	5.25	5.50 @5.55	5.35 @5.40
30	18 @18¼	17½ @17¾	76¾	36¼	5.25	5.50 @5.55	5.35 @5.40
31	18 @18¼	17½ @17¾	.....	36¼	5.25	5.50 @5.55	5.35 @5.40
2	....	....	74	..	....	.....	.....
3	17¾ @18¼	17½ @17¾	74⅛	36¾	5.25	5.45 @5.50	5.30 @5.35
4	17¾ @18⅛	17½ @17⅝	74½	37	5.25	5.45 @5.50	5.30 @5.35

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 electroytic 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—On Tuesday of this week the leading interests reduced their price to 18c., delivered buyers' works, cash in 30 days, but even previous thereto, reports came from Europe to the effect that one of the largest consumers, who had hitherto held to the same price as the Amalgamated Copper Company, was selling for export at considerably below the new official price. The domestic consumers are still indifferent, and such orders as they have placed have been of very small proportions and for immediate shipment, which they are able to secure at a concession in the price. It is too early to say whether the new level of prices will stimulate business, which is so urgently desired by all concerned; but there is no question that a large amount of business is being held back, on account of the unsettled condition of the market, and the same will be placed with manufacturers as soon as confidence in the future is restored. The close is easy at 17¾@18⅛c. for lake; 17¼ @17½ for electrolytic and 16¾@17c. for casting copper.

Statistics for the month of August show a decrease in the visible supplies of 600 tons.

The news of a reduction in refined sorts brought about a break in the standard market in London, which, however, has been holding its own at the lower level. The close is steady at £74 10s. for both spot and three months.

For refined and manufactured sorts we quote: English tough, £76 10s.; best selected, £82 10s.; strong sheets, £88 10s.

The statistics for the second half of August, as cabled us from abroad, show no change.

Copper Sheets—There has been a further reduction in the price of copper sheets, but the base price has not yet been decided upon.

Copper Wire—The price of copper wire has been again reduced. The base price for No. 0000 to No. 8 is now quoted at 20¼@21¼c. per lb.

Tin—Uuder good-sized transactions the London market has made steady progress and closes firm at £168 5s. for spot and £168 for three months.

Buyers in this market have also taken a more active interest. While transactions were for spot only, they have, nevertheless, been larger than for some time past. Spot material is growing rather scarce again and a premium is being exacted for it. The market closes at about 37c.

Lead—The market for desilverized remains unchanged at 5.25c., f.o.b. New York. Outside brands can be bought at a considerable discount, as noted for several weeks past.

The London market is still suffering from a lack of supplies, and consumers meet with the greatest difficulty in supplying their immediate wants. The close is firm at £19 10s. for Spanish and £19 12s. 6d. for English lead.

Spanish Lead Market—Messrs. Barrington & Holt report from Cartagena, Spain, under date of Aug. 18: The local price for pig-lead has been fixed at 94.25 reales per quintal, which, with exchange at 28.44 pesetas to £1, is equivalent to £18 19s. 11d. per ton of 2240 lb., Cartagena; silver content being paid at 14.25 reales per ounce. Shipments for the week were 132 tons desilverized and 220 tons argentiferous lead to Marseilles; 300 tons desilverized to Great Britain; a total of 652 tons.

Spelter—Business in this metal has been very slow throughout the week. There are reports from the producing centers that spelter is accumulating at the smelting works, and it is therefore not surprising that prices have yielded further. The market closes weak at 5.45@5.50c. New York and 5.30@5.35c. St. Louis.

The London market also is on the downward grade, and the close is cabled as £21 7s. 6d. for good ordinaries and £21 12s. 6d. for specials.

Spanish Zinc Ore Market—Messrs. Barrington & Holt report from Cartagena, Spain, under date of Aug. 18, that the market has been quiet. Shipments for the week were 5200 tons to Stettin, and 2730 tons blende to Antwerp; 7930 tons in all.

Antimony—The market is extremely quiet and practically no business is being done on contract. However, a small volume of spot transactions is reported but this class of business does not tend to stimulate the weak tone of the market. Quotations remain unchanged at 10½@11c. for Cookson's; 9¼@10c. for Hallett's; and 8¼@9½c. for ordinary frauds.

Nickel—For large lots, New York or 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.

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

	Per Lb.
Cadmium, 99.5% f. o. b. Hamburg	$1.27@1.35
Chromium, pure (N. Y.)	77c.
Copper, red oxide	50c.
Ferro-Chrome (60)	9c.
Ferro-Chrome (7-9% carbon, per lb. Cr.)	10¼c.
Ferro-Chrome (66-71% Cr., 6% C.)	12c.
Ferro-Chrome (66-71% Cr., 6.5% C.)	11½c.
Ferro-Chrome (60-70% Cr., 1% C. or less)	38c.
Ferro-Molybdenum (50%)	90c.
Ferro-Titanium (20%)	80c.
Ferro-Tungsten (37%)	50c.
Ferro-Vanadium (25-50%, per lb. vanadium contents)	$5.50
Magnesium, pure (N. Y.)	1.50
Manganese, pure 98@99% N. Y.	75c.
Manganese—Copper (30@70%) N. Y.	45c.
Molybdenum (98@99%, N. Y.)	$1.65
Phosphorus, foreign red (f. o. b. N. Y.)	90c.
Phosphorus, American yellow (f. o. b. Niagara Falls)	42c.
Tungsten (best) pound lots	$1.28
Ferro-Silicon (50%) spot. Ex. ship Atlantic ports	$110 ton.

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

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

Platinum—The price of this metal has has not advanced within a week, but the tendency is upward. Ordinary platinum sells for $28.50 and hard metal for $31 per troy ounce. Scrap fluctuates at $23@24 per ounce.

Missouri Ore Market

Joplin, Mo., Aug. 31.—The highest price reported paid for zinc ore was $46 per ton, on an assay base of $40@43 per ton of 60 per cent. zinc, averaging $41.64.

The highest price paid for lead was $62 per ton, medium grades selling from $56@59 per ton, and the total sales averaging $57.88.

At a meeting of mine owners held last night it was decided to unite on a restriction of the output, and as a consequence a number of large mills were closed down tonight, ostensibly for a period of 30 days, or longer. Some of the operators joining the movement cannot produce ore at the present prices, zinc being $2 per ton and lead $20 per ton less than a year ago.

Following are the shipments of zinc and of lead from the various camps of the district for the week ending Aug. 31:

	Zinc, lb.	Lead, lb.	Value.
Webb City-Carterville	2,508,950	1,608,840	$99,338
Joplin	2,383,550	349,550	61,381
Duenweg	999,320	49,900	22,432
Galena	702,430	140,490	18,825
Alba-Neck City	671,730	.....	14,778
Aurora	801,330	4,740	13,263
Badger	402,000	.....	8,844
Oronogo	324,890	64,050	6,556
Prosperity	86,380	82,140	4,195
Baxter Springs	185,150	5,180	3,946
Spurgeon	60,350	32,860	2,127
Sherwood	79,740	6,420	1,818
Sarcoxie	54,820	.....	1,123
Zincite	52,220	.....	1,070
Carl Junction	50,700	.....	1,064
Stott City	43,770	.....	897
Totals	9,307,330	2,344,010	$261,657
Eight months	413,343,550	63,846,410	$11,958,846

Zinc value, the week, $193,817; 8 mos., $9,541,886
Lead value, the week, 67,840; 8 mos., $2,416,960

Average prices for ore in the district, by months, are shown in the following table:

ZINC ORE AT JOPLIN.			LEAD ORE AT JOPLIN.		
Month.	1906.	1907.	Month.	1906.	1907.
January	47.38	45.84	January	75.20	83.53
February	47.37	47.11	February	72.83	84.58
March	42.68	48.66	March	73.73	82.75
April	44.63	48.24	April	75.13	79.76
May	40.51	45.98	May	78.40	79.56
June	43.83	44.82	June	80.96	73.66
July	43.25	45.79	July	74.31	58.18
August	43.56	43.22	August	75.36	59.54
September	42.58	.....	September	79.64	.....
October	41.55	.....	October	79.84	.....
November	44.13	.....	November	81.98	.....
December	43.68	.....	December	81.89	.....
Year	43.24	.....	Year	77.40	.....

Chemicals

New York, Sept. 4—The general market is steady and fairly firm. There is a good volume of business being done for this time of the year especially during the present uncertainty in the metal market.

Copper Sulphate—Quietness prevails in the copper sulphate market and prices are rather lower than those of many weeks back. Carload lots are quoted at $6.62½ and smaller quantities at $7 per 100 pounds.

Nitrate of Soda—Business is reported to be in a fairly good condition and prices hold firm.

For spot delivery 96 per cent. is quoted at 2.52½c. and 95 per cent. at 2.45c. For 1908 delivery these grades are practically the same, while for 1909 delivery 2.40c. is quoted for 95 per cent. grade.

Mining Stocks

Sept. 4—The stock markets are still confused, uncertain and generally depressed. The market was broken this week by a double holiday, which was probably a relief to some operators. The general tone of prices is rather lower than higher, though a few stocks made some show of improvement. Amalgamated Copper closes at $73¾, after selling below $72; American Smelting common at $98. Utah Copper sold at $24. United States Steel closes at $32½ for the common, and $95¾ for the preferred.

The curb market was also irregular and not very active. Cumberland-Ely closed at $7½; Greene-Cananea at $12¼; Nipissing at $8. The heaviest dealings were in the copper stocks; but the market was dull and heavy.

Boston

Sept. 3—Sentiment in the stock market is now moderately bullish for the time being. Some buoyancy is manifested in spots with prices from one to four points up for the week with exceptions and in excess of this in places. The reduction in the Quincy Mining Company's dividend did not stay the market except in the price of this stock alone. On the announcement that the rate had been cut from $4.50 quarterly, to $2.50 the stock broke $4.50 to $87, even though a cut in the rate had been expected. In the meantime the price recovered to $91 with the final tonight $89.

Amalgamated Copper is up $4.62½ for the week to $74.25. The buying has been largely for a turn it is thought. Calumet & Hecla has recovered $10 to $725. Dividend action by this company is expected at any time now. Copper Range has also displayed considerable buoyancy, selling up $3.25 to $68.25, with $1 reaction. North Butte after advancing $2 to $67, lost the majority of it. Osceola rose $7 to $112, holding all but $1 of it. U. S. Smelting spurted $1.50 to $40.50. This company has issued 15,984 shares of preferred stock in exchange for the outstanding stock of the Real del Monte Mining Company, share for share, of the stock not already owned.

Atlantic mining has recorded a $1.75 advance for the week, touching $13.75.

Boston Consolidated closed fractionally higher at $21.12½; Butte Coalition rose $2.50 to $21.12½, ex-dividend; Centennial $1.75 to $23; Isle Royale $1.87½ to $17.37½; Mohawk $2 to $70.50; Old Dominion $1.75 to $31.25; Parrot $1 to $15, ex-dividend; Trinity $1.62½ to $17.62½; and Shannon $1.50 to $15. President Auster of the latter company announces that there is little likelihood that there will be any change in the dividend rate, notwithstanding the reduction in the price of copper. Winona sold up to $8.37½, $1 assessment paid. An assessment is expected on Adventure mining. There have been few important changes on the curb. Troy-Manhattan had a sharp rise today on favorable announcements from the management.

STOCK QUOTATIONS

NEW YORK Sept. 3	
Name of Comp.	Clg.
Alaska Mine	¾
Am.Nev.M.&P.Co.	....
Amalgamated	73¾
Anaconda	47⅞
Balaklala	7¾
British Col. Cop.	7¼
Buffalo Cobalt	2
Butte & London	....
Butte Coalition	21
Butte Cop. & Zinc	....
Cobalt Contact	....
Colonial Silver	1
Cum. Ely Mining	7¾
Davis Daly	11
Dominion Cop.	4¼
El Rayo	3¾
Foster Cobalt	67
Furnace Creek	⅛
Gironx Mine	7
Gold Hill	2
Granby, New	....
Greene Gold	1⅜
Greene G. & S.	1½
Greenw'r & D.Val.	75
Guanajuato	3⅛
Guggen. Exp.	180
Hanapah	⅜
McKinley Dar.	13/16
Micmac	4
Mines Co. of Am.	1⅜
Mitchell Mining	1 5/16
Mont.Sho. C.(New)	6
Nev. Utah M. & S.	4
Newhouse M. & S.	11⅝
Nipissing Mines	8
Old Hundred	2¼
Silver Queen	1
Stewart	1¾
Tennessee Cop'r	35¾
Union Copper	1
Utah Apex	5⅜
West Columbus	10¾

N. Y. INDUSTRIAL	
Am. Agri. Chem.	19½
Am. Smelt. & Ref.	102⅛
Am. Sm. & Ref., pf.	100
Bethlehem Steel	....
Colo. Fuel & Iron	25¾
Federal M.& S., pf.	73¼
Inter. Salt	15
National Lead	54
National Lead, pf.	94¾
Pittsburg Coal	9¼
Republic I. & S.	21¾
Republic I.& S.,pf.	73¼
Sloss-Sheffield	47½
Standard Oil	450
Tenn. C. & I.	....
U. S. Red. & Ref.	....
U. S. Steel	32⅜
U. S. Steel, pf.	95¾
Va. Car. Chem.	21½
Va. I. Coal & Coke	....

ST. LOUIS Aug. 31		
N. of Com.	High.	Low.
Adams	.40	.30
Am. Nettie	.04	.03
Center Cr'k	2.50	2.00
Cent. C. & C.	69.00	67.00
C.C. & C. pd.	79.00	78.00
Cent. Oil	112.00	110.00
Columbia	5.00	3.00
Con. Coal	26.00	25.00
Doe Run	140.00	130.00
Gra. Bimet.	.37	.30
St. Joe	15.00	14.00

BOSTON Sept. 3	
Name of Comp.	Clg.
Adventure	2½
Allouez	35
Am. Zinc	30
Arcadian	5¼
Atlantic	14
Bingham	12½
Boston Con.	21⅜
Calumet & Ariz.	155
Calumet & Hecla	725
Centennial	22½
Con. Mercur	....
Copper Range	67⅜
Daly West	13⅜
Franklin	11¼
Greene-Can.	12½
Isle Royal	17⅜
La Salle	13
Mass.	....
Michigan	12
Mohawk	70½
Mont.C.&C.(new)	....
Nevada	....
North Butte	65¾
Old Colony	....
Old Dominion	30¾
Osceola	110
Parrot*	15
Phoenix	....
Quincy*	90
Rhode Island	4½
Santa Fe	2½
Shannon	14¾
Tamarack	....
Trinity	17¼
United Cop., com.	....
U. S. Oil	9¼
U. S. Smg. & Ref.	40⅝
U.S.Sm.& Re.,pd.	39⅝
Utah Copper	44½
Victoria	6¼
Washington	....
Winona	8
Wolverine	144
Wyandotte	...

*Ex. Div. †Ex. Rights.

BOSTON CURB	
Ahmeek	....
Ariz. Com	....
Black Mt.	4⅛
East Butte	7
Hancock Con.	7¾
Keweenaw	7¾
Majestic	2⅛
Raven	1 1/16
Shawmut	.46
Superior	....
Superior & Pitts.	14½
Troy Man.	1⅞

LONDON Sept. 4			
Name of Com.	Clg.		
Dolores	£1	5s	0d
Stratton's Ind.	0	2	6
Camp Bird	0	19	6
Esperanza	2	0	2
Tomboy	1	8	9
El Oro	1	5	0
Oroville	0	16	3
Somera	..	..	.
Utah Apex	0	17	6
Ariz.Cop.,pfd.	3	3	1
Ariz.Cop.,def.	3	2	3

Cabled through Hayden, Stone & Co., N. Y.

S. FRANCISCO Aug. 28	
Name of Comp.	Clg.
COMSTOCK STOCKS	
Belcher	.21
Best & Belcher	.82
Caledonia	.29
Challar	.22
Con. Cal. & Va.	.78
Crown Point	.22
Exchequer	.40
Gould & Curry	.22
Hale & Norcross	.80
Mexican	.54
Ophir	1.00
Overman	.13
Potosi	.15
Savage	.90
Sierra Nevada	.30
Union	.40
Utah	.04
Yellow Jacket	1.10
TONOPAH STOCKS	
Golden Anchor	.10
McNamara	.22
Montana-Pitts.ex.	.06
North Star	.21
Rescue	.13
GOLDFI'D STOCKS	
Black Ants	.05
Blue Bull	.33
Columbia Mt.	.51
Comb. Frac.	1.97
Conquerer	.12
Daisy	1.52
Florence	4.15
Frances-Mohawk	1.10
Goldfield Con.	7.57
Grandma	18
Great Bend	.64
Red Hills	.54
St. Ives	.85
BULLFROG STOCKS	
Amethyst	.20
Bonnie Claire	.42
Mayflower Con.	.35
Montgomery Mt.	.11
Original	.06
MANHAT'N STOCKS	
Gold Wedge	.06
Manhattan Mg.	.07
Pine Nut	.06
Ruby Wonder	...
Stray Dog	.19
Yellow Horse	.03

NEVADA Sept. 4 (Weir Bros. & Co., New York)	
TONOPAH STOCKS	Clg.
Tono'h Mine of N.	11.00
Tonopah Exten	1.12½
Montana Tonop'h	2.95
Belmont	2.62½
Tonopah Midway	.72
West End Con.	.70
Jim Butler	.84
GOLDFI'D STOCKS	
Sandstorm	.40
Kendall	.22
Red Top	3.50
Jumbo	3.50
Goldfield Mining	1.50
Dia'dfield B. B. C.	.24
Atlanta	.50
Mohawk	17.00
Silver Pick	.50
Lagnna	1.50
BULLFROG STOCKS	
Mont. Shoshone C.	6.25
Tramps Con.	.35
Gold Bar	.60
Bullfrog Mining	.10
Bullfrog Nat. B.	.17
Homestake Con.	...
MANHAT'N STOCKS	
Manhattan Con.	.40
Manhat'n Dexter	.12
Jumping Jack	.11
Stray Dog	.17
Indian Camp	.08

COLO. SPRINGS Aug. 30	
Name of Comp.	Clg.
Acacia	....
Black Bell	....
C. C. Con.	....
Dante	4⅞
Elkton	....
El Paso	37
Findlay	38
Gold Dollar	5¾
Gold Sovereign	....
Isabella	20½
Index	....
Jennie Sample	4½
Jerry Johnson	....
Mary McKinney	40
Pharmacist	4
Portland	....
Un. Gold Mines	5¾
Vindicator	78
Work	17

New Dividends

Company.	Payable.	Rate.	Amt.
American Coal	Sept. 3	$1.25	62,500
Am. Smelters Sec., A.	Sept. 1	1.50	255,000
Am. Smelters Sec., B.	Sept. 1	1.25	375,000
British Columbia	Sept. 4	0.40	122,000
Boston & Montana	....	12.00	1,800,000
Butte Coalition	Sept. 17	0.50	500,000
Calumet & Arizona	Sept. 21	5.00	1,000,000
Gt. Nor. Ore. Ctfs.	Sept. 16	1.00	1,500,000
Mohawk—Jumbo Lease	Sept. 3	0.10	60,000
National Lead, com.	Oct. 1	1.25	186,318
National Lead, pfd.	Sept. 16	1.75	260,820
North Butte	Sept. 21	2.00	800,000
Parrot	Sept. 18	0.25	57,463
Philadelphia Gas, pfd	Sept. 2	1.25	150,000
Pioneer, Alaska	Oct. 10	3.00	150,000
Quincy, Mich.	....	2.50	265,000
Republic Iron & Steel	Oct. 1	1.75	437,500
Sloss-Sheffield, pfd.	Oct. 1	1.75	117,250
Standard Oil	Sept. 14	6.00	5,820,000
Tyee Copper	Aug. 1	0.36	64,800
U. S. Steel, pfd.	Aug. 30	1.75	6,305,497
Yellow Aster	Aug. 5	0.20	20,000

Assessments

Company.	Delinq.	Sale.	Amt.
Belcher, Nev.	Sept. 18	Oct. 9	$0.10
Bullion, Nev.	Sept. 12	Oct. 4	0.05
Caledonia	Sept. 12	Oct. 2	0.10
Challar, Nev.	Aug. 19	Sept. 12	0.10
Confidence, Nev.	Aug. 27	Sept. 17	0.20
Con. Imperial	Aug. 27	Sept. 19	0.01
Emerald, Utah	Aug. 15	Sept. 7	0.01½
Etna-King, Cal.	Sept. 15	Oct. 15	0.02
Gould & Curry	Aug. 14	Sept. 10	0.10
Grand Pacific, Cal.	Aug. 10	Oct. 2	0.02
Helios, Cal.	Sept. 17	Oct. 15	0.02
Mt. Diablo, Nev.	Aug. 20	Sept. 16	0.20
Nassau Cop., Cal.	Sept. 16	Oct. 14	0.10
N. Y. Bonanza, Utah	Sept. 2	Sept. 23	0.02
Placer Queen, Cal.	Sept. 16	Oct. 7	0.00½
Royal Metals, Nev.	Aug. 29	Sept. 13	0.02
Sailor Consol., Cal.	Sept. 10	Oct. 7	0.01
Sheba G. & S., Utah	July 30	Nov. 2	0.10
Sierra Nevada, Nev.	Sept. 4	Sept. 25	0.10
Wabash, Utah	Sept. 9	Oct. 1	0.05
Yellow Jacket, Nev.	Sept. 23	Oct. 30	0.15

Monthly Average Prices of Metals

AVERAGE PRICE OF SILVER

Month.	New York.		London.	
	1906.	1907.	1906.	1907.
January	65.288	68.673	30.113	31.769
February	66.108	68.835	30.464	31.852
March	64.597	67.519	29.854	31.325
April	64.765	65.462	29.984	30.253
May	66.976	65.981	30.968	30.471
June	65.394	67.090	30.185	30.893
July	65.105	68.144	30.113	31.366
August	65.949	68.745	30.529	31.637
September	67.927	.....	31.483	.....
October	69.523	.....	32.148	.....
November	70.813	.....	32.671	.....
December	69.050	.....	32.003	.....
Year	66.791	.....	30.868	.....

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

AVERAGE PRICES OF COPPER

	NEW YORK.				LONDON.	
	Electrolytic		Lake.			
	1906.	1907.	1906.	1907.	1906.	1907.
January	18.310	24.404	18.419	24.825	78.869	106.739
February	17.869	24.869	18.116	25.236	78.147	107.356
March	18.361	25.065	18.641	25.560	81.111	106.594
April	18.375	24.224	18.688	25.260	84.793	98.625
May	18.475	24.048	18.724	25.072	84.867	102.375
June	18.442	22.665	18.719	24.140	83.994	97.272
July	18.190	21.130	18.585	21.923	81.167	95.016
August	18.380	18.356	18.706	19.255	83.864	79.679
September	19.033	.....	19.328	....	87.831	.....
October	21.203	.....	21.722	.....	97.269	.....
November	21.833	.....	22.398	.....	100.270	.....
December	22.885	.....	23.350	.....	105.226	.....
Year	19.278	.....	19.616	.....	87.282	.....

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

Month.	1906.	1907.	Month.	1906.	1907.
January	36.390	41.548	July	37.275	41.091
February	36.403	42.102	August	40.606	37.667
March	36.662	41.313	September	40.516	.....
April	38.900	40.938	October	42.852	.....
May	43.313	43.149	November	42.906	.....
June	39.260	42.120	December	42.750	.....
			Av. year	39.819	.....

Prices are in cents per pound.

AVERAGE PRICE OF LEAD

Month.	New York.		London.	
	1906.	1907.	1906.	1907.
January	5.600	6.000	16.850	19.828
February	5.464	6.000	16.031	19.531
March	5.350	6.000	15.922	19.703
April	5.404	6.000	15.959	19.975
May	5.685	6.000	16.725	19.688
June	5.750	5.760	16.813	20.188
July	5.750	5.288	16.525	20.350
August	5.750	5.250	17.109	19.063
September	5.750	.....	18.266	.....
October	5.750	.....	19.350	.....
November	5.750	.....	19.281	.....
December	5.900	.....	19.609	.....
Year	5.657	.....	17.370	.....

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

AVERAGE PRICE OF SPELTER

MONTH.	New York.		St. Louis.		London.	
	1906.	1907.	1906.	1907.	1906.	1907.
January	6.487	6.732	6.337	6.582	28.225	27.125
February	6.075	6.814	5.924	6.664	25.844	25.938
March	6.209	6.837	6.056	6.687	24.563	26.094
April	6.078	6.685	5.931	6.535	25.781	25.900
May	5.997	6.441	5.846	6.291	27.000	25.563
June	6.006	6.419	5.948	6.269	27.728	24.469
July	6.006	6.072	5.856	5.922	26.800	23.850
August	6.027	5.701	5.878	5.551	26.938	21.969
September	6.216	.....	6.056	.....	27.563	.....
October	6.222	.....	6.070	.....	28.075	.....
November	6.375	.....	6.225	.....	27.781	.....
December	6.593	.....	6.443	.....	27.938	.....
Year	6.198	.....	6.048	.....	27.020	.....

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

CHEMICALS, MINERALS, RARE EARTHS, ETC.—CURRENT WHOLESALE PRICES.

ABRASIVES—		
Bort, good drill quality, carat		$85.00
Carborundum, f.o.b. Niagara Falls, powd	lb.	.08
Grains	"	.10@.17
Corundum	"	.07@.10
Crushed Steel, f.o.b. Pittsburg	"	.05¾@.06
Emery, in kegs: Turkish flour	"	.01½@.02½
Grains	"	.03½@.04½
Naxos flour	"	.01½@.02½
Grains	"	.03½@.04½
Chester flour	"	.01½
Grains	"	.03½@.04½
Peekskill, f.o.b. Easton, Pa., flour	"	.01½@.01½
Grains, in kegs	"	.02½@.02½
Garnet, per quality	sh ton	25.00@35.00
Pumice Stone, Am. Powd. 100 lb.		1.60@2.00
Italian, powdered	"	.01¼@.01½
Lump, per quality	"	.03@.20
Rottenstone, ground	"	.02½@.04½
Lump, per quality	"	.05@.25
Rouge, per quality	"	.05@.30
Steel Emery, f.o.b. Pittsburg	"	.07¼@.07¾
ACIDS—		
Acetic 28%	lb.	.02¼@.02½
Boric	"	.09¾@.10
Hydrofluoric, 30%	"	.02¾@.03
" 48%	"	.06
" 60%	"	.10
Hydrochloric acid, 20°, per lb		1.25@1.50
Nitric acid, 38°	per lb.	4.25@4.62½c.
Sulphuric acid, 50°, bulk, per ton		$12 up.
60°, 100 lb. in carboys		.85@1.12½
60°, bulk, ton		16.00@18.00
66°, 100 lb. in carboys		1.00@1.25
66°, bulk, ton		18.00
Oxalic	"	.08½@.08¾
ALCOHOL—Grain	gal.	2.46½
Refined wood, 95@97%	"	.70@.75
ALUM—Lump	100 lb.	$1.75
Ground	"	1.85
Chrome Alum	lb.	.04¼
ALUMINUM—Sulphate, com'l	"	1.25@1.60
AMMONIA—24 deg.	lb.	.04½@.05½
" 26 "	"	.04¾@.05¾
AMMONIUM—		
Bromide	lb.	.23
Carbonate	"	.07¾@.08
Muriate grain	"	.06½@.06½
Lump	"	.09½@.09¾
Sulphate, 100 lb		3.10@3.12½
Sulphocyanide com	"	.30
" " chem. pure	"	.40
ANTIMONY—needle, lump	lb.	.08½@ 09
ARSENIC—White (nominal)	"	.07½@.07½
Red	"	.07½@.07¾
ASPHALTUM—		
Barbadoes	per ton.	40.00@80.00
West Indies	"	20.00@60.00
Egyptian	lb.	.14@.18
Gilsonite, Utah ordinary	per ton.	35.00
Trinidad	"	30.00@32.50
California	"	22.50@30.00
BARIUM—		
Carb. Lump, 80@90%	lg. ton.	30.00@35.00
Powdered 80@90%	lb.	.02@.02½
Chloride com'l	ton.	40.00 up
Nitrate, powdered, in casks	lb.	.05½@.06
Blanc Fixe	per lb.	.02¼
BARYTES—		
Am. Ground	sh. ton.	14.00@21.00
Floated	"	22.00
Foreign floated	"	19.50@22.50
BISMUTH—Sub-nitrate	lb.	1.50
BLEACHING POWDER—35%, 100 lb.		1.25@1.40
BLUE VITRIOL—(copper sulphate), carload, per 100 lb		7.00
BONE ASH	lb.	.02½@.04
BORAX	"	.07½@.08
CALCIUM—Acetate, gray	"	2.50@2.55
Acetate, brown	"	1.60@1.65
Carbide, ton lots f.o.b. Niagara Falls, N. Y., for Jersey City, N. J.	sh. ton.	65.00
Chloride, f.o.b. N. Y.	"	14.75@19.75
CEMENT—		
Portland, Am. 500 lb.	bbl.	1.55@1.60
Foreign	"	2.25@2.90
"Rosendale," 300 lb.	"	.85
(in sacks)		.65
Slag cement	"	.75@1.25
CHROME ORE—		
New Caledonia 50% ex. ship N. Y.	per lg. ton	17.50@20.00
Bricks, f.o.b. Pittsburg, M.	"	175.00
CLAY, CHINA—Am. common ex-dock, N. Y.	"	8.50@9.00
Foreign	"	11.50@17.50
COBALT—Oxide	lb.	2.50
COPPERAS—Bulk	100 lb.	$0.55
In bbls	"	.65@.75
In bags	"	.60@.70
CRYOLITE	lb.	.06½@.06¾
FELDSPAR—Ground best	sh. ton.	14.00
FIRE BRICK.		
American	per M.	30.00@40.00
Imported	"	30.00@45.00
St. Louis No. 1	"	18.00
" No. 2	"	15.00
Extra	"	20.00@23.00
FIRE CLAY. F. o. b. St. Louis.		
St. Louis, extra quality	per ton	5.00
" ordinary	"	2.50
FLUORSPAR—		
Domestic f.o.b. shipping port:		
Lump	lg. ton.	8.00@10.00
Ground	"	11.50@13.50
Foreign crude ex. dock		8.00@10.00
FULLER'S EARTH—Lump	100 lb.	.80@.85
Powdered	"	.85@.90
GRAPHITE—		
American, ore, common	lb.	.01@.10
Artificial	"	.06
Ceylon, common pulv	"	.02½@.03½
Best, pulverized	"	.04@.08
German, com. pulv	"	.01½@.01½
Best, pulverized	"	.01½@.02
Italian, pulverized	"	.01@.02
GYPSUM—		
Fertilizer	sh. ton.	7.00
Powdered	sh. ton.	10.00
INFUSORIAL EARTH—		
Ground Am. best	lb.	.01¾
French	lg. ton.	56.00
German	lb.	.02½@.02⅝
LEAD—Acetate (sugar of) brown	lb.	.07¾
Nitrate, com'l	"	.09¼@.09¾
MAGNESITE—Greece.		
Crude (95%)	lg. ton.	7.00@8.00
Calcined, powdered	sh. ton.	32.50@40.00
Bricks, domes, per qual. f.o.b. Pittsburg	M.	160@200
MAGNESIUM—		
Chloride, com'l	100 lb.	.80@1.15
Sulphate (Epsom salt)	100 lb.	.90@1.00
MANGANESE—		
Crude powdered:		
70@75% binoxide	lb.	.01¼@.01⅝
75@85% binoxide	"	.01½@.02
85@90% binoxide	"	.01¾@.05
90@95% binoxide	"	.06½
Ore, 80%-85%	sh. ton.	35.00@60.00
MARBLE—Flour	sh. ton.	9.50@10.00
MINERAL WOOL—		
Slag, ordinary	"	19.00
Selected	"	25.00
Rock, ordinary	"	32.00
Selected	"	40.00
MONAZITE SAND—		
Guar. 97%, with 5% Thorium oxide, nominal	lb.	.08 and up.
NICKEL—		
Oxide, crude, lb. (77%) for fine metal contained		.47
Sulphate, single	lb,	.11@.18
" double	"	.08@.10
NITRATE OF SODA—100 lb. 95% for 1907		2.45
95% for 1908		2.45
95% for 1909		2.40
96% is 7½c higher per 100 lb.		
OZOKERITE—best	lb.	.14@.17
PAINTS AND COLORS—		
Litharge, Am. powdered	"	.07½@.07¾
English glassmakers'	"	.08¼@.08½
Lithopone	"	.03½@.07
Metallic, brown	sh. ton.	16.50@22.00
Red	"	16.00
Ocher, Am. common	"	8.50@9.00
Best	"	16.00
Dutch, washed	lb.	.02½@.03
French, washed	"	.01½@.02½
Paris green, pure, bulk	"	.26
Red lead, American	"	.07½@.07¾
Foreign	"	.08¼@.08½
Turpentine, spirits bbl., per gal.		.60½
White lead, Am., dry	lb.	.06½@.07
American, in oil	"	.07½@.07½
Foreign, in oil	"	.10½@.10¾
Zinc white, Am. extra dry	"	.05½@.05½
Foreign, red seal, dry	"	.07½@.07¾
Green seal, dry	"	.08½@.08½
PHOSPHATES—Acid	.65@67½c per unit	
*Fla., hard rock		10.25@10.50
land pebble 68%		5.75@6.00
†Tenn., 78@80%		6.50@7.00
75%		6.00@6.25
68@72%		4.00@4.25
‡So. Car. land rock		5.75@7.25
" river rock		
POTASSIUM—		
Bicarbonate crystal	lb.	$.08½@.09
Powdered or granulated	"	.09@.09½
Bichromate, Am	"	.08½@.09
Scotch	"	.11
Bromide	"	.16
Carbonate (80@85%)	"	.03½@.04
Caustic, ordinary	"	.04½@.05½
Elect. (90%)	"	.05½@.06
Chloride (muriate), 100 lb.		1.90
Chlorate, powdered	"	.09½@.09½
Crystals	"	09@09½
Cyanide (98@99%)	"	.18@.19
Kainite, long ton, bulk, 8.50; bags, 9.50.		
Permanganate	lb.	10@10½
Prussiate, yellow	"	.16@.16½
Red	"	.33@.35
Sulphate	100 lb.	2.18½@2.21½
PYRITE—		
Domestic, non-arsenic furnace size, f.o.b. mines	per unit	11@11½c
Domestic, non-arsenical, fines, per unit, f.o.b. mines		10@10½c.
Imported non-arsenical, furnace size, per unit		.14@.14½
Imported, arsenical, furnace size, per unit		.13@.13½
Imported fines, arsenical, per unit		.08½@.09
" " non-arsenical, per unit		10½@11c.
Pyrite prices are per unit of sulphur. An allowance of 25c. per ton is made when delivered in lump form.		
SALT—N. Y. com. fine 280 lb. bbl.		.72@1.15
N. Y. agricultural	sh. ton.	3@4.40
SALTPETER—Crude	100 lb.	4.25@4.50
Refined, crystals	"	4.75@5.75
SILICA—		
Ground quartz, ord'ry	lg. ton	13.00@15 00
Silex	"	13.00@30.00
Lump Quartz	"	2.50@4.00
Glass sand	"	2.75
SILVER—Nitrate, crystals	oz.	.43½@.45¼
SODIUM—		
Acetate	lb.	.04½@.04¾
"Alkali," per 100 lb., 58/48		.80@.87½
Bicarb. soda, per 100 lb		1.20@1.50c.
Soda, caustic, per 100 lb., 76/60		1.75@1.85
" " powdered		.02¾@.03½
Salt cake, per 100 lb		.65@.85
Soda, monohydrate, per lb		1.4@1.75c.
Bichromate	lb.	.07½@.07½
Bromide	"	.16
Chlorate, com'l	"	.09@.09½
Cyanide, ("100% KCN")	"	.18@.19
Hyposulphite, Am	"	1.35 up
German	"	1.60@1.70
Phosphate	100 lb.	1.85@2.15
Prussiate	"	.09½@.10½
Sal soda, f.o.b. N. Y	100 lb.	.70@.85
Foreign, f.o.b. N. Y.	"	.80@1.00
Silicate, com'l	100 lb.	.75@1.15
Sulphate, com'l, (Glauber's salt)	100 lb.	.50@.60
" " calcined		.65@.85
STRONTIUM—Nitrate	lb.	.08½@.08½
SULPHUR—		
Louisiana (prime) to New York, Boston or Portland	lg. ton	22.12½
To Philadelphia or Baltimore	"	22.50
Roll	100 lb.	1.85@2.15
Flour	" "	2.06@2.40
Flowers, sublimed	" "	2.20@2.60
TERRA ALBA—French & Eng.	100 lb.	.85@1.00
TALC—Domestic	sh. ton.	15.00@25.00
French	"	20.00@25.00
Italian, best	"	35.00@40.00
TIN—Bi-chloride, 50%	lb	.11¼
Crystals	"	.23¾ up
Oxide, lb		.47@.49
URANIUM—Oxide	"	3.50
ZINC—Metallic ch. pure	"	.15
Chloride solution, com'l 20°	"	.02½
Chloride, granular	"	.04½@.05
Dust	"	.05½@.06½
Sulphate	"	.02½@.02½

Note—These quotations are for wholesale lots in New York, unless otherwise specified, and are generally subject to the usual trade discounts. Readers of THE ENGINEERING AND MINING JOURNAL are requested to report any corrections needed, or to suggest additions which they may consider advisable.

*F. o. b. Florida or Georgia ports. †F. o. b. Mt. Pleasant. ‡On vessel Ashley River, S. C.

Metal and Mining Companies—U. S.

Name of Company and Location.		Author-ized Capital	Shares. Issued.	Par Val.	Dividends. Total to Date.	Latest. Date.	Amt.
Alaska Mexican, g.	Al'ka	$1,000,000	180,000	$ 5	$1,626,381	July 1907	$ .30
Alaska Treadwell, g.	Al'ka	5,000,000	200,000	25	9,435,000	July 1907	1.00
Alaska United, g.	Al'ka	1,000,000	180,200	5	306,340	Jan. 1907	0.30
Amalgamated, c,.	Mont	155,000,000	1,530,879	100	53,646,546	Aug. 1907	2.00
Am.Sm.&Ref.,com.	U. S.	50,000,000	500,000	100	10,625,000	July 1907	2.00
Am. Sm. & Ref. pf.	U. S.	50,000,000	500,000	100	24,463,053	July 1907	1.75
Am. Smelters, pf. A	U. S.	17,000,000	170,000	100	1,940,000	Sept. 1907	1.50
Am. Smelters. pf. B	U. S.	30,000,000	300,000	100	3,375,000	Sept. 1907	1.25
Am.Zinc,Lead&Sm.	Kan.	3,750,000	80,000	25	60,000	Aug. 1907	.75
Anaconda,c.	Mont	30,000,000	1,200,000	25	36,950,000	July 1907	1.75
Annie Laurie, g.	Utah	5,000,000	25,000	100	465,061	July 1905	.50
Arizona, c.	Ariz	3,775,000	3,682,520	.....	6,182,361	Apr. 1906	.05
Atlantic, c	Mich	2,500,000	100,000	25	990,000	Feb. 1905	.02
Beck Tunnel, g.s.l.	Utah	100,000	1,000,000	0.10	595,000	July 1907	.04
Bingham & N.H.,c.g	Utah	2,000,000	226,000	5	22,600	Sept. 1906	.10
Boston & Montana.	Mont	3,750,000	150,000	25	47,875,000	Nov. 1906	12.00
Bull.Beck.&Cham.g	Utah	1,000,000	100,000	10	2,688,400	Apr. 1907	.10
Bunker Hill & Sull.	Ida	3,000,000	300,000	10	9,306,000	Aug. 1907	.60
Butte Coalition,c.s.	Mont	15,000,000	1,000,000	15	2,300,000	Sept. 1907	.50
Calumet & Arizonac	Ariz	2,500,000	200,000	10	9.000.000	Sept. 1907	5.00
Calumet & Hecla,c.	Mich	2,500,000	100,000	25	103,400,000	June 1907	20.00
Camp Bird, g., s.	Colo	5,500,000	820,000	5	4,079,500	Aug. 1907	.24
Carisa, c.g.	Utah	500,000	500,000	1	55,000	Nov. 1906	.01
Central Eureka, g.	Cal	400,000	398,425	1	778,921	Mar. 1906	.07
Columbus Con. c.	Utah	1,500,000	300,000	5	165,000	July 1907	.20
Combi'tion Co.G'f'd	Nevada	400,000	320,000	1	688,000	Sept. 1906	.15
Con. Mercur, g.	Utah	1,000,000	1,000,000	1	1,205,000	Dec. 1906	.02½
Continental, z. l.	Mo	550,000	22,000	25	209,000	July 1907	.50
Copper Range Con.	Mich	38,500,000	383.781	100	5,326,458	July 1907	2.00
Creede United, g.	Colo	2,000,000	1,625,000	1	214 053	July 1906	.00½
Cripple Creek Con g	Colo	2,000,000	2,000,000	1	180,000	Mar. 1905	.00½
Daly Judge, g. s. l.	Utah	300.000	300,000	1	225,000	Apr. 1907	.37½
Daly West, g. s. l	Utah	3,600,000	180,000	20	5,607,000	Mar. 1907	.60
De Lamar, g. s	Ida	400,000	67,180	5	2,926,370	May 1905	.72
Dillon, g.	Colo	1,250,000	1,250,000	1	21,875	July 1905	.01
Doctor Jack Pot	Colo	3,000,000	3,000,000	1	268,000	July 1906	.00½
Doe Run, l.	Mo	10,000,000	59,062	100	1,346,444	July 1907	.50
Elkton Con., g.	Colo	3,000,000	2,500,000	1	1,879,460	June 1907	.01½
El Paso, g.	Colo	2,500,000	2,450,000	1	1,022,750	June 1906	.01
Fed. Sm., com.	Idaho	10,000,000	60,000	100	2 348.750	June 1907	5.00
Federal Sm., pf.	Idaho	20,000,000	120,000	100	2,861,250	June 1907	1.75
Findley, g.	Colo	1,250,000	1,250,000	1	325,000	Aug. 1906	.01
Frances-Mohawk,g	Nevada	1,000,000	910,000	1	323,000	July 1907	0.10
Gemini-Keystone	Utah	500,000	5,000	100	1,950,000	July 1907	10.00
Gold King Con	Colo	5,750,370	5,750,370	1	1,407,504	May 1905	.01
Grand Central, g.	Utah	250,000	250,000	1	1,278,000	May 1907	.04
Gwin Mine, Dev., g.	Cal	1,000,000	100,000	10	35,000	Mar. 1906	.25
Hecla, s. l.	Idaho	250,000	1,000,000	0.25	1,300,000	July 1907	.10
Homestake, g.	S. D	21,840,000	218.400	100	22,244,040	Apr. 1907	.50
HornSilver,g.s.c.z.l	Utah	10,000,000	400,000	25	5,622,000	June 1907	.05
Inter'l Nickel, pf.	N. Y.	12,000,000	87,415	100	786,736	Aug. 1907	1.50
Iron Silver	Colo	10,000,000	500,000	20	4,050,000	July 1907	.10
Jamison, g.	Cal	3,900 000	390,000	10	278,470	July 1907	.02
Jerry Johnson.	Cal	2,500,000	2,500,000	1	61,700	Apr. 1906	.03
Kendall, g.	Mont	2,500,000	500 000	5	1,120,000	July 1907	.02
Liberty Bell,g. s.	Colo	700,000	130,551	5	110,857	Jan. 1906	.15
Lightner, g.	Cal	125,000	102,255	1	295,694	Aug. 1905	.05
Lower Mammoth, g	Utah	190,000	190,000	1	19,000	July 1907	.05
Mammoth, g. s. l.	Utah	10,000 000	400,000	25	2,120,000	Oct. 1906	.05
Mary McKinney, g.	Colo	1,500,000	1,304,252	1	801,765	Apr. 1907	.03
May Day, g. s. l.	Utah	200,000	800,000	25	28,741	July 1907	.01
Mohawk, c.	Mich	2,500,000	100,000	25	1,400,000	July 1907	5.00
Mont. Ore Purch.	Mont	2,500,000	80,833	25	9,437.274	Jan. 1907	15.00
Nevada Hills, s.g.	Nevada	1,000,000	200,000	5	20,000	Mar. 1907	.10
New Century, z., l.	Mo	300,000	300,000	1	228.800	June 1907	.01
Newhouse M. & S.c.	Utah	6,000,000	600,000	10	300,000	Aug. 1907	.50
New Idria, q	Cal	500,000	100,000	5	920,000	July 1907	.20
New Jersey Zinc	U. S.	10,000,000	100,000	100	8,400,000	Feb. 1906	3.00
North Butte	Mont	6,000,000	400,000	15	5,000,000	June 1907	2.00
North Star, g	Cal	2,500,000	250,000	10	1,436,989	July 1907	.20
Old Dominion Cop.	Ariz	7,500,000	281,589	25	280,843	May 1906	.50
Old Gold	Colo	2,101,150	2,101,150	1	10,506	Mar. 1906	.05
Ophir, g. s	Nevada	302,400	100,800	3	1,797,400	July 1904	.25
Osceola, c	Mich	2,500,000	96,150	25	7.035 650	July 1907	7.00
Parrot, c,s.	Mont	2,300,000	229,850	10	6,807,649	Sept. 1907	.25
Pennsylvania. g.	Cal	5,150,000	51,500	100	284,925	July 1905	.10
Pitts. L. & Z., l.z.	Mo	1,000,000	1,000,000	1	20,000	July 1907	.02
Portland, g.	Colo	3,000,000	3,000,000	1	7,507,080	July 1907	.04
Quartette, g. s.	Nevada	1,000,000	100 000	10	375,000	July 1907	.20
Quincy, c	Mich	3,750,000	110,000	25	17,725,446	Sept. 1907	2.50
Rob Roy, z.	Mo	15,000	15,000	1	9,600	May 1906	.03
Rocco Homest'k,l.s.	Nevada	300,000	300,000	1	112 000	Dec. 1905	.02
Sacramento, g, q.	Utah	1,000,000	1,000,000	1	258,000	Nov. 1906	.00½
St. Joseph, l.	Mo	20,000,000	1,000.000	10	5,258,357	June 1907	.15
Silver Hill, g. s	Nevada	108,000	108 000	1	81 000	June 1907	.05
Silver King, g. s. l.	Utah	3,000,000	150,000	20	11,000,000	Jan. 1907	.33½
Shannon, c.	Ariz	3,000,000	300,000	10	450 000	July 1907	.50
Snowstorm, s. l.	Ida	1,500,000	1,500,000	1	360,000	July 1907	.03
Spearfish, g.	S. D	1,500,000	1,500,000	1	165.500	Jan. 1905	.01½
Standard Con., g. s.	Cal	2,000,000	178,600	10	5,139,061	Mar. 1907	.10
Stratton'sIndepend	Colo	5,500,000	1,000.007	5	4.895,865	Apr. 1906	.12½
Swansea, g. s. l.	Utah	500,000	100,000	5	329,500	Mar. 1907	.05
Tamarack, c	Mich	1,500,000	60,000	25	9,420,000	July 1907	4.00
Tennessee, c.	Tenn	5,000,000	175,000	25	1,443,750	Aug. 1907	2.00
Tomboy, g. s	Colo	1,750,000	300,000	5	900.000	June 1906	.48
Tonopah of Nev.	Nevada	1,000,000	1,000,000	1	3,250,000	July 1907	.25
Tonopah Belmont	Nevada	2,000,000	1,295,007	1	518,003	Apr. 1907	.10
Tonopah Ext'nsion	Nevada	1,000,000	928,433	1	278,530	Apr. 1906	.15
Tonopah Midway	Nevada	1,000,000	1,000,000	1	300,000	Jan. 1907	.05
Uncle Sam, g.s.l.	Utah	500,000	500,000	1	135 000	Aug. 1907	.02
United Cop. com.	Mont	75,000,000	450,000	100	5,962,500	Aug. 1907	1.75
United, c. pf	Mont	5,000,000	50,000	100	1,500,000	May 1907	3.00
United, z. l., com	Mo.-Kan.	500,000	92,400	5	27,450	Oct. 1903	.05
United, z. l., pf	Mo.-Kan.	500,000	19.556	25	293,028	July 1907	.50
United, (Crip'le C'k)	Colo	5,000,000	4,009.100	1	280,071	Apr. 1905	.00½
United Verde, c.	Ariz	3,000,000	300,000	10	18,810.322	July 1907	.75
Un.States,pf.g.s.c.l*	Utah	37,500,000	750,000	50	3,937,500	July 1907	.87½
U.S. Red. & Ref. Pf	Colo	4,000.000	39,458	100	946,317	July 1907	1.50
Utah, g.(Fish Sp'gs)	Utah	1,000,000	100,000	10	270,000	Jnly 1907	.03
Utah Con., c.	Utah	1,500,000	300,000	5	6,936,000	July 1907	1.50
Victoria, Utah	Utah	250,000	250,000	1	177,500	Mar. 1907	.04
Vindicator Con., g.	Colo	1,500,000	1,500,000	1	1,650,000	July 1907	.03
Wolverine, c.	Mich	1,500,000	60,000	25	4,050,000	Apr. 1907	10.00
Work, g	Colo	1,500,000	1,500,000	1	105,000	July 1907	.01
YankeeCon	Utah	500,000	500,000	1	140,000	Jan. 1907	.03
Yellow Aster, g.	Cal	1,000,000	100,000	10	958,789	Aug. 1907	.20

Previous to consolidation $1,436,250 were divided.

Coal, Iron and Other Industrials—United States.

Name of Company and Location.		Author. ized Capital.	Shares. Issued.	Par Val. $	Dividends. Total to Date.	Latest. Date.	Amt.
Ala. Con., C. & I., pf.	Ala	$2,500,000	24,638	100	$905,265	May 1905	$1.75
Allis-Chalmers, pf.	U S	25,000,000	200,000	100	3,213,750	Feb. 1904	1.75
Amer. Ag. Chem., pf.	U. S	20,000,000	181,530	100	7,375,870	Apr. 1907	3.00
American Cement.	Pa.	2,000,000	200,000	10	1,108,000	July 1907	.40
American Coal.	Md	1,500,000	50,000	25	2,367,500	Sept. 1907	1.25
Associated Oil.	Cal	21,000,000	21,000,000	1	630,000	Aug. 1905	.01½
Bethlehem Steel, pf.	Pa.	15,000,000	150,000	100	900,000	Nov. 1906	.75
Cambria Steel.	Pa.	50,000,000	900,000	50	8,887,500	Aug. 1907	.75
Caribou Oil.	Cal	100,000	80,000	1	56,000	July 1905	.07
Central C. & C., com.	Mo	5,125,000	51,250	100	1,998,750	July 1907	1.50
Central C. & C., pf.	Mo	1,875,000	18,750	100	1,289,064	July 1907	1.25
Central Oil	W. Va.	1,500,000	60,000	25	182,500	May 1904	.25
Claremont Oil.	Cal	500,000	450,000	1	58,500	June 1905	.01
Col. & Hock. C.& I,pf.	Ohio	7,000,000	69,244	100	176,086	July 1907	1.50
Consolidated Coal	Ill.	5,000,000	50,000	100	350,000	July 1904	1.00
Consolidation Coal	Md	10,250,000	102,500	100	9,109,150	July 1907	1.50
Crucible Steel, pf	Pa.	25,000,000	250,000	100	2,125,000	June 1907	1.50
Empire S. & I., pf.	N. J	5,000,000	25,000	100	712,500	July 1907	3.00
Fairmont Coal,	W. Va.	12,000,000	120,000	100	1,384,000	Feb. 1907	3.00
Four Oil.	Cal	500,000	300,000	1	105 406	July 1905	.01
General Chem. Com.	U. S	12,500,000	74,103	100	1,893,331	Sept. 1907	2.00
General Chem., pf.	U. S	12,500,000	100,000	100	4,690,178	July 1907	1.50
George's C'k Coal	Md	2,500,000	22,000	100	1,188,000	July 1904	3.00
Imperial Oil	Cal	1,000,000	100,000	100	880,000	July 1905	.20
International Salt.		30,000,000	182,280	100	927,060	Dec. 1906	1.00
Jeff. & Cl'f C. & I., cm.	Pa.	1,500,000	15,000	100	330,000	Aug. 1905	5.00
Jeff. & Cl'f. C. & I., pf.	Pa.	1,500,000	15,000	100	825,500	Aug. 1906	2.50
Kern River Oil.	Cal	2,000,000	20,000	100	39,500	May 1905	.13
Lehigh Coal & Nav.	Pa.	17,378,500	346,901	50	25,614,693	May 1907	2.00
Maryland Coal,pf.	Md	2,000,000	18,850	100	1,592,560	June 1907	4.00
Monon R. Coal, pf.	Pa.	10,000,000	100,000	100	3,504,945	July 1907	3.50
Monte Cristo Oil.	Cal	500,000	500 000	1	120,000	July 1905	.01
National Carbon, pf.	U. S	4,500,000	45,000	100	2,047,500	May 1905	1.75
National Lead, com.	N. Y.	15,000,000	149,054	100	2,161 284	Oct. 1907	1.25
National Lead, pf.	N. Y.	15,000,000	149,040	100	16,585,148	Sept. 1907	1.75
Nat'l Steel & Wire,pf.	N. Y.	5,000,000	25,778	100	631,561	May 1906	1.75
New Central Coal	Md	1,000,000	50,000	20	350,000	May 1907	.40
New River Coal, pfd.	W. Va.	4,000,000	37,617	100	169,276	Aug. 1907	1.50
Pacific Coast Borax.	Cal	2,000,000	19,000	100	2,086,500	Aug. 1905	1.00
Peerless Oil.	Cal	1,000,000	92,000	10	396,320	May 1905	.14
Penna. Salt.	Pa.	3,000,000	60,000	50	14,528,000	Apr. 1907	3.00
Penna. Steel, pfd.	Pa.	25,000,000	168,214	100	7,615,744	May 1907	3.50
Phila. Gas, com	Pa.	28,953,029	579,061	50	8,050,040	Aug. 1907	.75
Phila. Gas, pf.	Pa.	6,000,000	120,000	50	2,550,000	Sept. 1907	1.25
Pittsburg Coal, pf.	Pa.	32,000,000	297,010	100	11,434,962	Apr. 1905	1.75
Pocahontas Coll., pf.	W. Va.	1,500,000	15,000	100	460,000	May 1907	1.50
Republic I. & S., pfd.	Ill.	25,000,000	204,169	100	5,330,746	Oct. 1907	1.75
Sloss-Sheffield, com.	Ala	7,500,000	75,000	100	9,480,250	 1907	1.25
Sloss-Sheffield, pf.	Ala	20,000,000	67,000	100	3.411.750	Oct. 1907	1.75
Standard Oil.	U. S	100,000,000	970,000	100	581,022,905	Sept. 1907	6.00
Tenn. C. & I., com	Tenn	22,553,600	225,536	100	3,131,988	May 1907	1.00
Tenn. C. & I., pf.	Tenn	248,000	2,480	100	385,080	May 1907	2.00
Texas & Pacific Coal.	Texas	2,000,000	20,000	100	1,960,000	June 1907	1.50
Thirty-three Oil.	Cal	500,000	100,000	5	430,000	July 1905	.10
Union Oil	Cal	10,000,000	100,000	100	1,118,766	May 1905	.50
U. S. SteelCorp.,cm.	U. S	550,000,000	5,083,025	100	66,041,541	July 1907	.50
U. S. Steel Corp., pf.	U. S	360,281,100	3,603,141	100	187,454,724	Aug. 1907	1.75
Va. Carolina Ch., pf.	U. S	20,000,000	180,000	100	12,180,869	July 1907	2.00
Westmoreland Coal.	Pa.	3,000,000	60,000	50	8,580,000	Oct. 1905	2.50

Canada, Mexico, Central and South America.

Name of Company and Location.		Author-ized Capital.	Shares. Issued.	Par Val. $	Dividends. Total to Date.	Latest. Date.	Amt.
Amistad y Conc'rdia.	Mex	$480,000	9,600	50	$258,064	Jan. 1905	$1.71
Buffalo, s.	Ont.	1,000,000	900,000	100	108,000	July 1907	.02
Butters' Salvador, g.	Salv	750,000	150,000	5	600,000	Apr. 1905	.25
Coniagas (Cobalt)	Ont.	1,000,000	1,000,000	1	20,000	July 1907	.02
Cariboo McKin'y, g.	B. C.	1,250,000	1,250,000	1	546,837	Feb. 1904	.04
Consolidated M & S.	B. C.	5,500,000	48,338	100	714,945	Aug. 1907	2.50
Copiapo, c.	Chile	1,125,000	112,500	10	3,000,900	Oct. 1904	1.20½
Crow's Nest Pass	B. C.	3,500,000	140,000	25	2,018,648	July 1907	.62½
Dominion Coal, com.	N. S.	15,000,000	150,000	100	2,250,000	July 1907	1.00
Dominion Coal, pf.	N. S.	3,000,000	30,000	100	3,330,000	Jan. 1905	4.00
Dos Estrellas, g. s.	Mex	150,000	3,000	50	1,020,555	July 1905	13.65
El Oro, g. s.	Mex	5,750,000	1,080,000	5	3.823,200	July 1907	.37
Esperanza, s. g.	Mex	2,275,000	455,000	5	6,721,649	July 1907	1.32
Foster Cobalt, s.	Ont.	1,000,000	1,000,000	1	50,000	Jan. 1907	.05
Granby Con.	B. C.	15,000,000	135,000	100	2,563,630	Mar. 1907	3.00
Greene Con. Copper.	Mex	8,640,000	864,000	10	5,814,200	Mar. 1907	.40
Greene Con. Gold.	Mex	5,000,000	500,000	10	300,000	July 1905	.20
GreenGold-Silv'r,pfd.	Mex	3,000,000	300,000	10	120,000	Mar. 1907	.40
Guanajuato	Mex	3,000,000	540,000	5	74,250	Oct. 1906	.07½
Guggenheim Expl.	Mex	17,000,000	105,000	100	3,435,000	July 1907	2.50
Kerr Lake, s.	Ont.	3,000,000	600,000	5	300,000	July 1907	.15
LeRoi No. 2, g.	B. C.	3,000,000	120,000	25	716,400	Feb. 1907	.24
McKinley-Darragh,s.	Ont.	2,500,000	2,000,000	1	100,000	Mar. 1907	.02
Mexican Coal & Coke	Mex	5,000,000	50,000	100	600,000	Dec. 1905	3.00
Mex. Con. M. & S. Co.	Mex	2,500,000	240,000	10	60.000	Aug. 1907	.50
Mines Co. of Am.	Mex	2,000,000	2,000,000	1	2,745,000	Aug. 1907	.02
N. Y. & Hond. Ros.	C. A	1,500,000	150,000	10	2,307,000	Aug. 1907	.10
Nipissing, s.	Ont	6,000,000	1,200,000	5	1,140,000	July 1907	.15
North Star.	B. C.	1,500,000	1,300,000	1	351,000	Dec. 1904	1.00
N. S. St. & Coal, com.	N. S.	5,000,000	49,876	100	938,228	July 1907	1.50
N. S. St. & Coal, pf.	N. S.	1,030,000	10,300	100	396,550	July 1907	2.00
Penoles*	Mex	250,000	2,500	100	8,213,375	Mar. 1907	20.00
Platanillo	Mex	500,000	206,989	1	5,580	Sept. 1906	.00½
Reco, g. s.l	B. C.	1,000,000	958,000	1	327.082	Apr. 1906	.02
Silver Queen, s.	Ont.	1,500,000	1,500,000	1	120,000	Jan. 1907	.08
Slocan Star.	B. C.	500,000	500,000	1	575,000	Dec. 1904	.06
St. Eugene Con.	B. C.	3,500,000	3,202,000	1	402,120	Oct. 1905	.02
Tezuitlan Copper	Mex	1,000,000	10,000	100	.....	July 1907	2.00
Tilt Cove, c.	N. F.	1,000,000	89,000	2	21,360	Jan. 1905	.48
Tretheway, s	Ont.	1,000,000	1,000,000	1	80,000	Mar. 1907	.04
Tyee, c	B. C.	940,000	180,000	5	136,800	Dec. 1904	.24

*Mexican Currency

THE MINING INDEX.

The editors of this paper read all the important publications of the world that relate to mining and the treatment of minerals. This index is published as a reference for all interested and to make it impossible for readers of the ENGINEERING AND MINING JOURNAL to miss any important article published anywhere.

We will undertake to furnish a copy of any article (if in print) in the original language, for the price quoted. Where no price is quoted the cost is unknown. These papers are not kept in stock, but must be ordered from the publisher; hence there will be some delay for foreign papers.

No accounts can be opened for these small amounts, but remittance must be sent with order. For the convenience of those making small but frequent remittances, coupons are furnished at the following prices: 20 cents each, six for $1.00, thirty-three for $5.00 and one hundred for $15.00. This arrangement will be especially appreciated by foreign readers and men in distant mining camps. Where remittances are made in even dollars we will return the excess over an order in coupons upon request.

ABRASIVES

4140 — EMERY AND CORUNDUM WHEELS—Leistungsversuche mit nasen Schmirgel- und Karborundumscheiben. G. Schlesinger. (Zeits. des Vereines Deutscher Ingenieure, Aug. 3, 1907; 2½ pp.) Investigates the respective advantages of wet grinding with emery and carborundum wheels.

ALUMINUM

4141—ALUMINUM ALLOY FOUNDING PRACTICE. H. Dolnar. (Am. Machinist Aug. 22, 1907; 3½ pp.) An account of the methods and practices in use by the Allyne Brass Foundry Co. of Cleveland, which is a large producer of aluminum castings and alloys. 20c.

4142—PRODUCTION of Bauxite and Aluminum in 1906. E. F. Burchard. (Advance Chapter from Mineral Resources of the U. S., Calendar Year 1906; 14 pp.) Gives notes on the present condition of the bauxite industry, and reviews the progress of aluminum production during 1906.

4143—WELDING—Die Autogene Schweissung von Aluminum. M. U. Schoop. (Chem. Zeit., July 27, 1907; 1 p.) Deals with the autogenous welding of aluminum. 20c.

BARYTES

4144—PRODUCTION of Barytes in 1906, With a Note on Strontium. E. F. Burchard. (Advance Chapter from Mineral Resources of the U. S., Calendar Year 1906; 10 pp.) Reviews conditions in the barytes industry during 1906, and gives the usual statistics of production, imports, exports and consumption. 20c.

BAUXITE

4145—PRODUCTION of Bauxite and Aluminum in 1906. E. F. Burchard. (Advance Chapter from Mineral Resources of the U. S., Calendar Year 1906; 14 pp.) See Aluminum.

BISMUTH

4146—ELECTROLYTIC REFINING of Bismuth. A. Mohn. (Electrochem. and Met. Ind., Aug., 1907; 1½ pp.) Gives detailed information as to a process of refining bismuth by electrolysis, including drawings of the cells used. 40c.

BORAX

4147—PERUVIAN BORAX DEPOSITS. (Boletin del Cuerpo de Ingenieros de Minas del Peru, No. 49, 1907.) Gives information relating to the borax deposits in the salt marshes of Peru, their extent, situation and the methods of working them.

COAL AND COKE

4148—ANKYLOSTOMIASIS — Miner's Anemia. F. W. Gray. (Can. Min. Journ., Aug. 15, 1907; 5 pp.) Reviews briefly English literature bearing upon this disease, and gives a long account of the characteristics of the parasites and the symptoms and effects of the disease which they induce. To be continued. 20c.

4149—BITUMINOUS COAL WASHING. G. R. Delamater. (Mines and Minerals, Aug., 1907; 3½ pp.) Treats of the theories and principles relating to the washing of coal and considers the preliminary and final investigations which should be made before establishing a coal washing plant. 20c.

4150 — BRITISH COLLIERIES — Polmaise Collieries. J. Saimond. (Trans. Min. Inst. Scotland, Vol. XXIX, Part 5, 1907; 11 pp.) A complete description of the equipment of these collieries, including boilers, winding engines, electric generating plant, haulage, pumping, screening and washing plants.

4151 — BRITISH COLUMBIA — Coal Mining in British Columbia in 1906. (Brit. Col. Min. Record, June, 1907; 3 pp.) Reviews operations in coal mining during 1906, which was a record year, and gives the statistics of production and consumption. 20c.

4152—COAL MINING—The Technics of Coal Mining. G. H. Winstanley. (Min. Engineering, Aug., 1907; 4 pp.) Continuation of article previously mentioned in this Index, dealing in the present instalment with steam boilers for collieries. 20c.

4153—COKE—The Manufacture of Coke from Western Coal. R. S. Moss. (Min. Wld., Aug. 17, 1907; 1½ pp.) Continued dissertation upon the art of coking Western coals, showing that forced draft is not necessary, but that a quick high temperature in the coking operation is essential. 20c.

4154—COKE—Why Is It That Some Coals Coke and Others Do Not? F. C. Keighley. (Iron Age, Aug. 8, 1907; 2 pp.) From the presidential address before the Coal Min. Inst. of America, June, 1907. Considers some reasons why certain coals are better adapted to coking purposes than others, and discusses briefly cases when special treatment is necessary. 20c.

4155—COKE MANUFACTURE—Extinction et Manutention du Coke dans les Usines à Gaz. Extinction et Transport par un Courant d'Eau. A. Thibeault. (Génie Civ., Aug. 3, 1907; 4½ pp.) Deals with the methods of coke manufacture in France, giving special attention to methods of quenching and transporting coke by streams of water. 40c.

4156—COKE QUENCHING—An Apparatus for Watering Coke Ovens. (Iron Tr. Rev., Aug. 1, 1907; 1 p.) Description of a machine adapted to watering and cooling coke in beehive ovens preparatory to withdrawing it. 20c.

4157—COLLIERY WARNINGS. (Coll. Guard., Aug. 9, 1907; 2 pp.) Deals with the confusion which at present exists as to the significance of colliery warnings in respect to gas outbreaks and earth movements, and presents a concise account of prevalent opinions on this subject. 40c.

4158—COMPOSITION OF COAL—Heat Production and the Constituents of Coal. A. Bement. (Eng. and Min. Journ., Aug. 3, 1907; 1½ pp.) Discussion on an article of this title by S. W. Parr appearing in the JOURNAL of June 29. Deals with the necessity for exact definitions of the terms usually used in designating the component parts of coal. 20c.

4159—COMPRESSIVE STRENGTH OF COAL—The Ultimate Crushing Strength of Coal. Joseph Daniels and L. D. Moore. (Eng. and Min. Journ., Aug. 10, 1907; 5½ pp.) Tabulates the results secured and describes the method and appliances used in an elaborate set of tests upon the compressive strength of coal, in order to obtain data to use in determining dimensions of mine pillars. 20c.

4160—CRUSHING COAL—Fortschritte im Kohlenstampfverfahren. A. Thau. (Glückauf, July 27, 1907; 10 pp.) Outlines recent progress in the art of crushing coking coal by stamps, and describes several types of machines adapted to this purpose. 40c.

4161—DETERMINING VOLUMES of Coal in Bins and Piles. C. Enzian. (Eng. and Min. Journ., July 27, 1907; 3 pp.) Gives methods and formulas for finding the dimensions and volumes of masses of coal of different forms, either intact or partially tapped. 20c.

4162—ELECTRIC POWER PLANT at Lansford, Pennsylvania. W. E. Joyce. (Eng. and Min. Journ., Aug. 24, 1907; 4 pp.) General description of this large power plant which is to furnish electric power to collieries of the Lehigh Coal and Navigation Co., and to outside concerns. 20c.

4163—ENGLISH COLLIERY—The Baggeridge Colliery, South Staffordshire, England. James Tonge. (Mines and Minerals, Aug., 1907; 2 pp.) An account of the development of a new area of the thick coal deposits of Staffordshire. 20c.

4164—FLOODED WORKINGS—A Mine Dam to Recover Flooded Workings. J. H. Haertter. (Eng. and Min. Journ., Aug. 17, 1907; 3 pp.) Tells how difficulties were overcome in constructing a dam to permit unwatering coal mine workings which were already flooded. 20c.

4165—FUEL COMBUSTION—Efficiency in the Burning of Fuel Under the Steam Boiler. William D. Ennis. (Eng. Mag., Aug., 1907; 11 pp.) Third instalment in a series of articles upon the combustion of fuel, dealing in this number with the modifications and practical management made necessary by variations in the quality of commercial fuels. 40c.

4166 — HYDRAULIC CARTRIDGES — Hereingewinnung unterschrämter Kohlenstösse mittels hydraulischer Sprengarbeit auf Gruben des Saarbezirks. W. Mentzel. (Glückauf, Aug. 3, 1907; 6 pp.) Gives facts connected with the use of hydraulic cartridges as a substitute for explosives in certain German coal mines, and contains statements of operating and maintenance costs. 40c.

4167—JAPANESE COAL—Notes on Analyses of Japanese Coals. John C. H. Mingaye. (Geol. Surv. of New South Wales, Vol. VIII, Part III, 1907; 6 pp.) Investigates the quality of Japanese coal and its value for gas, steam and household purposes, and compares the results obtained with similar tests on the coals of New South Wales.

4168—MINE EXAMINATION — Examination of a Large Coal Property in the West. Arthur Lakes. (Min. Wld., July 27, 1907; 1¼ pp.) Describes the process of examining into the merits of a coal property with a view to reporting upon its suitability for development. 20c.

4169—MINE FILLING—Le Remblayage Hydraulique. A. Wildiers. (Rev. Univ. des Mines, June, 1907; 78 pp.) A very complete account of the principles governing the filling of coal mines by hydraulic means and an investigation into the practical aspects of this art, giving much data taken from collieries where the system is in use.

4170—NEW DISCOVERIES—New Supplies of Anthracite Coal. W. E. Joyce. (Eng. and Min. Journ., Aug. 3, 1907; 1½ pp.) Shows how recent discoveries of anthracite coal in Pennsylvania regions upset established geological theories and

point to the existence of coal seams in unexpected localities. 20c.

4171—PERU—Coal Deposits of Santiago de Chuco, Peru. Fermin Malaga Santolalla. (Min. Wld., Aug. 3, 1907; 1 p.) Abstract-translation of an article in Bulletin No. 46, Soc. of Eng. of Peru, giving some general information as to the character and extent of coal measures in the above province. 20c.

4172—PLANT—Searights Plant of Taylor Coal and Coke Co. (Iron Tr. Rev., Aug. 8, 1907; 3 pp.) Describes the mine operations, power equipment and coke plant of this company which operates in the Connellsville region. 20c.

4173—QUALITY OF COAL—The Purchase of Coal Under Specification. J. E. Woodwell. (Iron Tr. Rev., Aug. 22, 1907; 2½ pp.) Discussion of various methods of purchasing coal by specification, dealing especially with the relative importance of analysis and thermal value as a criterion of quality; also mentions the specifications used by the Government. 20c.

4174—RACK-RAIL HAULAGE in Coal Mines. George E. Lynch. (Eng. and Min. Journ., Aug. 3, 1907; 3½ pp.) Discusses the principal features and advantages of rack-rail haulage to supplement the ordinary means of traction when the grades are steep. 20c.

4175—SHOT-FIRING—Shot-Firers, and Evils of Solid Shooting. Geo. Harrison. (Eng. and Min. Journ., July 27, 1907; 1 p.) From advance copy of report of chief inspector of mines, Columbus, O. Considers some of the dangers from shooting solid coal and means whereby the cause of the danger may be removed. 20c.

COPPER

4176—BRASS CASTING—The Hygienic Aspect of Brass Melting and Casting. E. S. Sperry. (Brass World, Aug., 1907; 5 pp.) Reviews the causes and effects of typical diseases met with in brass founders, and considers the means whereby the liability to infection may be reduced. 20c.

4177—BRITISH COLUMBIA—Mining in the Boundary Copper Field. Ralph Stokes. (Min. Wld., Aug. 3, 1907; 3½ pp.) Gives a general outline of mining conditions in this district of British Columbia. 20c.

4178—BRITISH COLUMBIA—The Britannia Copper Mine, British Columbia. R. Stokes. (Min. Wld., Aug. 17, 1907; 1 p.) Gives brief references as to the character of the deposits and the scope of operations of this mine, including a flow sheet of the new system of ore treatment. 20c.

4179—BRITISH COLUMBIA — The Emma Mine. Frederic Keffer. (Paper read before the Can. Min. Inst., Toronto meeting, 1907; 7 pp.) Brief note upon the mining operations and the geology of the deposit at this low grade mine in the Boundary district.

4180—BRITISH COLUMBIA—The Industrial Outlook of Boundary Copper Field. R. Stokes. (Min. Wld., Aug. 10, 1907; 2 pp.) Reviews briefly the present condition of the chief operators of this copper district, and discusses their probable future. 20c.

4181—CALIFORNIA—The Ore Deposits of Copperopolis, Calaveras Co., California. John A. Reid. (Econ. Geology, June, 1907; 38 pp.) Exhaustive investigation into the character, extent and relations of the above ore deposits. 60c.

4182—CANADIAN COPPER COMPANY—The Mining and Smelting Equipment of the Canadian Copper Company. D. H. Browne. (Can. Min. Journ., Aug. 1, 1907; 7½ pp.) Outlines the equipment and the scope of operations of the above company at Copper Cliff, Ont. 20c.

4183—COPPER SMELTING PRACTICE in the Boundary District, B. C. Frederic Keffer. (Eng. Mag., Aug., 1907; 13 pp.) General description of the plants and the smelting practice of some of the large operators in this district. 40c.

4184—CORROSION of Copper and Copper Alloys. J. G. A. Rhodin. (Engineer, London, July 19, 26 and Aug. 2, 1907; 3½ pp.) Discusses the theory of balanced alloys and the influence of various corrosive agents upon the dissolution of metals. Deals also with causes of accelerating corrosion. $1.00.

4185—NEVADA—The Ely Copper Deposits and Their Rapid Development. W. S. Bullock. (Min. Wld., Aug. 10, 1907; 2 pp.) Gives brief notes upon the principal groups of mines in this region. 20c.

4186—ELECTROLYTIC COPPER—Procéde d'Extraction Electrolytique du Cuivre. W. Stoeger. (Rev. Univ. des Mines, July, 1907; 14 pp.) Gives a general explanation of a new and simple process of extracting copper electrolytically from its ores, and describes some European smelters where it is in use.

4187—NEW MEXICO—The Burro Mountains Copper Deposits. Wm. R. Wade. (Eng. and Min. Journ., Aug. 24, 1907; 1½ pp.) Brief notes on the geology of this New Mexican district, and the present scope of mining operations. 20c.

4188—NICARAGUA—Copper Ores in Nicaragua and Their Treatment. (Min. Journ., July 27, 1907; 1 pp.) Deals with the mining of copper ores in this Central American country and mentions some of the different methods in use for treating them. 20c.

4189—PYRITIC SMELTING. J. W. Richards. (Electrochem. and Met. Ind., Aug., 1907; 4 pp.) Gives fundamental principles of pyritic smelting, and explains the solution of various problems connected with it. 40c.

4190—PYRITIC SMELTING—Negative Results in Pyritic Smelting. G. F. Beardsley. (Eng. and Min. Journ., Aug. 24, 1907; 1 p.) An account of the tests made and the results obtained during an attempt to apply pyritic smelting to copper-nickel ores. 20c.

4191—QUEENSLAND—Cloncurry Copper Mining District. Lionel C. Ball. (Queensland Gov. Min. Journ., June 15, 1907; 12¼ pp.) Gives general details of the geographical situation and physical features of this district and reviews the present state of mining development in the different groups throughout the territory. To be continued. 60c.

4192—SHEET COPPER—The Rolling of Sheet Copper. (Iron Age, Aug. 22, 1907; 2 pp.) Gives descriptions of the style of rolling mills used and the general methods of manufacturing sheet copper. 20c.

4193—SMELTING PLANT—Proyecto para la instalacion de un establecimiento de beneficio de minerales de cobre con una capacidad anual de seis mil toneladas de cobre fino. (Bol. de la Soc. Nac. de Mineria, Apr. 30, 1907; 13½ pp.) Deals with the calculations to be made in the designing of a plant for smelting copper minerals, having a yearly capacity of 6,000 tons of fine copper.

4194—STEAM STAMP—The Nordberg Compound Steam Stamp. (Eng. and Min. Journ., Aug. 24, 1907; 2½ pp.) Gives indicator cards and an extended discussion of the advantages of this steeple compound stamp which is finding application in the Lake Superior copper district. 20c.

4195—WALES—Briton Ferry Works of the Cape Copper Co. Edward Walker. (Eng. and Min. Journ., Aug. 17, 1907; 2 pp.) General account of the works of this copper company which are noteworthy for their mechanically-rabbled roasting furnace. 20c.

4196 — WIRE DRAWING — Modern Practice in Wire Drawing Machines—No. 1. (Engineering, Aug. 9, 1907; 1 p.) First of a series of three articles upon this general subject, giving in this instalment general data relating to speed, power requirements, adjustment, dies and methods of driving. 40c.

CORUNDUM

4197—COLORADO—On an Occurrence of Corundum and Dumortierite in Pegmatite in Colorado. G. I. Finlay. (Journ. of Geol., July-Aug., 1907; 5 pp.) Describes the mineralogical and chemical features of the above corundum deposits, and of the accompanying rock matrix. 60c.

4198—ONTARIO—Corundum at Craigmont. H. E. T. Haultain. (Can. Min. Journ., Aug. 1, 1907; 5 pp.) Reviews the methods of exploitation and the commercial conditions which have bearing upon the importance of corundum as an abrasive. 20c.

DIAMONDS

4199—DIAMOND DRILLING. Frank D. Hill. (Eng. and Min. Journ., July 27, 1907; 1½ pp.) Abstract of article in Daily Consular and Trade Reports, June 15, 1907. Gives some general information upon the present state of the diamond mining industry in South Africa and discusses the effect of present output and future development upon prices. 20c.

FLUORSPAR

4200—FLUORINE—Ueber das Fluor und einige neuere Fluoride. Otto Ruff. (Zeit. f. angew. Chem., July 19, 1907; 3¼ pp.) Investigates the chemical properties of several compounds of fluorine. 40c.

GOLD AND SILVER

4201—AUSTRALIA—Deep Leads of Victoria, or the Cainozoic Buried Auriferous River Deposits. H. L. Wilkinson. (Paper to be discussed at a meeting of the Brit. I. M. M., Oct., 1907; 54½ pp.) Describes at length the buried auriferous gravel deposits in Victoria, known as Deep Leads, and considers the conditions determining their value, both from the point of view of gold contents, and cost of extraction of the gold-bearing wash or gravel from the lead-bed.

4202—BLACK SAND PROBLEM, The. F. Powell. (Eng. and Min. Journ., Aug. 10, 1907; 1 p.) Illustrated description of a sluice-box having a perforated plate adapted to the saving black sands from placer gravel. 20c.

4203—BLACK SANDS of the Snake River, Idaho. G. W. McGhee. (Ores and Metals, Aug. 20, 1907; ½ p.) Deals with the composition and characteristics of the sands of the Snake river which are remarkable for the extreme fineness of their gold content, and the difficulty in saving them. 20c.

4204—BRITISH COLUMBIA—Cariboo District. (Min. Record, June, 1907; 6 pp.) Review of progress of placer mining in this district during 1906. 20c.

4205—BRITISH COLUMBIA—Le Roi Mining Company, Limited, Rossland, B. C. G. A. Ohren. (Can. Min. Journ., Aug. 15, 1907; 1½ pp.) Brief review of the history of operations of this company; also a statement of its mining costs which are typical for this district. 20c.

4206—BULLION REFINING—A Few Notes on the Refining of Base Bullion. C. W. Lee and W. O. Brunton. (Journ. Chem. Met. and Min. Soc. of So. Africa, May, 1907; 2½ pp.) Describes a scheme for increasing the fineness of bullion by the use of air or oxygen injected into the molten base metal. 60c.

4207—COBALT—Vein Formation at Cobalt, Ontario. J. B. Tyrrell. (Can. Min. Journ., Aug. 1, 1907; 2 pp.) Compares and comments upon several theories which have been propounded as to the origin of the ore deposits of this camp. 20c.

4208—COBALT SILVER FIELD as An Industry.—I. R. Stokes. (Min. Wld., Aug. 24, 1907; 3 pp.) The first of a series of articles on this subject, reviewing general mining conditions in the field, and the progress made by the various mines. 20c.

4209—COLORADO—Lodes in the Tertiary Eruptives of Colorado. T. A. Rickard. (Min. and Sci. Press, Aug. 10, 1907; 2 pp.) Describes various mineralogical features of metalliferous veins in eruptive rocks of Colorado, and makes an attempt to correlate them. 20c.

4210—COLORADO—The Downtown District of Leadville, Colorado. S. F. Emmons and J. D. Irving. (U. S. Geol. Surv., Bull. No. 320, 1907; 72 pp.) Monograph upon this district dealing with the general geology, present mining conditions, structural geology, the ores of the district and their genesis.

4211—CYANIDATION—Last Drainings. H. A. White. (Journ. Chem., Met. and Min. Soc. of So. Africa, June, 1907; 4 pp.) Discussion of the above paper, which was previously mentioned in this Index. 40c.

4212—CYANIDATION—Some Methods of Cleaning up a Cyanide Plant. A. H. Martin. (Ores and Metals, Aug. 20, 1907; ¼ p.) Gives some hints upon the construction and equipment of a cyanide plant which will facilitate cleaning up, and contains also a few notes upon precautions to be taken while working with cyanide solutions. 20c.

4213—CYANIDE PLANT—A Cheap Form of Cyanide Plant. Chas. Hunter. (Paper to be read before the Instn. Min. and Met., Oct., 1907; 3½ pp.) Describes briefly a simple and inexpensive cyanide plant which is used in Southern Rhod-

esia by operators of small mining propositions.

4214—DREDGING—A New Gold Dredge in Shasta County, California. (Mineral Wealth, Aug. 1, 1907; 1½ pp.) Brief description of the operation of a bucket dredge, which has lately been installed on Clear creek, ten miles southwest of Redding. 20c.

4215—EGYPT—Gold Mining in Egypt. C. S. Herzig. (Min. and Sci. Press, Aug. 17, 1907; 2 pp.) Interesting historical account of the past and present status of gold mining in this country. 20c.

4216—GOLD MINING INDUSTRY, Present Status of the. J. H. Curle. (Min. and Sci. Press, Aug. 3, 1907; 3 pp.) Reviews the present condition of the principal gold mines of the world. 20c.

4217—HYDRAULIC MINING—Notes on Hydraulic Mining with Special Reference to the Cariboo District, British Columbia and Yukon Territory. (Mines and Minerals, Aug., 1907; 3½ pp.) Describes various installations of sluices and giants in this territory. 20c.

4218—HYDRAULIC MINING—Ways of Cleaning Up in Hydraulic Placer Mining. Dennis H. Stovall. (Ores and Metals, July 20, 1907; 1 p.) Shows how gold and platinum may be lost by carelessness in a placer clean-up and gives some brief hints as to methods of reducing these losses. 20c.

4219—MERCURY IN PLACER MINING—The Use and Care of Mercury. (Min. and Sci. Press, Aug. 17, 1907; 1½ pp.) Hints upon the best ways of utilizing mercury in placer workings, and the effect of foreign substances upon its activity. 20c.

4220—MEXICO—The Mines of La Luz, Guanajuato, Mexico—II. John A. Church. (Eng. and Min. Journ., July 27, 1907; 3½ pp.) Second instalment of this article dealing with the present condition of the underground workings of the principal mines, and giving some information as to the output of the district. 20c.

4221—NEVADA—Recent Developments at Wonder. Edw. R. Zalinski. (Eng. and Min. Journ., Aug. 24, 1907; 1 p.) Brief mention of the present mining situation in this Nevada district. 20c.

4222—ORIGIN OF GOLD—Concentration of Gold in the Klondike. J. B. Tyrrell. (Econ. Geol., June, 1907; 6 pp.) Describes briefly the process of erosion of gold-bearing veins and the subsequent collection and concentration of the values in the placer deposits of the Klondike. 60c.

4223—PHILIPPINE ISLANDS—Camarines Gold Fields. (Far Eastern Review, July, 1907; 1 p.) General notes on the geology of several districts in the Philippine islands, and the development work that has been done. 40c.

4224—PLACER INVESTIGATIONS—The Essential Data of Placer Investigations. J. P. Hutchins. (Eng. and Min. Journ., Aug. 24, 1907; 3½ pp.) A summary of the points to be ascertained and the precautions to be taken into consideration in the examination and the valuation of placer ground before exploitation. To be continued. 20c.

4225—PLACER MINING in Southern Chili and Tierra del Fuego. (Eng. and Min. Journ., Aug. 3, 1907; 1 p.) Gives a general summary of present commercial and mining conditions in Southern Chile with special reference to dredging operations. 20c.

4226—PLACER MINING—The Nomenclature of Modern Placer Mining. J. P. Hutchins. (Eng. and Min. Journ., Aug. 17, 1907; 3½ pp.) General discussion of the usual classification of placers, with brief notes on their origin and method of exploitation. 20c.

4227—SCREEN ASSAY on the Meyer and Charlton G. M. under "the New Metallurgy." C. Toombs. (Journ. Chem., Met. and Min. Soc. of So. Africa, May and June, 1907; 5 pp.) Continued discussion of this paper, which was previously mentioned in this Index. 80c.

4228—SIBERIA—Gold Mining in Siberia. L. Schlund. (Inst. of Min. and Met., Bull No. 34, 1907; 4½ pp.) A few notes on the present state of gold mining in Siberia, supplementing the paper by A. L. Simon, which was previously mentioned in this Index.

4229—SLIMES TREATMENT—Recent Improvements in the Art of Slimes Treatment. D. J. Kelly. (West. Chem. and Met., Sept., 1907; 9½ pp.) Deals chiefly with improved methods and machines for filtering and leaching slimes. 60c.

4230 — SLIMES TREATMENT — The Utilization of Waste Heat in Slimes Settlement. A. Salkinson. (Journ. Chem. Met. and Min. Soc. of So. Africa, June, 1907; 3 pp.) Contains experimental results and working costs obtained from large-scale tests upon the efficiency of using waste heat to heat slimes solutions in order to cause quicker settling. 60c.

4231 — SLIMES TREATMENT — The Wade Vacuum Filter. E. M. Wade. (West. Chem. and Met., Sept., 1907; 4 pp.) A reprint of the patent specification for this filter which is designed to effect a considerable saving in the filtration of cyanide slimes. 60c.

4232—SOUTH AFRICA—The Gwanda District. (So. Afr. Mines, June 29 and July 6, 1907; 2 pp.) Reviews briefly progress and prospects of the East Gwanda district and gives information concerning Rhodesia's first copper smelter. 40c.

4233 — STAMP MILL REDUCTION PLANT of the New Kleinfontein Company, Limited, Witwatersrand, Transvaal. E. J. Way. (Paper No. 3631 before the Brit. Instn. Civ. Eng., 1907; 61 pp., 2 plates.) Gives very detailed figures upon the cost of the reduction plant of this company and describes also various parts and their construction.

4234—TUBE MILL PRACTICE—Notes on Some Recent Improvements in Tube Mill Practice. Kenneth L. Graham. (Journ. Chem. Met. and Min. Soc. of So. Africa, May, 1907; 3 pp.) Discussion of the above paper which was previously mentioned in this Index, principally upon the relative efficiency of pebbles and banket in tube mills and the best material for tube mill linings. 60c.

4235—VEIN SYSTEM of the Standard Mine, Bodie, Cal. H. Gilman Brown. (Paper read before the N. Y. Meeting. A. I. M. E., Apr., 1907; 14½ pp.) Describes all the principal features of this vein system which comprises nine different sets of fissures, five of which are ore-bearing.

GYPSUM

4236—CHEMICAL PROPERTIES—The Nature of the Changes Involved in the Production and Setting of Plaster of Paris. W. A. Davis. (Journ. Soc. Chem. Ind., July 15, 1907; 11 pp.) Reviews many of the standard theories as to the chemistry involved in making plaster of paris and gives an account of a very thorough investigation into this question with a view to establishing the exact nature of the chemical compounds formed. 80c.

IRON AND STEEL

4237—BLAST FURNACE—VI. H. Allen. (Iron Tr. Rev., Aug. 8, 1907; 1 p.) Continuation of article previously mentioned in this Index. 20c.

4238—BLAST FURNACE—Chemistry of the Iron Blast Furnace. Bradley Stoughton. (Eng. and Min. Journ., Aug. 3, 1907; 3 pp.) Traces the chemical changes which take place in an iron blast furnace during the downward course of the ore and fluxes to the smelting zone. 20c.

4239—BLAST FURNACE—The Modern American Blast Furnace. Bradley Stoughton. (Eng. and Min. Journ., July 27, 1907; 5½ pp.) Describes the construction of the modern American iron blast furnace giving details as to method of charging and heating, and supplying the blast. 20c.

4240—BLAST FURNACE—The Operation of the Iron Blast Furnace. Bradley Stoughton. (Eng. and Min. Journ., Aug. 17, 1907; 2 pp.) Gives details of the working of a blast furnace and the disposition of the iron and slag. 20c.

4241—BLAST FURNACE CHARGING—Charging a Modern Iron Blast Furnace. Bradley Stoughton. (Eng. and Min. Journ., Aug. 24, 1907; 1½ pp.) Shows how variations can be made in the ore, flux and fuels charged into a blast furnace in order to produce definite results in the output. 20c.

4242—BLAST FURNACE ENGINES, Speed Records of. (Iron Tr. Rev., Aug. 15, 1907; 1 p.) Brief description of a machine for keeping on a chart a continuous record of the speed of blowing engines which supply blast furnaces. 20c.

4243 — BLAST FURNACE RECONSTRUCTION—An Example of Blast Furnace Reconstruction. (Iron Age, July 25, 1907; 3½ pp.) An account of the reconstruction of an old blast furnace plant, and a description of the present modern devices for storing and handling ore, fluxes and fuels. 20c.

4244—BLAST FURNACES—The Parsons Turbo-Blower for Blast Furnaces. (Iron Age, Aug. 22, 1907; 2 pp.) Gives information relating to the design, construction, and working conditions of an installation at the Trzynietz furnace plant in Austria. 20c.

4245—CALIFORNIA — The Magnetite Deposits of Shasta County, California. (Mineral Wealth, July 15, 1907; 1 p.) Contains a general description of magnetic iron ore deposits in this county and considers their economic importance when smelted in electric furnaces. 20c.

4246—CONVERTER LINING—Die neue Dolomitmuhlenanlage der Georgs-Marienhütte bei Osnabrück. Kurt Gerson. (Stahl u. Eisen, July 17, 1907; 3½ pp.) Describes the installation of apparatus in the George-Marie smelter at Osnabrück, which is used in the crushing, calcining, and grinding of dolomite for subsequent use in lining converters for the basic bessemer process. 40c.

4247—COOLING CURVES—Ueber den augenblicklichen Stand unserer Kenntnisse der Erstarrungs-und Erkaltungsvorgänge bei Eisenkohlenstofflegierrungen. P. Goerens. (Stahl u. Eisen, July 24, 1907; 5½ pp.) Investigates the question as to what types of cooling-curve diagrams are best suited to interpreting the properties of iron-carbon alloys. 40c.

4248—CORROSION—Electrolytic Corrosion of Iron and Steel in Concrete. A. A. Knudson. (Can. Eng., Aug. 2, 1907; 4½ pp.) Gives the results of laboratory experiments to determine the amount of current and the time necessary to cause corrosion of metals incased in concrete.

4249—CORROSION — The Effect of Stress on the Corrosion of Iron. (Eng. Rec., Aug. 3, 1907; 1 p.) Investigates the influence which stresses in the metal have upon the rate of corrosion of iron. 20c.

4250—CORROSION OF IRON. A. S. Cushman. (U. S. Dept. of Agriculture, Office of Public Roads, Bull. No. 30, July 23, 1907; 34 pp.) An elaborate study into the causes which underlie the corrosion of iron and steel, discussing in turn the relative importance of the carbonic acid, the peroxide and the electrolytic theories.

4251—CUBA—The Mayari Iron Ore District of Cuba. (Iron Age, Aug. 15, 1907; 5 pp.) Description of the large deposit of bessemer iron ore in Cuba controlled by the Pennsylvania Steel Co., giving information as to the extent of the deposit, and the present equipment for handling it. 20c.

4252—DRY AIR BLAST—Notes on the Gayley Dry Air Blast Process. (Paper read before the N. Y. Meeting, A. I. M. E., Apr., 1907; 11 pp.) A discussion by J. E. Johnson of the paper of C. A. Meissner, presented at the Bethlehem meeting, A. I. M. E., Feb., 1906, giving some experiences of the author with the use of dry blast in furnaces.

4253—DRYING CHAMBERS—Neuerungen an Trockenkammern für Eisen- und Stahlgiesserein. E. Freytag. (Stahl u. Eisen, July 24, 1907; 4 pp.) Brief description of several improvements in drying chambers for foundries. 40c.

4254—ELECTRIC SMELTING of Iron Ore. (Min. Wld., Aug. 3, 1907; ¾ p.) A brief account of the preliminary runs of the Héroult electric furnace recently established in California, together with some information on the general conditions relating to iron smelting in this State. 20c.

4255 — ELECTRIC SMELTING — The Electrical Smelting of Iron Ore. R. L. Phelps. (Min. and Sci. Press, July 20, 1907; 2½ pp.) An account of the establishment of an electric furnace of the Héroult type in California for the production of iron, giving details of the furnace as constructed. 20c.

4256—GERMAN IRON MINES — Das Manganeisenerzvorkommen der Grube Elisenhöhe bei Bingerbrück. Jüngst. (Glückauf, Aug. 10, 1907; 5 pp.) Treats of the geological aspects and gives brief notes of the mining operations at the Elisenhöhe manganiferous iron mine at Bingerbrück. 40c.

4257—GRADING STEELS—The Spark Methods for Grading Steels. A. F. Shore. (Am. Machinist, Aug. 15, 1907; 1 p.) Description of a quick method for determining the kind and quality of a steel

by the action of oxygen upon the more combustible elements contained in steel which tend to act explosively when heated to the proper temperature. 20c.

4258—IRON ORE DEPOSITS—A Study of the Iron Ore Deposits of Almeria. P. Fabrega. (Min. Journ., July 20 and 27, 1907; 2 pp.) Conclusion of article which was previously mentioned in this Index. 40c.

4259 — MAGNETIC PROSPECTING — Magnetic Observations in Geological and Economic Work. I. H. L. Smyth. (Economic Geology, June, 1907; 12 pp.) Explains the use of the principal European types of dial compass and dip needle in prospecting for magnetic iron ores, and how the observed values are related to magnetic lines of force. 60c.

4260—MESABI DISTRICT—The Iron-ore Mines of the Mesabi Range. Reginald Meeks. (Eng. and Min. Journ., Aug. 3, 1907; 3 pp.) Gives a general summary of the method of prospecting, open-pit working and underground mining on this Minnesota range. 20c.

4261—METALLIC IRON—Method for the Estimation of Metallic Iron in the Presence of Its Oxides. H. G. Martin. (Journ. Am. Chem. Soc., Aug., 1907; 2½ pp.) Describes the apparatus used and the procedure for the rapid estimation of metallic iron when it occurs with oxides. 60c.

4262—MINING METHODS on the Gogebic Range. R. Meeks. (Eng. and Min. Journ., Aug. 10, 1907; 2½ pp.) Gives details of mining methods and shaft head frame construction as exemplified by typical mines on this Range. 20c.

4263—MINING METHODS—Operations at the Hartley, Shenango and Other Mines. (Iron Tr. Rev., Aug. 1, 1907; 2 pp.) Makes brief mention of the methods used in stripping and in mining ore from these Steel Corporation mines. 20c.

4264—NEW SOUTH WALES—The Iron Industry in New South Wales. (Engineer, London, July 19, 1907; 1 p.) A brief review of various attempts at iron smelting in this State and an account of the installation of the present plant, the initial capacity of which is about 600 tons of pig iron per week. 40c.

4265—PIPING—The Influence of the Conditions of Casting on Piping and Segregation, as Shown by Means of Wax Ingots. H. M. Howe and Bradley Stoughton. (Paper read before the N. Y. Meeting, A. I. M. E., Apr., 1907; 15 pp.) Studies the theory of segregation in ingots and the influence of size and shape of the ingot upon the segregation, by means of wax ingots.

4266—PIPING—Zur Frage der Vermeidung von Lunkerbildung. A. Obholzer. (Stahl u. Eisen, July 31, 1907; 4½ pp.) Studies the question of piping in ingots, and examines the influence of a special thermit compound as a possible aid in preventing piping and segregation. To be concluded. 40c.

4267—PIPING AND SEGREGATION in Steel Ingots. (Bi-monthly Bull., A. I. M. E., July, 1907; 7½ pp.) A discussion of the paper of Prof. H. M. Howe, presented at the London meeting of the Institute, July, 1906, and previously mentioned in this Index.

4268—PIPING—The Methods Adopted in the Hungarian Government Steel Works, at Diosgyor, for Avoiding Piping in Steel Ingots. A. Obholzer. (Iron and Coal Tr. Rev., Aug. 9, 1907; 2 pp.) Describes the use of Goldschmidt anti-piping thermit as a means of avoiding segregation in ingots, and gives numerous comparative analyses of borings from ingots made by this method and the ordinary one. 40c.

4269—SEGREGATION IN INGOTS—Compression of Steel by Wire Drawing During Solidification in the Ingot Mold. (Iron Tr. Rev., Aug. 22, 1907; 10 pp.) Deals with a method of preventing segregation in ingots by a process of compression by wire drawing as it is practiced in a large establishment at St. Etienne, France. 20c.

4270—SEGREGATION IN STEEL. J. E. Stead. (Iron Age, Aug. 8, 1907; 1 p.) Abstract of a paper read before the Engineering Conference of the Brit. Instn. Civ. Eng. Shows that segregation does not always take place at the top of ingots, and considers the effect of segregation upon mechanical properties. 20c.

4271 — SILICA AND ALUMINA IN IRON ORES, The Determination of. G. W. Dean. (Journ. Am. Chem. Soc., Aug., 1907; 1½ pp.) Gives a few modifications of the latest rapid process for determining these oxides in iron ores. 60c.

4272—SLAG CEMENT—Ueber chemisch-physikalische Verhältnisse der Hochbasischen Hochöfenschlacken und Zemente. Karl Zulkowski. (Stahl u. Eisen, July 17 and 24, 1907; 10 pp.) An inquiry into the physical and chemical relations of basic blast furnace slags and cements, attempting to develop a rational theory as to their constitution and its relation to the hardening of the cements. 60c.

4273—SOUTHERN IRON INDUSTRY—Relative Importance of the Southern Iron Industry. E. C. Eckel. (Manufacturers' Rec., Aug. 22, 1907; 1 p.) A review of the present condition of the iron industry of the Southern States, giving statistics of production from 1854 to 1907, with notes on the causes of its retrogression. 20c.

4274—SPECIFIC HEAT OF IRON—Die spezifische Wärme des Eisens. P. Oberhoffer. (Metallurgie, July 22, 1907; 11½ pp.) Conclusion of article previously mentioned in this Index. 40c.

4275—STEEL PRODUCTION — Etude Experimentale de l'Affinage sur Sole Basique (Scraps et Ore process). A. Bosser. (Rev. Univ. des Mines, July, 1907; 77½ pp.) A thorough critical and experimental inquiry into the theory and practice of the "ore and scrap" process of steel production.

LEAD

4276—LIME-ROASTING — Laboratory Experiments in Lime-Roasting a Galena-Concentrate. (Bi-monthly Bull., A. I. M. E., July, 1907; 5 pp.) Discussion by G. A. Packard of the paper of H. O. Hofman, R. P. Reynolds and A. E. Wells, previously read before the Institute.

4277—LIME-ROASTING—Les Procédés de Grillage a La Chaux des Minerais de Plomb. Eug. Prost. (Rev. Univ. des Mines, June, 1907; 22 pp.) An inquiry into the theory of the lime-roasting of galena with considerable data taken from actual smelting practice. The article is mainly a condensation of the chapters on lime-roasting from W. R. Ingalls' "Lead Smelting and Refining."

4278—WHITE LEAD—Analysis of White Lead. W. A. Davis and C. A. Klein. (Journ. Soc. Chem. Ind., Aug. 15, 1907; 2 pp.) Gives the results of a comparative study of the different methods of analysis now in use in the trade, to ascertain the sources of error to which these methods are subject, and to devise a method worthy of general adoption. 80c.

4279—WHITE LEAD—The Millwall Lead Works. (Engineer-in-Charge, Aug., 1907; 3½ pp.) Interesting description of the various operations and appliances used in the production of white lead by what is known as the stack process.

NICKEL

4280—NICKEL IN CHROMIUM—The Rapid Determination of Nickel in the Presence of Chromium, Iron and Manganese. C. M. Johnson. (Journ. Am. Chem. Soc., Aug., 1907; 7 pp.) Gives a procedure for the above determination with the usual tests upon the suitability of the process. 60c.

4281 — PERU — Compañia Niquelifera Peruana. Alfredo Lapoint. (Lima, Peru, 1907; 32 pp.) Engineer's report on the properties of the Compañia Niquelifera Peruana, dealing with the history, geographical location, geology and general conditions of the nickel deposits controlled by them.

4282—PYRRHOTITE—On the Microstructure of Nickeliferous Pyrrhotites. Wm. Campbell and C. W. Knight. (Econ. Geol., June, 1907; 19 pp.) Report upon the examination of the structure of various samples of pyrrhotite from different regions, illustrated by numerous micro-photographs. 60c.

PRECIOUS STONES

4283—BENITOITE, a New California Gem Mineral. G. D. Louderback, with chemical analysis by W. C. Blasdale. (Univ. of Cal. Pub., Vol. V, No. 9, July, 1907; 4 pp.) Brief note upon the crystallographical and chemical characteristics of this new gem stone.

QUICKSILVER

4284—TEXAS—The Mercury Minerals from Terlingua, Texas: Kleinite, Terlinguaite, Eglestonite, Montroydite, Calomel, Mercury. W. F. Hillebrand and W. T. Schaller. (Journ. Am. Chem. Soc., Aug., 1907; 14½ pp.) An extended report upon the chemical, mineralogical and crystallographical characteristics of the new mercury minerals which have recently been discovered in Texas. 60c.

4285—SPAIN—Estado Actual Del Establecimiento Minero de Almaden. (Revista Minera, July 16, 1907; 3 pp.) An inquiry into the financial and industrial conditions in force at the famous Almaden mine, giving some general conclusions concerning the establishment and the influence of labor charges upon the cost of production. 40c.

SALT

4286—RUSSIA—Die Salzindustrie und der Salzhandel Russlands zu Beginn des zwanzigsten Jahrhunderts. F. Thiess. (Preuss. Zeit. f. B. H. u. S., B. 55, 1907; 7 pp.) Reviews the progress of the salt industry and trade of Russia since 1900, and gives statistics of output.

STONE

4287—SOAPSTONE. G. M. Bertram. (Mine and Quarry, Aug., 1907; 5 pp.) Mentions the location of soapstone deposits in the U. S., and describes briefly methods of quarrying. 20c.

TIN

4288—ELECTROLYTIC REFINING of Tin. O. Steiner. (Electrochem. and Met. Ind., Aug., 1907; 3 pp.) Reviews the experimental work in developing a process for the commercial extracting of tin by electrolysis, and describes the operations of the perfectd process. 40c.

4289—MALAY STATES—Tin Mining in Ulu Selangor, Federated Malay States. E. Nightingale. (Inst. of Min. and Met., July 18, 1907; 5 pp.) Reviews briefly the geological features of this tin district and gives notes on the methods of mining and the present means of transportation and communication.

4290—TINSTONE DEPOSITS—Alluvial Tinstone Deposits of Northern Nigeria. (Bull. Imperial Inst., Vol. V, No. 2, 1907; 4 pp.) Note on the occurrence of placer tin in northern Nigeria, giving analysis of the mineral, and some general information as to mining conditions. 40c.

ZINC

4291—NEW MEXICO—The Kelly Mine, New Mexico, and Treatment of Its Ores. W. McA. Johnson. (Min. Wld., Aug. 17, 1907; 3 pp.) Brief information in regard to the geology, mining methods, concentration of ores in this mine. 20c.

4292—OPEN-PIT ZINC MINE at Webb City, Missouri. F. Lynwood Garrison. (Eng. and Min. Journ., Aug. 17, 1907; 2 pp.) Brief description of the open-pit workings in this zinc district. 20c.

4293—ORE SEGREGATION — Differentiation by Leaching in the Wisconsin Zinc Region. H. A. Wheeler. (Eng. and Min. Journ., Aug. 17, 1907; 1 p.) Traces the effect of aqueous solutions in this district where their action has resulted in the concentration of zinc below water level and the preponderance of lead above it. 20c.

4294—ORE TREATMENT—The Treatment of Zinc Ores in Colorado. F. W. Traphagen. (Mines and Minerals, Aug. 1907; 2 pp.) Reviews breifly several methods of treating zinc ores in Colorado, such as wet concentration, magnetic and electrostatic separation, and oil concentration. 20c.

4295—WISCONSIN—The Lead and Zinc Fields of Southwestern Wisconsin. G. E. Edwards. (Min. Wld., Aug. 17, 1907; 1 p.) Brief review of the possibilities of this district, and a few figures as to the cost of prospecting. 20c.

4296—ZINC SMELTING WORKS of Swansea, Wales. Edward Walker. (Eng. and Min. Journ., July 27, 1907; 2½ pp.) An account of the zinc smelting industry of Wales giving a few notes on industrial conditions and metallurgical practice. 20c.

ECONOMIC GEOLOGY—GENERAL

4297 — BRITISH COLUMBIA—Peace River Valley District of British Columbia. Wm. Fleet Robertson. (Brit. Col. Min. Record, June, 1907; 12 pp.) An account of an exploration trip to this district of British Columbia, giving much information as to the physicial features of the country and its resources in timber, coal, etc. 20c.

4298—BRITISH COLUMBIA — Reconnaissance up West Fork of Kettle River.—II. H. F. Evans. (Min. Wld., Aug. 24, 1907; ½ p.) Brief notes on an exploration of the above region. 20c.

4299—CALIFORNIA — Some Ore Deposits in the Inyo Range. John A. Reid. (Min. and Sci. Press, July 20, 1907; 3 pp.) Information as to the extent and character of the ore deposits of this range and several theories as to the probable method of origin of the different types. 20c.

4300—ECONOMIC GEOLOGY and Mineral Deposits—XIII and XIV. F. C. Nicholas. (Min. Wld., July 27 and Aug. 3, 1907; 2 pp.) Continuation of series of article previously mentioned in this Index, dealing in these instalments with simple tests to determine the value of minerals by means of the blowpipe. 40c.

4301—NORWAY—Sundry Geological Problems. G. Henriksen. (Printed by Grondahl & Son, Christiana, Norway, 1906; 18 pp.) Supplements a previous report of this author upon the character of the iron ore deposits in Sydvaranger, Finmarken, Norway.

4302—ORE DEPOSITS in Serpentine. William Forstner. (Min. and Sci. Press, July 27, 1907, 2 pp.) Discussion on the nature of serpentine rock and the usual types of deposits which may be expected to occur in it.

4304 — PENEPLAIN — The Tertiary Peneplain of the Plateau District and Adjacent Country, in Arizona and New Mexico. H. H. Robinson. (Am. Journ. of Sci., Aug., 1907; 20½ pp.) Inquiry into the geological history of the above district giving notes on the present rock systems and the geological forces instrumental in producing them. 60c.

4305—RHODE ISLAND—The Green Schists and Associated Granites and Porphyries of Rhode Island. B. K. Emerson and J. H. Perry. (U. S. Geol. Surv., Bull. No. 311; 75 pp.) Describes the occurrences of rocks of this character in Rhode Island and investigates their relations to the igneous formations of adjacent territory.

4306—ROCK INVESTIGATION—The Geology of the New England Plateau, with Special Reference to the Granites of Northern New England; Part IV. E. C. Andrews, and J. C. H. Mingaye, with Microscopic Determinations by G. W. Card. (Geol. Surv. of New South Wales, Vol. VIII, Part III, 1907; 56½ pp.)

4307 — UNDERGROUND WATERS—Mineral Veins the Pathway of Water Courses. Arthur Lakes. (Ores and Metals, Aug. 5, 1907; ½ p.) Mentions very briefly some of the reasons for believing that mineral veins may act as channels for underground water. 20c.

4308—UTAH—Stratigraphy and Structure of the Park City Mining District, Utah. J. M. Boutwell. (Journ. of Geol., July-Aug., 1907; 25 pp.) Deals with the general geology and geography of the Park city district, and gives detailed descriptions of the chief formations and their stratigraphical relations. 60c.

4309—UTAH—Underground Water in Sanpete and Central Sevier Valleys, Utah. G. B. Richardson. (U. S. Geol. Surv., W. S. and I. Paper No. 199; 63 pp.) Investigates the sources and distribution of underground water in this district.

MINING—GENERAL

4310—AIR MEASUREMENT—Uber die praktische Ausführung von Wettermessungen. Kurt Seidl. (Glückauf, July 27, 1907; 3 pp.) Outlines some methods of measuring air velocities and quantities. 40c.

4311—BORE HOLES—Die Steuerungen der hydraulischen Tiefbohrvorrichtungen. F. Freise. (Oest. Zeit. f. B. u. H., July 20, 27, Aug. 3 and 10, 1907; 9 pp.) Discussion of methods of controlling and governing hydraulic apparatus for boring deep holes. $1.00.

4312—BORE HOLES—The Deviation of Rand Bore-holes from the Vertical. Joseph Kitchin. (Bull. No. 34, Inst. of Min. and Met., July 18, 1907; 17 pp.) A collection of the survey notes from a number of deep diamond drill holes on the Rand and a discussion of the influences which tend to make holes deviate from the vertical direction.

4313—BRITISH COLUMBIA — Review of Progress in the Minerai Production of British Columbia. E. Jacobs. (Paper read before the Can. Min. Inst. Toronto meeting, 1907; 5 pp.) Gives statistics of the mineral production of British Columbia, and comments briefly upon the figures.

4314—EXPLOSIVES—The Detection of Mercury in Explosives. W. A. Hargreaves and W. T. Rowe. (Journ. Soc. Chem. Ind., July 31, 1907; ½ p.) Describes a procedure for the detection of mercury in expiosives, whereby the adulterant is extracted in the metallic state. 80c.

4315 — GRAVEL SCREENING and Washing Plants. (Eng. News, Aug. 1, 1907; 2 pp.) Gives some information regarding the design and erection of typical plants for screening and washing gravel. 20c.

4316—GROUND BREAKING in the Joplin District. Doss Brittain. (Eng. and Min. Journ., Aug. 10, 1907; 4 pp.) Gives information upon the standard methods of pointing holes for ground breaking and shaft sinking in this district, and includes brief notes upon the methods of handling ore and supporting the roof. 20c.

4317—HEAD FRAMES—The Design of Head Frames for Mines. J. M. C. Corvette. (Paper read before the Sydney Univ. Eng. Soc., W. Australia Branch, Nov. 15, 1906; 12 pp.) Enumerates many principles to be used in designing head frames, gives stress computations for the various members of the frame and describes details of construction and bracing.

4318—HISTORY OF MINING—Geographische Verbreitung und Wirtschaftliche Entwicklung des süd- und Mitteleuropäischen Bergbaus im Altertum. (Preuss. Zeit. f. B. H. u. S., B. 55, 1907; 68 pp.) An interesting review of mining operations as carried out in the Middle Ages in middle and southern Europe, with a few comments on the evolution of the art of mining.

4319—INVENTORIES—The Taking of a Complete Inventory. Clinton E. Woods. (Iron Tr. Rev., July 25, 1907; 3½ pp.) A description of the operation of taking an inventory giving the division of the work among the employees of the plant. Illustrated by numerous specimen forms. 20c.

4320—MINE FILLING—Ueber die Herbeischaffung und Entladung des Spülversatzmaterials mit besonder Beschreibung des Waggonkippers auf Zeche Katharina bei Kray. (Bergbau, Aug. 1, 1907; 3 pp.) Deals with the collection and disposal of material for mine filling, and gives special attention to the system in operation at the Katharina shaft at Kray. 20c.

4321—MINE FIRES — Grübenwasser und Grubenbrand in dem Erzbergwerk Neu-Diepenbrock III bei Selbeck. D. Hilt. (Glückauf, July 20, 1907; 9 pp.) Account of the means adopted for overcoming a mine-flood and fire at the Neu-Diepenbrock mine at Selbeck. 40c.

4322—MINE SUBSIDENCE—A. Richardson. (Journ. Chem., Met. and Min. Soc. of So. Africa, May, 1907; 5 pp.) Discussion of the above paper which was previously mentioned in this Index. 40c.

4323 — MINERS' WAGES — Methods of Paying Miners' Wages. Jos. Daniels. (Eng. and Min. Journ., Aug. 24, 1907: ½ p.) Summary of present established methods of paying miners, with a few notes on the evolution of these methods from old-time practices. 20c.

4324—MINING LAW—Mineral Land—An Important Decision. (Min. and Sci. Press, July 27, 1907; 1½ pp.) Abstract of a decision of the court reviewing the litigation over certain mineral tracts in Placer Co., Cal. 20c.

4325 — MINING LAW — State Provisions for Location of Lode Claims. R. S. Morrison. (Ores and Metals, July 20. 1907; 2 pp.) Gives information as to the manner in which the discover of mineral must proceed in Montana in order to secure his rights under Federal statutes. 20c.

4326—ORE RESERVES—Notes on the Estimation and Valuation of Ore Reserves. W. R. Tait. (Journ. Chem., Met. and Min. Soc. of So. Africa, June, 1907; 1 p.) Reply of author to the discussion of his paper of above title, which was previously mentioned in this Index. 40c.

4327—PROSPECTING—Das Aufsuchen von Erzen mittels Eleztrizität. Walfr. Peterson. (Glückauf, Juiy 20, 1907; 4 pp.) Information regarding the methods used by the Electrical Ore Finding Co. in prospecting for ores by means of electricity. From *Jern Kontorets Annaler*, 1907, Heft 2-3. 40c.

4328—ROCK EXCAVATION — Method of Excavating Rock in Large Masses. George C. McFarlane. (Eng. and Min. Journ., Aug. 3, 1907; 2 pp.) Gives methods and costs of removing rock in large masses including brief notes on methods of drilling, blasting and loading holes. 20c.

4329—SHAFT SINKING—A Theoretical Aspect of the Presence of Water Encountered in Sinking. F. G. Herdman. (Min. Engineering, Aug., 1907; 3½ pp.) Considers some of the factors which have bearing upon the penetration of water in porous strata and the effect of mining operations upon its movements. 20c.

4330—SHAFT SINKING—Die Abteufarbeiten auf Schacht Hildesia. Graefe-Dieckholzen. (Zeit. f. angew. Chem., July 19, 1907; 8 pp.) Gives a general account of the work of sinking a shaft in water-bearing strata, describing the methods of lining with iron cuvelage or tubbing. 40c.

4331—SPAIN AND PORTUGAL—Die tunzbaren Mineralien Spaniens und Portugals. J. Ahlburg. (Zeit. f. prak. Geol., June-July, 1907; 27 pp.) Detailed summary of the resources of Spain and Portugal in respect to metalliferous deposits and principal and secondary minerals, comparing the rank of these countries with the large producers. 40c.

4332—TUNNEL CONSTRUCTION—Cost of Concrete Work in Gunnison Tunnel. H. A. Howe. (Cement Age, Aug., 1907; 6 pp.) Gives analysis of cost of placing concrete on the side walls and arch of the Gunnison tunnel in Colorado. 20c.

4333—TUNNEL CONSTRUCTION—Methods Employed in Reconstructing the Battery Tunnel of the New York Rapid Transit Railway. (Eng.-Contracting, Aug. 7, 1907; 1 p.) Gives details connected with the rectification of the line and grade of one of the New York tunnels. 20c.

4334—UTAH—Mining Activity in the Alta District, Utah. (Min. Wld., Aug. 3, 1907; 1½ pp.) Mentions the renewal of mining interest in this district which produces copper, lead and silver ores. 20c.

4335—WIRE ROPE—A Few Notes on Results of Tests of Worn Ropes. W. Martin Epton. (Journ. of the Transvaal Inst. Mech. Eng., June, 1907; 7½ pp.) Gives the results of ninety complete tests of wire rope and discusses the significance of the results and the influence of the method of fastening the rope to the cage upon the wearing powers.

ORE DRESSING

4336—CONCENTRATION—Die Trockenaufbereitung des Biei- und Zinkerzbergwerks "Cons. Bleischarley" bei Beuthen O.-S. Piegza. (Glückauf, Aug. 3, 1907; 2½ pp.) Describes briefly some of the means and appliances used in the dry concentration of zinc and lead ores in Upper Siberia. 40c.

4337—DRY CONCENTRATION — Une Nouvelle Méthode D'Enrichissement à sec des Minerais Métalliques. U. Le Verrier. (Bull. Men. de L'Association des Siéves de L'école Nationale Superieure des Mines, May, 1907; 8 pp.) Gives a brief account of a device for concentrating ores by centrifugal force without the use of water, and discusses the significance of many tests which were made by the machine upon various kinds of minerals and gangues.

4338—FLOTATION PROCESS—Ueber den "Fiotation Prozess." C. Gopner. (Metallurgie, Aug. 8, 1907; 8½ pp.) Exposition and critical review of the theory and practice of the flotation process of ore concentration, including brief information as to its working in established plants. 40c.

4339—WILFLEY TABLE. R. H. Richards. (Paper read at Toronto Meeting, A. I. M. E., July, 1907; 26 pp.) A thorough investigation into the possibilities and limitations of the Wilfley table showing that classified and sized feeds are superior to a natural product.

METALLURGY—GENERAL

4340—BLAST FURNRACE CONSTRUCTION— Rapid Blast Furnace Foundation Work. Charles M. Ripley. (Iron Age, July 25, 1907; 3½ pp.) Gives details regarding the excavation of the furnace site and the laying of the concrete foundation, describing the special apparatus used for measuring, handling and conveying the concrete. 20c.

4341—FURNACE CHARGES—Calculation of Furnace Charges. Regis Chauvenet. (Min. Rep., July 25, Aug. 1, 15 and 22, 1907; 9½ pp.) Continuation of an article previously mentioned in this Index, giving the solutions of typical problems connected with the calculation of slags and furnace charges. 80c.

4342 — MELTING POINTS — Die Schmelzdiagramme der binären Systeme Bleiglanz-Magnetkies und Bliеglanz-Schwefelsilber. K. Friedrich. (Metallurgie, July 22, 1907; 10 pp.) Studies the melting points of galena and magnetic pyrite and mixtures of these minerals, also galena and silver sulphide. Micrographical examinations give information as to the structure of the mixtures. 40c.

4343 — METALLIFEROUS WASTE — The Systematic Treatment of Metalliferous Waste. L. Parry. (Min. Journ., July 27 and Aug. 3, 1907; 2½ pp.) Further instalments of this article containing chapters on the partial refining of scrap and the smelting of lead ashes and the cleaning of tin slags. 20c.

4344—METALLURGICAL METHODS—Some Metallurgical Vagaries and the Results. Dwight E. Woodbridge. (Eng. and Min. Journ., Aug. 10, 1907; 1 p.) Interesting account of how some wild theories of ore treatment and smelting were tried in a district in the Southwest and resulted in failure. 20c.

4345—ORE TREATMENT—Combined Ore Crusher, Pulveriser. Retort and Bullion Separator. (Min. Reporter, Aug. 22, 1907; 1 p.) Describes and illustrates a new combined arrangement for crushing, retorting and smelting ore in a continuous operation, which it is claimed can be operated on any class of ore. 20c

4346—REVERBERATORY FURNACE —The Construction and Operation of the Modern Reverberatory Furnace. B. H. Bennetts. (West. Chem. and Met., Aug., 1907: 5 pp.) Gives a few brief details on the materials needed in building reverberatory furnaces and the methods of erection. 60c.

4347—SMELTER SMOKE—Injury to Vegetation and Animal Life by Smelter Fumes. J. K. Haywood. (Journ. Am. Chem. Soc., July, 1907; 11 pp.) Investigates the effect of sulphur dioxide in smelter fume upon animal and vegetable life in the vicinities of smelters located at Redding, Cal., Ducktown, Tenn., and Anaconda, Mont. 60c.

4348—SMELTER SMOKE—The Sulphur Smoke Question in Germany. A. Gradenwitz. (Eng. and Min. Journ., Aug. 17, 1907; ⅛ p.) Reviews the prevailing attitude in Germany with regard to the disposal of smoke from smelters and chemical works. 20c.

4349—PREVENTION OF SMOKE—The National Smoke Consumer. (Iron Age, July 25, 1907; 1 p.) Gives information as to the construction and operation of this device which aims to prevent smoke by supplying pre-heated air so that complete combustion may be attained without chilling the gases and preciptating carbon. 20c.

4350—THERMO-ELECTRIC COUPLES —The Thermoelectromotive Forces of Potassium and Sodium with Platinum and Mercury. Harold C. Baker. (Am. Journ. of Sci., Aug., 1907; 8 pp.) Reports the results of a recent and thorough investigation into the thermo-electric properties of potassium and sodium when coupled with platinum and mercury. 60c.

MINING AND METALLURGICAL MACHINERY

4351—AIR COMPRESSOR—The Value of an Air Compressor in Development. D. H. Stovall. (Ores and Metals, Aug. 6, 1907; 1 p.) Gives some reasons why it is advantageous to install air power in developing a mine, together with suggestions as to the size of the compressor. 20c.

4352—AUTOMATIC SAMPLERS—Ueber Mechanisches Probenehmen. O. Binder. (Preuss. Zeit. f. B. H. u. S., B. 55, 1907; 6 pp.) Considers the leading features of various types of mechanical samplers with special reference to the present method of sampling ores as carried on in the United States.

4354—CABLE SPLICING — Splicing Wire Cables. Florio Seperak. (Min. Rep., Aug. 1, 1907; 1 p.) Gives a few practical hints upon proper methods of splicing broken wire cables. 20c.

4355—ELECTRIC POWER at the Calumet & Hecla. Carl L. Fichtel. (Eng. and Min. Journ., July 27, 1907; 1½ pp.) A brief account of the remodeling of the Calumet & Hecla mill at Lake Linden where steam power was superseded by electricity. 20c.

4356—CENTRIFUGAL FANS—High-Pressure Centrifugal Fans. A. Rateau. (Engineering, Aug. 16, 1907; 3 pp.) Describes a series of experiments made to determine the efficiency of turbine-driven centrifugal fans, and tabulates the results obtained from their use under varying conditions. To be continued. 40c.

4357—ELECTRICITY IN MINING—A Modern Electrically Operated Mine. Frank C. Perkins. (Min. Wld., July 27, 1907; 1¼ pp.) Gives general details of the power station and the electrically operated hoists and pumps at the Wilhelmina mine near Heerlen, Holland. 20c.

4358—FANS—Untersuchung eines Grubenventilators auf der Zink- und Bleierzgrube Neu-Diepenbrock III. (Glückauf, Aug. 3, 1907; 4 pp.) Reports the results of efficiency tests made on the mine fans of the Neu-Diepenbrock III mine in Germany. 40c.

4359—GAS AND PETROL ENGINES, The Present Position of. Dugald Clerk. (Electrician, Aug. 9, 1907; 3 pp.) Deals with the difficulties experienced in the construction of large gas engines and the possibility of compounding them. 40c.

4360—GAS ENGINES and Steam Turbines in Mining Power Plants. F. C. Perkins. (Min. Wld., Aug. 24, 1907; ½ p.) Brief notes on the application of these prime movers in German mining power plants. 20c.

4361—GAS ENGINES—New German Tandem Double-Acting Gas Engines. (Journ. Elec., Power and Gas, July 20, 1907; 2½ pp.) Describes briefly some of structural features of a gas engine of the above type operating on blast furnace gas and installed at the power station in Friedens Hütte, Germany. 40c.

4362—GAS ENGINES—Ueber Grossgasmaschienen und ihre Untersuchungen. (Glückauf, July 13, 1907; 10 pp.) Deals with the essential features of large-sized gas engines, giving especial attention to methods of testing their working efficiencies, and discussing the devices used in testing. 40c.

4363—HOISTING DEVICES — Geschwindigkeitsregelung und Sicherheitsvorrichtung für Dampffordermaschinen. E. Koch. (Bergbau, July 18, 1907; 3 pp.) Describes briefly several devices for governing the speed of steam hoists, and for securing safety in their operation. 20c.

4364—ORE HANDLING PLANT at Cripple Creek. S. A. Worcester. (Eng. and Min. Journ., Aug. 24, 1907; 2½ pp.) An account of the design and construction of an improved ore handling plant at Cripple Creek where a single counterbalanced skip discharging into self-dumping cars adds materially to shaft capacity. 20c.

4365—ROASTING FURNACE — The Wedge Furnace. (Eng. and Min. Journ., July 27, 1907; 1½ pp.) A description of an improved form of roasting furnace of the MacDougal type which is noteworthy for its large capacity and the efficient system of air cooling in the vertical shaft. 20c.

4366—SAFETY LAMPS—Versuche mit Tragbaren Elektrischen Grubensicherheitslampen auf der Grube amphausen der Königlichen Berginspektion XI zu Camphausen. Rossenbeck. (Preuss. Zeit. f. B. H. u. S., B. 55, 1907: 13½ pp.) Gives an account of tests made upon all the important types of portable electric lamps suitable for use in mines, and especially adapted to use in rescue work or where inflammable gases exist.

4367—STEAM TURBINE—The Modern Steam Turbine. A. F. Harrison. (Paper No. 572, Brit. Instn. Civ. Eng., 1907; 16 pp.) Describes several of the principal types of turbines and the reasons for the chief differences in their construction.

4368—SURVEYING INSTRUMENT—The Verschoyle Pocket Transit. W. D. Verschoyle. (Paper read before the Toronto Meeting, A. I. M. E., July, 1907; 4 pp.) Describes briefly the principle upon which this instrument is based.

4369—TURBINE BLOWERS—Das Turbinengebläse von C. A. Parsons als Hochöfengebläsemaschine. Julius Fürstenau. (Zeit. Ver. Deut. Ing., July 20, 1907; 8 pp.) Gives details of the construction, the operation, and the performance of turbine blowers of the Parsons type for blast furnaces.

4370—WOOD-STAVE PIPE LINE of the Madison River Power Company. W. E. Belcher. (Eng. and Min. Journ., Aug. 24, 1907; 1 p.) Gives the calculations made to determine the essential features in the design of a wooden pipe line, such as the method of support, thickness of staves, and intervals of banding. 20c.

ANALYTICAL CHEMISTRY

4371 — ANALYTICAL METHODS — Some Observations on Technical Methods of Analysis. W. H. Seamon. (West. Chem. and Met., Aug., 1907; 5 pp.) Points out the various stages in an analysis where care should be exercised in order to obtain a reliable result. 60c.

4372—PRODUCER GAS—A Commercial Method of Testing Producer Gas for Sulphur. Randolph Bolling. (Eng. News, Aug. 1, 1907; 1 p.) Describes the apparatus required and the various steps in the procedure devised by the author for determining sulphur in producer gas, avoiding the troubles and complicated apparatus characteristic of other methods.

Exploration at Leadville

The Western Mining Company is carrying out one of the most important pieces of work that has been done in the Leadville district in Colorado for years on the Neusitz placer, west of the city. Experts are of the opinion that the ore shoots of the Coronado and Penrose, as well as those of the Wolftone, Adams, etc., trend west of the city to the Arkansas river. When the ore shoot in the Coronado was opened, it pitched directly to the west, and after the company had developed it for some distance in that direction, ran across an unknown fault which cut off the ore-bearing horizon. To catch this ore zone to the west of the fault, work was started with a churn drill at Thirteenth street, Leadville, and is now down in the neighborhood of 400 ft. The site for carrying on the operations was selected after a great deal of study as to the trend of the different shoots and formation. The wash has been passed and the drill is now in the lake bedding. If ore in paying quantities is found in this section it will prove of great benefit to the district, as it will open up for development work thousands of acres of virgin territory. A great deal of interest is being manifested in the work, not only by the mining men of the district but by many on the outside.