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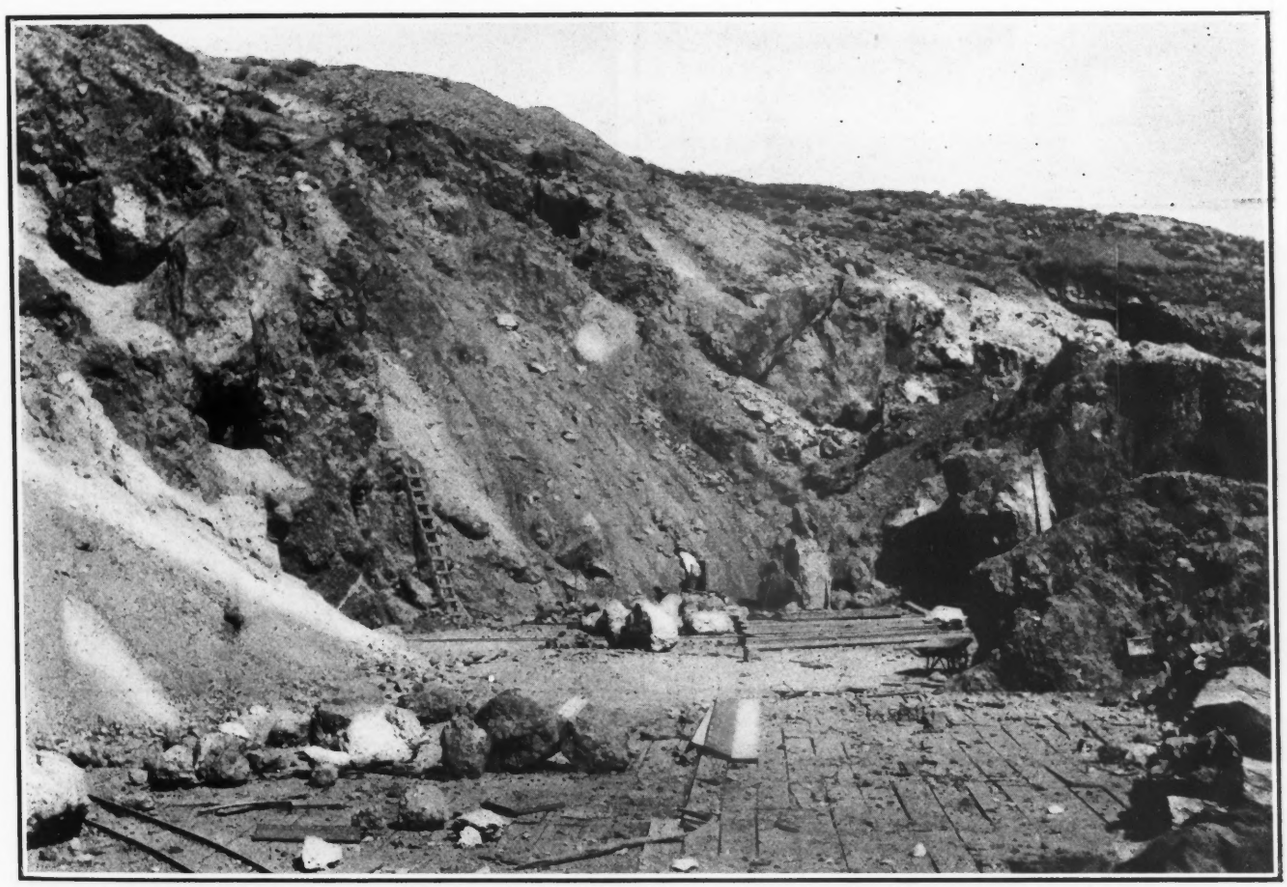
# The Silver-lead Mines of Eureka, Nevada

## A Famous Old Mining District That Is Now Being Reopened. Interesting Geological Problem of the Continuance of Ore with Depth

BY WALTER RENTON INGALLS

The first important mines of silver-lead ore in the United States were at Eureka, Nevada. It is now nearly 40 years since they were opened, nearly 25 years since they receded largely in production, and fully 15 years since anything worth mentioning has been heard of them until recently. But from 1869 to 1879, when their star paled under the superior brilliancy of Leadville, they were the largest domestic supply of pig lead and they are of peculiar interest because of their romantic history in the early days, because of the uniqueness of their geology and the famous litigation which arose respecting it, because of the richness and easy mining of the remarkable orebodies, and because at Eureka many mining engineers and metallurgists who subsequently became eminent received their first practical experience. Eureka is properly considered the birthplace of the American silver-lead smelting industry. In view of all these things and especially the brilliant record of the old mines there is peculiar interest in the reopening of them, undertaken about two years ago by the Richmond-Eureka Mining Company, which was a virtual consolidation of the historic old "Eureka Con." and Richmond companies, two neighboring concerns that were at loggerheads for 30 years. There are some who think that their mines were abandoned prematurely and that well planned and persistently executed explorations will disclose new orebodies as rich as those which formerly were mined. There are others who think that the mineral bearing formation of Ruby Hill was exhausted by the thorough exploitation of the old companies, that the mines were bottomed and have no further ore to yield, i.e., silver-lead ore; of course there is no question about the low-grade iron ore that was left behind in the old stopes. Before discussing this difference of opinion with any detail, it is worth while to relate briefly the history of the mines.



SURFACE WORKINGS ON RUBY HILL

### The History of Eureka

The first locations at Eureka were made in 1864, but such ores as were found were not then considered of value. There were remarkably prominent exposures of iron ore on Ruby Hill, which must have been observed by the early prospectors, but it is equally certain that such ore was abso-

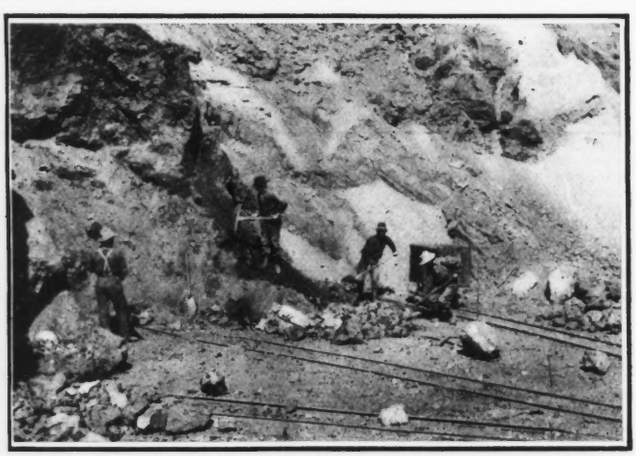
THE EUREKA SLAG DUMP

THE RICHMOND SLAG DUMP

THE MAIN STREET IN EUREKA

RICHMOND CONSOLIDATED

SURFACE WORKINGS ON RUBY HILL



SURFACE WORKINGS ON RUBY HILL

lutely destitute of value to them under the then existing conditions. After the rich discoveries in 1869, at White Pine, 40 miles east of Eureka, which were made in a limestone formation, attention was redirected to Eureka, and a smelting furnace was erected by C. A. Stetefeldt, already an eminent metallurgist, in which he smelted ore from several of the mines. The process was not quite successful because of the large proportion of gangue in the ore delivered to the furnace, necessitating a proportionately large quantity of flux, while pecuniary embarrassment prevented even the completion of the works. Dr. Raymond, in writing of Eureka in 1869, said: "The deposits are frequently large, but occur irregularly in limestone. They contain smelting ores, which, for cheap reduction ought to be dressed before they reach the furnaces. The ores assay well and probably average better than those from the base range at White Pine."

In 1869, Col. G. C. Robbins built a small furnace at Eureka and demonstrated that the ores could be successfully smelted. About the same time, Col. David E. Buel and associates leased the McCoy furnace (which had been erected by Mr. Stetefeldt) and bonded the Buckeye, Champion, and Sentinel mines. After Colonel Buel had satisfied himself of the smelting qualities of these ores, he resolved to build a large smeltery and together with Messrs. Bateman, Allen, Ingoldsby and Farren, formed a company called the Bateman Association. A combination was soon afterward made with Wm. Lent, who had acquired valuable property in the district, and the Eureka Consolidated Mining Company was organized.

The development of Eureka was rapid, and in 1870 the mines came into great prominence. The ores were at first easily found, once the requisite knowledge was acquired, and were easily mined. A great orebody in the Champion mine outcropped as a 3-in. crack in the limestone, filled with limonite. The limestone over the ore proved to be only 6 or 8 in. thick. This and other deposits in the district were dug out in open cuts. The ore was earthy lead carbonate and was so easily mined with pick and shovel alone that one man could take out 10 tons per day, and two miners actually supplied two smelting furnaces.

### The Beginning of Smelting

At the end of 1870 there were 14 furnaces, all in or close to the town of Eureka. According to Guido Kuestel, the ores smelted at that time averaged 40 to 48 per cent lead, $60 to $80 in silver and $15 to $20 in gold per ton. Three and a half tons of ore yielded one ton of pig lead. The latter averaged about $170 in silver and $80 in gold per ton. The yield of the Eureka mines in 1870 was not less than $1,200,000 in value.

From 1870 onward Eureka poured out a constant stream of base bullion until the great ore deposits were exhausted. The Eureka Consolidated Mining Company was always the largest producer; the Richmond Consolidated was a good second. In 1871 the works of the Eureka Consolidated comprised five furnaces, which had an aggregate capacity of 120 to 148 tons of ore per day. In that year about 19,000 tons of ore were mined and smelted, which cost $5.52 per ton for the mining and $19.60 per ton for the smelting. The total production of the Eureka district in 1871 was 5665 tons of bullion valued at $2,035,588. In 1872 the production of base bullion was 6780 tons. In that year the cost of mining and delivering the ore to the furnaces was $7.84 per ton, and 8.42 tons of ore produced one ton of bullion. The reason that there was not a larger increase in the production of the district this year was litigation between the Eureka and Richmond companies, which checked the output of the latter. This litigation was the beginning of hard feeling between these two companies which lasted until the death of some of the prominent figures concerned in it. However, there was a great increase in the production in 1873, when the output of base bullion aggregated 12,000 tons, which was furnished by eight smelting works with a total of 17 furnaces. In 1874 the Richmond company erected a refinery, and in 1875 the Eureka & Palisade Railway was completed, giving the district connection with the Union Pacific Railway at Palisade.

In 1875 the mining and smelting industry of Eureka fell more and more into the hands of the two large companies, which made increasing outputs up to about 1880 and paid large dividends. In the early 80's, however, the old bonanzas began to be exhausted and the production of lead dwindled, falling to about 4000 tons in 1884. The reduction in mining and smelting cost was insufficient to compensate for the impoverishment of the ore, for although the cost of smelting was reduced somewhat, the cost of mining increased because of the necessity of operating at greater depth and other unfavorable conditions. In 1883 the cost of mining to the Richmond company was $13 per ton, while smelting cost $11.66 per ton.

### Waning Production—The Grand Total

By 1880 the workings in the principal mines had attained considerable depth, the Richmond having a shaft 1000 ft. deep. Up to this time the mines had been dry, but in 1881 the Eureka company encountered water in its new shaft at a depth of 756 ft. In the same year the great suit between the Eureka and Richmond companies was decided by the Supreme Court of the United States in favor of the former. This suit was brought in 1877 on account of the Richmond company having crossed its line and worked out the famous Potts chamber whereby the Eureka company claimed to have lost $2,000,000. In 1882 the deep shaft of the Eureka was drowned out, and henceforward pumping was a serious difficulty.

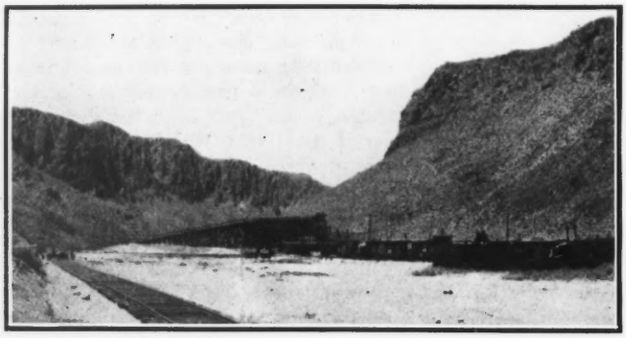
From 1884, mining at Eureka continued to fall off, the output dwindling to a comparatively low figure, being largely the product of tributers, to whom the upper portions of the mines had been given over. As early as 1885 most of the ore production of the Eureka Consolidated was from its tributers. In 1889 the total lead production of the district was only 1489 tons. In the early 90's all operations came practically to a standstill. The feud that arose between the two big companies over early disputes, which became the subject of litigation, was still alive and prevented harmonious action when such was especially needed. In 1893 the production of the whole district was 14,515 tons of ore. In 1897 the output of the mines of the Eureka Consolidated was only 1121 tons of ore.

Up to the end of 1882 the production of the district, according to Curtis, was about 225,000 tons of lead, $40,000,000 worth of silver and $20,000,000 of gold. From the statistical records in Raymond's reports, in the "Mineral Resources of the United States" and elsewhere, I am unable to account for more than 178,000 tons of lead actually shipped from the State of Nevada, of which, of course, all but an insignificant amount came from Eureka. From 1882 to the end of 1890 the lead production was probably about 25,000 tons, and from 1891 to the end of 1900 I surmise it may have been about 12,000 tons. Probably the output of Eureka up to the end of 1900 was about 210,000 tons of lead and doubtless 90 per cent. of that was derived from the two big mines.

### The Eureka & Palisade Railway

To go to Eureka, one leaves the main line of the Southern Pacific at Palisade. From that point the Eureka & Palisade runs almost due south to Eureka, a distance of about 80 miles. The country traversed is unfertile, unsettled and uninteresting. There are occasional stations along the road, but nothing that can be called a village by any stretch of the imagination. At present there are two trains a day. One of them is exclusively a freight train. The other is chiefly a freight train, but by virtue of carrying a single combination car, with seats for 12 or 15 passengers, is by courtesy called a passenger train. This makes the journey of 80 miles in about six hours. Previous to the reopening of the mines there was only one train every other day.

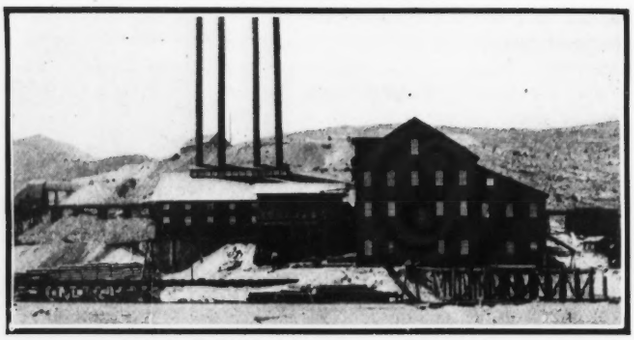
The Eureka & Palisade railway presents a rather unique survival of what railroading in the West used to be. The road was built just 30 years ago and operates today with the same equipment that it had at the beginning. The road is narrow-gage, laid with 40-lb. rails. The construction would be pronounced easy by any mountain railroad builder, the grades over Garden pass, which is the worst place, being only a lit-



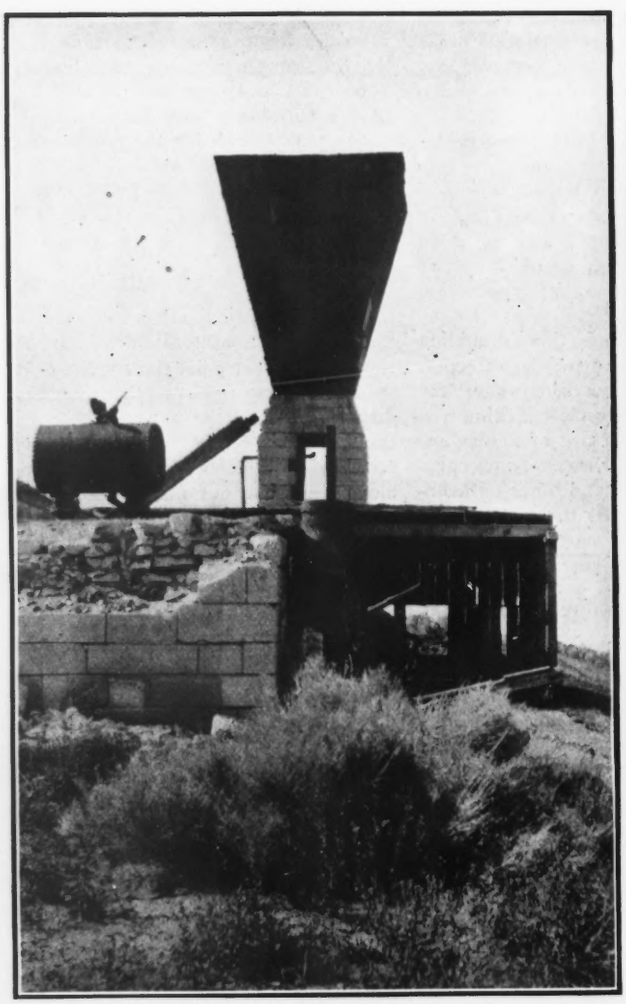
ORE TRANSFER STATION AT PALISADE

A STATION ON THE ROAD TO EUREKA

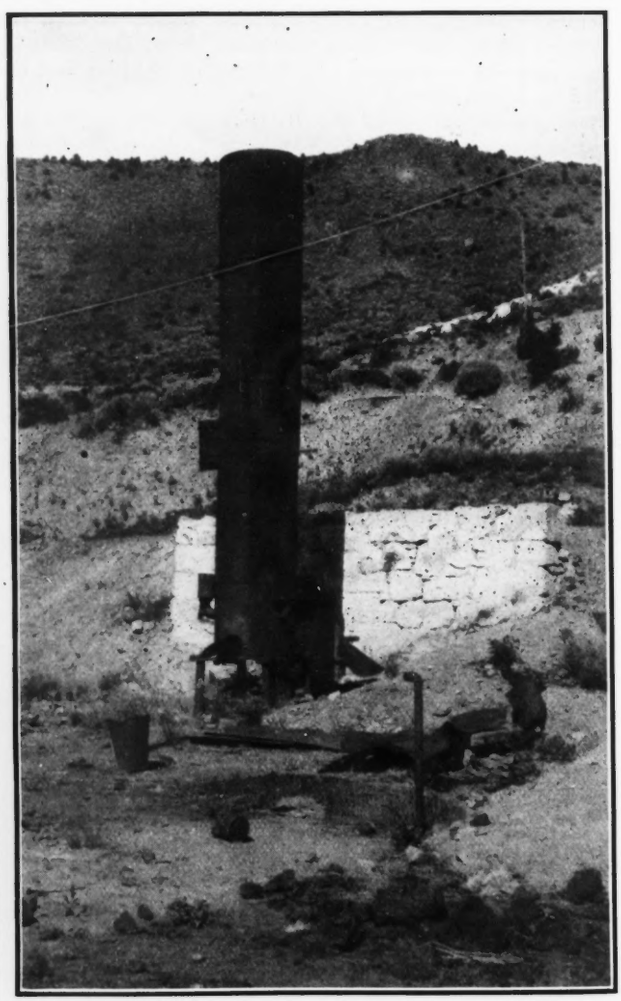
BOARDING HOUSE AT THE EUREKA CONSOLIDATED



THE LOCAN SHAFT



MATAMORAS SMELTER



OLD CUPOLA FURNACE ON RICHMOND DUMP

tle more than 2 per cent., but the feeble and worn-out locomotives of the line have great difficulty in negotiating even that gentle ascent. In coming down from Eureka with a train of five gondola cars, loaded with a total of about 100 tons of ore, and the little combination car at the end of the train, we finally came to a standstill in puffing up a 2 per cent. grade. The solution of the difficulty was to split the train, the locomotive going off to the summit with three cars, and putting them on a siding, returning for the three cars left back on the line. With a railway operated in this manner, the trials and tribulations of a mine operator at Eureka in shipping out his ore and bringing in his coal, etc., can readily be pictured. At Palisade the miniature freight cars, which carry each from 15 to 20 tons of ore, are pushed up an incline, and dumped into elevated pockets, from which the standard-gage cars of the Southern Pacific are loaded.

### The Town of Eureka

Descending from Garden pass the railway crosses Diamond valley and enters one of the gently sloping ravines, characteristic of Eastern Nevada, in which—a short distance from the entrance—is situated the town of Eureka at an altitude of about 6500 ft. above sea-level. The terminus of the railway is below the town, a quarter of a mile or so. Just above the railway station was the smelter of the Eureka Consolidated, which company was always referred to as the "Con." Then comes the town and at the upper end of the town the Richmond smelter. There were smaller smelters near the Con and near the Richmond, but with a single exception nothing remains of these save the slag-dumps, and indeed the same is true of the two big works.

It is interesting to visit some of the old mining camps, which acquire a picturesqueness in their decay and dilapidation that savors of more years than they actually possess. But Eureka is not exactly dilapidated. On the contrary it exhibits rather a trim appearance in spite of the rows of shops with shutters closed on doors and windows since many years ago, bearing mute testimony to the fact that the 1000 inhabitants of today do not require so much as the 9000 of 30 years previous. Indeed, it is a mystery how the town has lived so well during the long years of stagnation in mining and has supported the many excellent retail stores, and two hotels—one particularly good—which it has to-day. Even now the number of miners in the district is only about 200, most of whom live at the mines and being chiefly foreigners do not spend their money in the old-fashioned, reckless American way, so that the tradespeople and saloon-keepers say that business is not materially better than before the mines were reopened.

However, Eureka is the county-seat; there are some ranchmen up and down Diamond valley who come to it for trade; until the Nevada Northern railway was built it was the railway station for Ely; and it is still the supply point for Hamilton—another famous old mining camp of the '60s, that is now so dead that the saloon is open only one day in the week, although some mining is going on and there is hope that it also may experience a rejuvenation.

Eureka is agreeably situated, its site being sufficiently roomy and the hills on either side being not very steep, and looking north there is a fine outlook over broad Diamond valley. There are some trees in the town and with the aforesaid shops and other conveniences it is not a bad place as mining camps go. In its various vicissitudes the town has been several times partially washed away by floods, once ravaged by small-pox, and twice almost completely destroyed by fire, but if not so prosperous as once it remains today a respectable shadow of its pristine self with fond hopes that somewhat of its former activity may yet return.

### Ruby Hill and Its Mines

The principal mines of Eureka are situated on Ruby Hill, which rises to an elevation of about 7300 ft., two miles west of the town. On this hill, going from southeast to northwest, are the Jackson, Phœnix, Eureka Consolidated, Richmond and Albion mines, following in the order mentioned. Ore was found in each of these properties, but only in the Eureka Consolidated and the Richmond were the deposits of great magnitude. The geology of the Eureka district, including Ruby Hill, was described by Joseph S. Curtis in "Silver Lead Deposits of Eureka, Nevada," which was one of the earlier monographs published by the U. S. Geological Survey, and ranks still among the best. Mr. Curtis' field work was begun in July, 1881, and concluded late in 1882; the book was published in 1884. Unfortunately, even when the field work was begun, the mines had passed their prime, and when the monograph was published their production had run down to a comparatively small figure. However, the report is of superlative value at present, when the mines are being re-opened.

I shall not attempt to go much into detail in describing the geology of Ruby Hill By reference to the accompanying vertical cross-section it will be seen that there is a wedge of crushed limestone lying on the southwest side of the Ruby Hill fault, the wedge lying between the Ruby Hill fault and a secondary fissure which joins the main fissure at about the 12th level of the Eureka Consolidated mine, or rather joins it at about the 12th level on the line of this particular section. However, by reference to the elevation on a longitudinal plane, it appears that the line of junction of the two fissures increases with depth in going northwest, *i.e.*, from the Eureka Consolidated into the Richmond. Consequently, in going in that direction the vertical cross-section of the crushed limestone increases both in width and in depth. The Ruby Hill fault is a fissure of remarkable persistency and sharp definition. The faulting of the formation thrust upward the Prospect Mountain quartzite, immediately underlying the ore-bearing limestone, upon the southwestern side, so that the quartzite and crushed limestone are now in contact at the secondary fissure. At the junction of these two fissures they appear to cross each other and at great depth there is probably another wedge of limestone in reverse position.

### Form of the Orebodies

In the upper wedge of crushed limestone the ore occurs in deposits of very irregular form, sometimes resembling lodes, sometimes "stocks," and sometimes beds. According to Curtis the orebodies of any size were always capped by caves, or in some way connected with such openings in the rock and with fissures. This connection of orebodies with fissures is universal in the district. Curtis believed that the caves were formed subsequent to the deposition of the ore, partly by the action of water carrying carbon dioxide, and partly by the shrinkage of the ore in its decomposition. The origin of these caves, whether before or after the deposition of the ore, is a highly important point. Since the decomposition of the original ore, the latter has in many instances been redistributed by the flow of underground water.

The ore above the water level is principally composed of galena, anglesite, cerussite and mimetite, with very little quartz and calcite, the gangue being for the most part hydrated oxide of iron. The ore carries both gold and silver. Below the water level the ore is chiefly composed of pyrite, arsenopyrite, galena and blende.

The description of the ore deposits of Ruby Hill as occurring in forms resembling lodes, stocks and beds, is undoubtedly scientific, but I doubt if it conveys a thoroughly good idea of the occurrence of these orebodies. They occur as large masses, sometimes more or less ellipsoidal in form, in the crushed limestone. But what really constitutes the orebody? In the early days it was only the mineral high in lead that was considered to be ore; lead and silver bearing limonite was "gangue." At present the former "gangue" is ore.

Considering all the mineralized matter to be ore, which is proper from the present standpoint, the ore-deposits of Eureka consist of masses of oxidized silver-lead mineral, of irregular form, imbedded in larger masses of limonite containing a comparatively little gold, silver and lead, the ultimate form of which is unknown.

because the iron ore was not extracted in the former working.

### The Surface Workings

An excellent idea of these orebodies is obtained from the surface workings, which are shown in some of the engravings from photographs that accompany this article. All of these photographs were taken on the western side of Ruby Hill, where there were enormous outcrops of iron ore, and also toward the top of the hill. These form, I believe, one of the most extensive iron outcrops ever known in North America. (The iron outcrop at Leadville, Colo., was more extensively covered by surface gravel.) There was little or no lead ore showing in the original outcrop at Eureka, but certain seams, which were followed down, rapidly swelled into great bodies of ore, and at the present time in the old quarries may be seen small seams of yellowish lead ore, ramifying into the red iron ore, which were overlooked by the tributers. The great excavation represents lead ore extracted, together with iron ore that was taken out incidentally, but the quantity of the latter apparently was not proportionately large, because the old dumps show comparatively little. However, there is at least one dump of iron ore which looks good enough to ship, while there are other dumps containing a mixture of iron ore and non-mineralized waste which probably it will never pay to rework.

### Underground Prospecting

The conditions underground are similar to, indeed I may say identical with, those exemplified at the surface. Some of the surface deposits, in fact, extended right into the hill, one of them developing into the famous Hicks stope underground, and there are workings which go clear through Ruby Hill, coming out on the eastern side at what is the 100-ft. level of the Locan shaft. The ore that is now being mined at the surface on the western side of the hill is dumped down through one of the old shafts to this level through which it is trammed to the bins at the eastern side of the hill.

The great orebodies throw out branches, veinlets, and streamers, so to speak, for long distances, the form being comparable to that of a cuttle-fish, with a large central body and tentacles extending in many directions. This made prospecting comparatively easy because the drifts driven on any level, if reasonably close together, were fairly sure to strike some tentacle of an orebody if any existed. In following up such a leader the main orebody was found sooner or later. We find this same kind of prospecting going on at present, under the new regime, but alas! with some extremely vexatious results, as will be presently pointed out.

### Operations Under the Tribute System

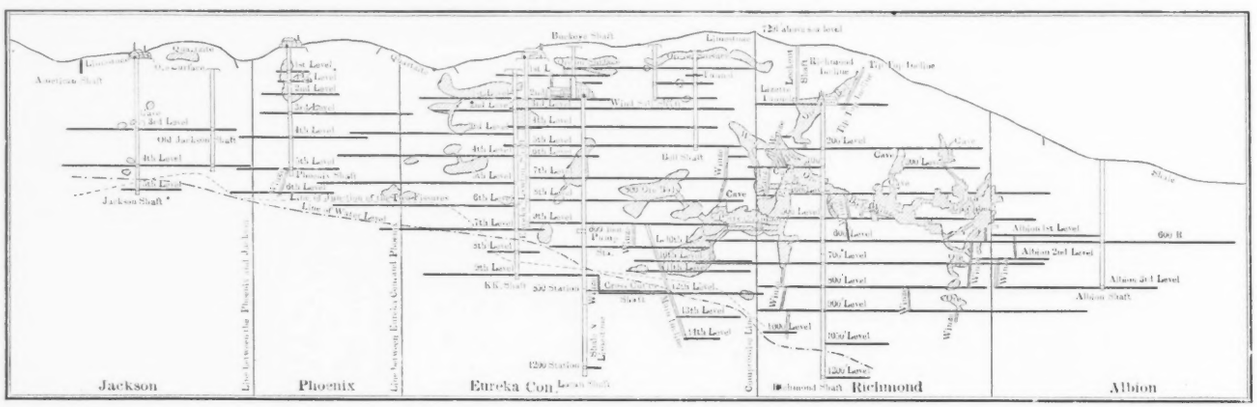
As early as 1878 the older workings of the Eureka mine contained considerable ore, which had failed to be extracted either through oversight or improper mining. Many small orebodies also had been passed over as too poor or insignificant to be worth mining and there was reason, moreover, to believe that undiscovered orebodies of small size existed, as indeed turned out later to be the case. To make a clean sweep of the ground, in that year T. J. Read, then superintendent of the mine, introduced the tribute system, dividing up the ground into blocks. A little later the tribute system was introduced in the Richmond mine, and in that as well as in the Eureka, it was found to work very well. As the companies gradually finished their operations in the lower levels, tributers were put in them also, and eventually tributers were in possession of the whole mine in each case, especially after the influx of water had driven the companies out of the extreme lower levels. Subsequent to 1885 or 1886 the bulk of the production in the Eureka was made by tributers, and since about that time no maps were kept up by the companies.

It is almost unnecessary to say that the tributers put the mines in wretched condition, because that is always what they do when they are not carefully supervised, and in almost all cases supervision which at first may be effective gradually becomes lax and eventually there is no supervision at all. The tributers in Ruby Hill burrowed, gouged and gutted, filled up some old workings and allowed others to cave in. Probably it never will be known fully how and where they went. But the annoyance of present prospecting is that in discovering and following a promising leader of ore, it always is found to end not in a substantial and desirable nucleus, but invariably in a stope opened and exhausted by some tributer coming from a different direction. One can not help admiring the industry of the former tributers, but it is to be remarked that in 30 years they had ample time to dig far and thoroughly.

### Future Prospects

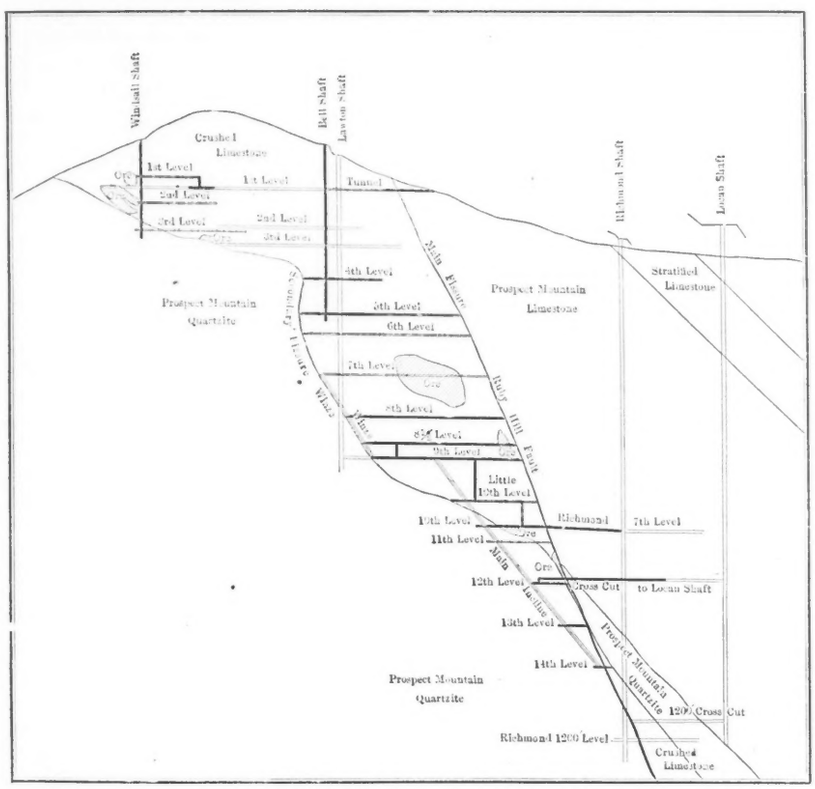
This may well take us to the question, "What are the future prospects of the mines? In the first place, as to the upper wedge of limestone, it has evidently been nearly completely prospected. The ground in the Eureka mine has been prospected rather exhaustively clear to the bottom. However, in lower levels there are some blocks of 200 or 300 ft. square, which may be found to contain bodies of ore not yet discovered, although the chance for this would not appear to be extremely brilliant. In the Richmond mine the wedge of limestone is deeper and wider and the lower part of it has by no means been cut up so thoroughly as in the Eureka Consolidated. It is true that such exploratory work as has been done in the lower part of the Richmond mine has not resulted very successfully, but this may be due rather to bad luck than to the non-existence of orebodies. Nevertheless, it must be acknowledged that the mineral bearing country in both these mines has been well prospected, and the production from any new orebodies that may be found in the upper wedge of limestone is unlikely to be more than a tithe of those which previously have been mined out. Recognizing this, it must be admitted that the chances are better for the Richmond mine than for the Eureka.

As to the lower wedge of limestone the prospects are uncertain. They are the same today as when Curtis made his report, and consequently Curtis' views are important. He says in concluding his re-




ELEVATION ON LONGITUDINAL PLANE THROUGH RUBY HILL

port: "The probability of finding ore in the lower wedge of limestone depends in a great measure upon the validity of the theory of substitution. If this theory is the true one—and the proofs favoring of it are strong—there seems to be no reason for doubting the presence of ore below, provided that the limestone was in a fit state to admit the ore-bearing solution during the period of deposition. That this was the case is indicated by what has been thus far observed in the lower limestone and by the fact that ore was found in the Ruby Hill fault-fissure when it was laid bare by the cross-cut from the 1200-ft. level of the Locan shaft. On the other hand, if the orebody were dependent on the prior formation of caves they will not




CROSS-SECTION THROUGH RUBY HILL

be found below the water level, as cave formation could not take place much below that plane."

It may be remarked here that Curtis himself rather strongly favored the theory of substitution. He continued as follows: "Whether the extraction of the ore in the deeper workings will prove profitable will depend upon the flow of water, size of orebody, value of ore and facilities with which it can be reduced. Water may prove a serious impediment, but it is not necessarily one which should be fatal to the exploration of these mines. As to the size of the orebodies no satisfactory predictions can be made. No great change in the value of the ore as regards to silver need be feared, though it is possible that the contents in gold may be decreased."

Whatever may be learned with respect to the lower wedge of limestone, its exploration is certain to prove one of the most interesting problems in mining geology. Up to the present time no active move has been made in this direction, although the equipment for boiling out the Locan shaft is already on the ground.

## Recent Developments

The activity of the Richmond-Eureka Mining Company so far has been confined to re-opening the old mine for the extraction of iron ore. This has been a costly, dangerous, troublesome and tedious work, the old stopes having largely caved in, so that it has been necessary to retimber them entirely with square sets. The shafts also, had to be retimbered. As a preliminary to the present operations all of the leases in the mine were cancelled.

Operations are now going on in the surface workings on the western side of Ruby Hill, on the first, second and ninth levels of the Eureka and on the sixth level and elsewhere of the Richmond. The operations are resulting in the production of about 130 tons of ore per day, which averages about 3½ per cent. lead, 30 per cent. excess of iron, 0.18 to 0.2 oz. of gold and from 2 to 3 oz. of silver per ton. The value of such ore is probably about $10 per ton at the mine. In its production 160 men are employed. Drill runners are paid $4 per day, miners, $3.50, muckers and trammers, $3. Timber is very expensive, costing $80 per thousand. It is probable that the requirements will be reduced later on by the introduction of the top-slice system of mining in certain portions of the mine. The reopening of the mine has been done in a highly skilful manner, which reflects great credit upon Andrew S. Mayberry, the superintendent. The work has not yet by any means been completed, and gradually without doubt the cost of mining will be reduced, but even under the most favorable circumstances, it is difficult to see how there can be any great profit from $10 ore which has to stand transportation charges of 380 miles to the smelter at Salt Lake City. That there is any profit must be due to a favorable smelting contract with the U. S. Smelting, Refining and Mining Company, which owns a large interest in and manages the Richmond-Eureka. The ore from the latter furnishes a necessary and valuable flux to the smelter.

## Smelting

Eureka was the real birthplace of silver-lead smelting in the United States. It had been tried a few years previously at a few other places, but the operations were ephemeral and unsuccessful, except at Cerro Gordo, Cal., and left no stamp on metallurgical practice. At Eureka, on the contrary, several important improvements were introduced, but of more importance was the training which many metallurgists received in a successful practice of the art. The two large smelters of Eureka were in operation for 20 years. The Richmond was closed in 1890; the "Con" in 1891. When the Richmond was built, in 1871, it was the finest thing in American lead-smelting practice. Doubts were expressed as to the justification of so much perfection in view of the uncertain life of the mines. This is, of course, amusing, when we read the later history of the latter.

Now, nothing much remains of the old works except the huge slag dumps which are shown in photographs accompanying this article. On the Richmond site there is standing a small cupola furnace and a few pieces of rusty dismantled machinery that it was not worth while to remove. On the "Con" site there are a few dismantled sheds. The sites of the smaller works are stripped equally clean.

However, there is at Eureka one relic that should be carefully preserved as a monument of the past. This is the Matamoras smelter, just above the "Con," which is shown in one of my photographs. Its stone furnace surmounted by a strange piece of iron-work is a prominent sight upon arriving at Eureka. The building in which it stood has fallen down and been carried away for lumber, but the furnace has withstood the action of wind, weather and vandals, and remains today a fine example, and the only example, of how smelting used to be done at Eureka. The date of its erection I am unable to say, but it must have been early. The fur-

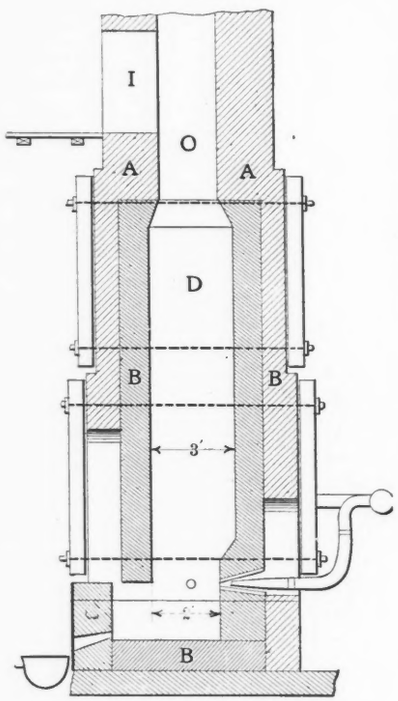
nace is constructed of the "firestone," a refractory, easily cut sandstone which was used in all of the early furnaces at Eureka. Indeed, the Eureka Consolidated did not abandon this construction and substitute water-jackets until 1884. The entire shaft of the Matamoras furnace is constructed of this stone. The breast is open—a sump-furnace. The curious structure on top of the furnace is a dust-catcher. It is of sheet iron lined with brick. In the top there is a circular hole, about 18 in. in diameter, for escape of the gas. At the bottom a steam pipe, bent upward, was evidently to promote the draft. The idea was that the dust carried upward from the charge would be checked in the inverted pyramid and would slide down the sides of the latter into the furnace again. To our modern eyes this is an amusing contrivance, but at that time, be it remembered, dust-collecting flues had not been introduced. Alongside of the furnace is the Sturtevant fan which furnished the blast, then the little engine which drove the fan, and finally the boilers, set also in firestone, which produced the steam. These are shown quite clearly in the photograph. Smelteries of equal primitiveness are to be found in Mexico today.

### The Old Slag Dumps

The question naturally arises, Can any part of the old slag dumps be shipped profitably under present conditions? In so far as slag proper is concerned the answer is probably not. The old metallurgists were fairly skilful and the ores were of easy smelting character. Consequently the slags are not very rich; certainly not rich enough to rework. They are said to contain from 2 to 3 oz. silver per ton and 1 to 2 per cent. lead. However, there are large accumulations of speiss, which may some day be a source of value. The formation of this compound, due to the arsenic in the ore, was always a great trouble to the Eureka metallurgists. They could not cleanly extract its gold, silver and lead, and cast it aside in cones, which glisten brilliantly on the dumps today. I was informed by an official who had long been connected with the Eureka Consolidated company that the amount of the speiss in the Eureka and Richmond dumps is probably between 130,000 and 200,000 tons, and that it contains 30 per cent. arsenic, 3 per cent. lead, 2 per cent. copper, and 2 to 3 oz. silver and $3 to $4 gold per ton. If these figures are approximately correct, there is in these dumps a great resource of arsenic, enough to supply the domestic consumption for many years. The high percentage of arsenic noted in the bag-house fume at the United States smelter at Salt Lake undoubtedly comes from the smelting of the Eureka ore.

### Other Prospecting

Outside of Ruby Hill a little prospecting is going on in the Eureka district. A Philadelphia company is sinking a shaft on the flat to the north of the hill, looking for a continuation of the mineral zone of the latter. If the work of the United States Geological Survey be correct, and there is no good reason to doubt it, the outlook in this direction is not flattering. Steps are also being taken to reopen the old Ruby-Dunderberg mine on Prospect mountain, which in the early days was a rather large producer, in fact the only producer of note outside of Ruby Hill, although its output was far inferior to that of Ruby Hill. According to the study of the United States Geological Survey the Ruby-Dunderberg occurs in a different formation, which is not to say, however, that it was not, or may not yet be, a good mine. (I did not visit it.) But




THE SMELTING FURNACES OF 1870

*A.* Outer wall of porphyry. *B.* Inside lining of sandstone. *C.* Front of hearth of composition. *D.* Shaft of square horizontal section. *O.* Shaft of circular horizontal section. *I.* Charge hole.

Ruby Hill seems to have been unique, and the great concentration of its mineral value was unquestionably within the Richmond and Eureka lines.

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A note in the *Min. Journ.* says that the employment of aluminum in metallurgy to prevent blisters and fissures in steel ingots gives excellent results. Suppression of blisters is due to the fact that aluminum has so great an affinity for oxygen that when it is thrown into a crucible of melted steel it absorbs all the oxygen, free or combined with iron, disengaging such heat that the metal is kept extremely fluid; about 0.01 per cent. aluminum suffices.

## Aluminum Instead of Carbon for Safety Explosives

A new explosive designed to secure safety in blasting in a gassy atmosphere and to do away with the noxious products of the discharge, has been invented by Jean A. Fürstenhoff, and is described in *Revue des Produits Chimiques* (Oct. 15, 1907). Safety explosives of the liquid-air type give off carbon monoxide upon their detonation and the liberated gases are injurious to workmen, forcing them in many cases to return to the use of dynamite. The new explosive is prepared from material which cannot give rise to the formation of any toxic substance. To this end carbon and all other organic matter containing this element is replaced by a metal or mixture of metals which will react with liquid air or oxygen and so prevent the formation of an oxide of carbon. For example, it is known that aluminum forms explosive mixtures with substances which readily give up oxygen. In order to attain this result with liquid air or oxygen, aluminum in powdered form is placed in a cartridge, preferably metallic, and air or liquid oxygen is added just before the explosion is desired. In order to increase the rapidity of the reaction a varied quantity of metallic hydrate or a mixture of hydrates may be added, their composition depending upon the result desired. Hydrate of calcium, or any other alkaline hydrate, answers this purpose, but care must be used not to select any hydrates which are unstable at temperatures but little above the ordinary as their presence is likely to produce an unreliable explosive.

In using the cartridge the powdered aluminum is mixed with a certain quantity of the hydrates (obtained by heating an alloy of calcium and sodium in a current of hydrogen), the cartridge is put in place and then the requisite quantity of liquid air or liquid oxygen is introduced. The necessary detonation is given by fulminate or by a flame from a ribbon of magnesium. No noxious products are formed and there is no flame. Aluminum may be replaced by magnesium or any other suitable metal or alloy, and the hydrates may be those of any other suitable metal or metals.

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The total production of limestone and dolomite for flux in the United States in 1906 is reported by the United States Geological Survey at 16,077,202 long tons; an increase of 689,311 tons over 1905. The total value in 1907 was $7,612,692, the average value at quarry being $0.47 per long ton. The larger outputs were 6,396,765 tons in Pennsylvania, 3,096,346 in Ohio, and 1,019,031 in West Virginia. Dolomite is used chiefly in Alabama.

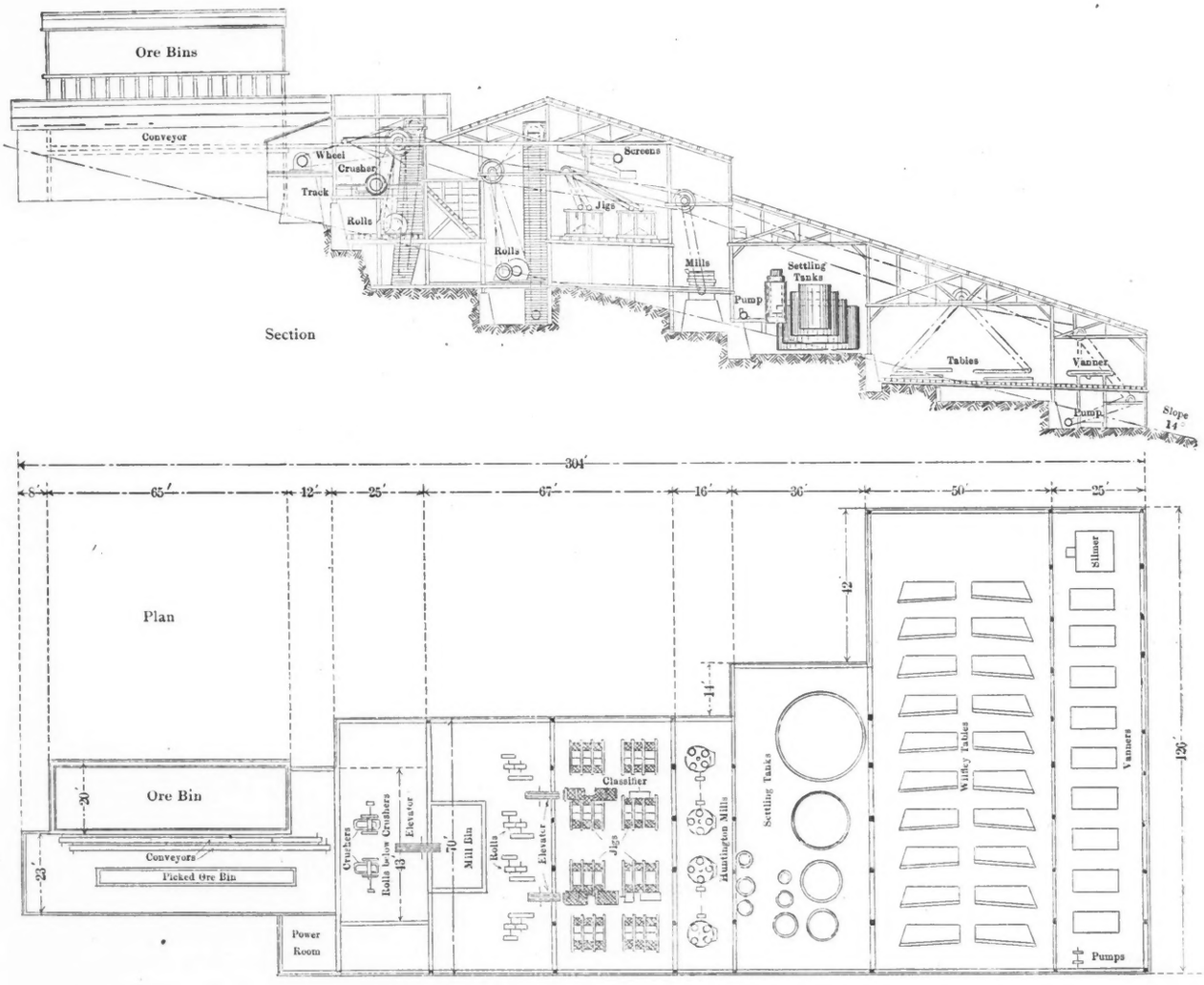
# The Braden Copper Mines in Chile

## Two Mines in the Andes Which Have Large Reserves of Ore. Unique Geological Occurrence. Ingenious System of Mining

BY WILLIAM BRADEN*

The Braden Copper Company owns 1200 acres of mining claims, which comprise one of the great copper mines of the world. The mines are 80 miles from Santiago. Valparaiso, 200 miles distant by railroad, is at present the nearest seaport, but in a short time, a railroad, now under construction, will be completed to the port of San Antonio, 150 miles from the mines. Atlantic seaboard of North America and Europe than from any of the copper-producing sections in the western United States.

At the time of the purchase of the mines, in April, 1904, it was calculated that there were 300,000 tons of 4 per cent. ore in sight, with promising prospects for the continuation of the orebodies. The time the machinery and building materials purchased in the United States, amounting to more than 4000 tons, were ready to be transported from Graneros to the mine. This difficult task was prosecuted vigorously, as many as 2500 oxen being used at one time, with the gratifying result that the concentrating mill, of 250 tons capacity, was completed in seven months




CONCENTRATION MILL OF THE BRADEN COPPER COMPANY

Forty-two miles of this will be over the railroad which the Braden Copper Company is building from Rancagua to the mines.

It is a noteworthy fact that it will cost less for freight from these mines to the property, which is in the main range of the Andes, was accessible for only a few months each year by very bad mule trails. There were no houses or living quarters at the mine, nor were there machinery, tools or plant for the development of the property.

A wagon road, 35 miles in length, was completed in November, 1905. By that and began operation June 1, 1906. This mill was so erected that it could easily be increased to 500 tons capacity. During the erection of the mill a 1000-h.p. hydraulic and electric power station, one main and two branch Riblet aërial tramways, equipment for mine, sufficient living quarters, stores and warehouses for immediate needs were constructed, and pre-

*Mining and metallurgical engineer; general manager, Braden Copper Company, New York.

parations for ore extraction were under way at the mine.

### The Ore Deposits

Today the 300,000 tons of ore reserves have been increased to 4,000,000 tons of ore in the Fortuna mine alone, averaging 3 to 4 per cent. copper; and the probable ore of the same grade and character can be estimated at an enormous tonnage, in addition to which exists the probability of finding new bodies of high-grade ore in the Teniente mine, at the Capitana mine, and at other points around the contact; especially where similar intrusions of porphyry to that at the Teniente mine occur, masses of high-grade ore may be found.

The occurrence of the ore deposits is unique in geological records. An extinct volcanic vent, filled with tuff, about three miles in circumference, is surrounded by highly fractured diorite, the fractures in which are seen to be mineralized around the contact for a distance of three miles. Where these croppings are penetrated by the underground workings in the Fortuna section of the property, copper sulphides and metallic copper in less proportions are found all through the seams and veinlets in the diorite and brecciated contact material for a depth of 2000 ft. below the croppings on the top of the mountain. In the present deepest workings there is no change in the character of the ore.

The diorite is a close-fractured, slightly schistose, dark green rock highly fractured and considerably metamorphosed in the vicinity of the mines. It weathers to light brown and such is the color of the croppings. While the mineralization extends out for 1000 ft. in width, the commercial "diorite ore" has, so far, been shown to have an average width of 115 ft. In different sections of the property the depth of oxidation from the surface varies, being from 3 to 150 ft. or more. The fractures in the rock range in width from a mere scum of copper sulphide to 3 or 4 in. of that substance, which is principally chalcopyrite with a variable amount of bornite. The clean "black sulphide" is found to contain from 40 to 50 per cent. copper. Due to the fracturing, the rock breaks easily into angular fragments.

Through these great masses of "diorite ore," porphyry dikes skirt around the contact, occasionally cutting into the tuff. At one such point on the contact of the porphyry and tuff occurs the famous Teniente mine, worked by the Spaniards before the independence of Chile, from which some 50,000 tons of 30 to 50 per cent. copper ore was extracted. The No. 2 adit of the Fortuna workings has recently, at a depth of 700 ft. from the surface, crossed a porphyry dike, which enters the tuff in a similar manner to that where the great Teniente orebody was found.

The ore coming from the Teniente mine is quite distinct in appearance and character from the diorite ore above described. It is a breccia of tuff and porphyry, these two gangue constituents being seamed with cuprite, carbonates of copper, native copper and tetrahedrite. The last mineral predominates and in its pure state carries 50 to 60 per cent. copper. Domeyko, the famous Chilean mineralogist, mentions in his works that some of the most beautiful crystals of gray copper ever found came from this mine. Both the porphyry, which is light gray, and the tuff, which ranges from light gray to black in color, contain a small amount of copper in the form of small grains for some distance on each side of the contact. The croppings in this portion of the property are very showy with copper carbonates; although immediately over the richest orebodies no more than occasional small seams of from 1 to 2 in. wide of cuprite are seen in the tuff and breccia, and the croppings present anything but an attractive appearance. Within 20 ft. from the surface, however, these seams gradually expand into solid masses of high-grade ore up to a maximum width of 70 feet.

At the Capitana mine, situated on the other side of the mountain from the Fortuna, in what is called the "Devil's cañon," and at the Soldado mine, higher up on the mountain than any of the rest of the mines, are found croppings of ore giving great interest to these sections of the property, which, up to this time, have received less attention than the more accessible parts. They will be brought into close communication by the Fortuna adits, which are being driven in ore, and in their prolongation will, in due course, tap the Capitana at considerable depth below the surface workings, in which 15 per cent. copper ore occurs massively. The Soldado will, in like manner, be tapped at great depths by explorations carried on from the Teniente mine.

### The Fortuna Mine

At the time when the mines were purchased, the Fortuna was developed by a

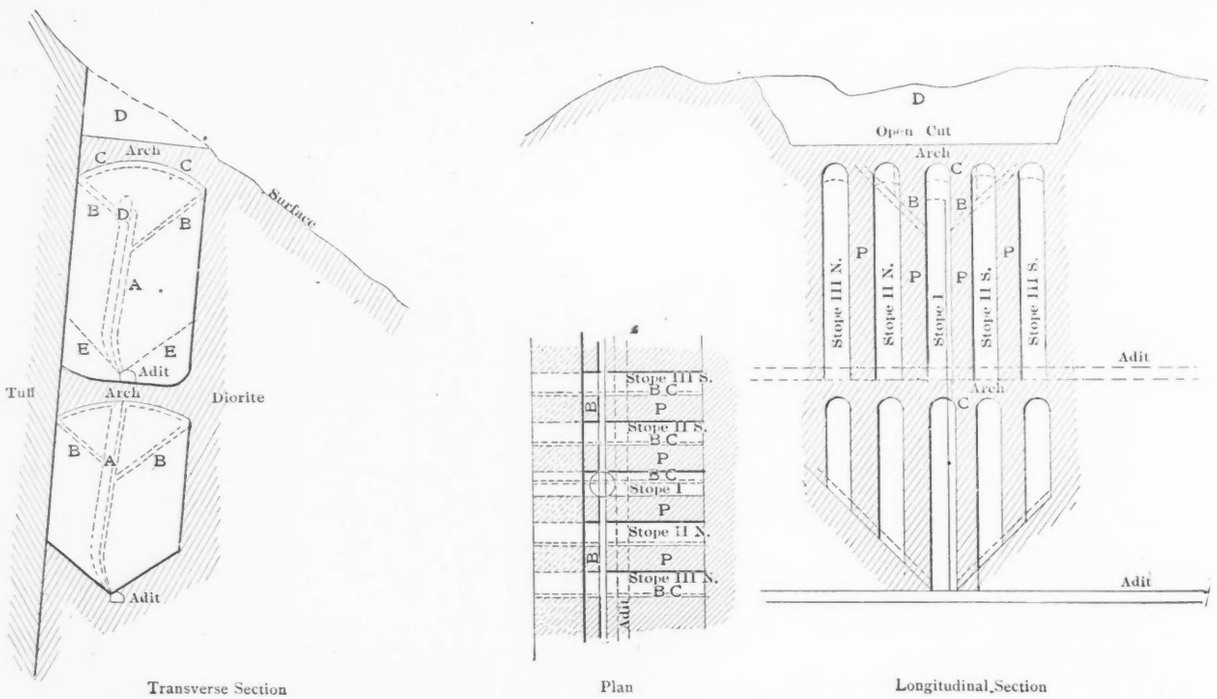



DIAGRAM SHOWING STOPING SYSTEM IN USE AT THE MINE OF THE BRADEN COPPER COMPANY

net-work of irregular workings, which had been made by former owners in looking for rich ore. The mountain, in which the deposit occurred, through the fact of its being so precipitous and 4000 to 5000 ft. high, lent itself to the rapid development and opening up of the mines by adit levels.

No. 1 adit was driven across the deposit and developed a width of 250 ft. of ore averaging 3.71 per cent. copper at the bottom of the old workings, 225 ft. from the surface. No. 2 adit entered the mountain 50 ft. below No. 1 and 500 ft. to the north, and developed the same ore as above, except in greatly increased extent. No. 3 adit was started 1000 ft. to the north and 350 ft. below No. 1 adit, and in turn the same class of ore was found in still greater extent. The two lower adits, with numerous crosscuts, winzes and raises, have exposed ore from one end to the other. No. 4 adit has been started at a point 750 ft., vertically, down the mountain from No. 3 adit, and drifts will be run in both directions upon the ore when this adit reaches the contact. It is expected that adit No. 4 will encounter ore as abundant and of as good a grade as shown above.

Some consideration has already been given to driving a No. 5 adit, which would be 800 to 1000 ft. below No. 4, and would be on a level with the top of the mill. Such an adit would be approximately 2000 m. long to be vertically under the present Fortuna workings.

The width of the deposit of diorite ore developed in the Fortuna mine is from 50 to 250 ft., the average being 115 ft. It is defined on the east by the contact with tuff. In some places there is a clean contact, but irregularly mineralized brecciated tuff and diorite is usually found as contact material.

### The Teniente Mine

Because of the high grade of much of the ore at this mine, it was possible for the former owners to work it in the crudest way with great profit a few months each year for many years; at last, however, the water became too difficult to handle with the *malacate* (horse whim), and the mine was abandoned about 20 years ago. The character of ore of this mine is quite different from the "diorite ore," the mineral serving as a cementing agent for the fragments of a breccia of porphyry and tuff. In appearance, the ore resembles the conglomerate ore of the Calumet & Hecla in Michigan, with the difference that the copper is more abundant and in the form of sulphide, instead of metallic. Although this ore concentrates well, the former owners had no machinery, and only through the fact of high-grade mineral occurring so massively were they able to extract profitably the ore and send it to the Pacific Coast, 150 miles distant, on mules.

From the upper part of this mine good concentrating ore is now being taken, from which a certain amount of high-grade ore is sorted out, by "benching" around the old stopes, which testify eloquently to the former grandeur of the mine.

The lower part of the mine will be unwatered by an electric hoist. It must not be thought, however, that the only prospect of finding rich ore at the Teniente is in the lower part of the mine; on the contrary, it is believed that when workings, which are now under way be-


gin to prospect to the east of the present workings, further masses of high grade ore will be exposed. In fact, already a new shoot of ore is being opened, which produces a concentrating ore of 5 per cent. or more. Even the tuff, as explored for a width of 240 ft. to the north of the Teniente shaft was found to contain an average of 2.1 per cent. copper.

### System of Mining

A system of mining has been adopted, to use the minimum amount of preparatory work and no timber in the stoping of ore. Both the physical structure of the deposit and the topography of the mountain lend themselves to this method of mining, which it is believed, will prove to be one of the cheapest known.

Briefly described, after the adits have penetrated the orebody as shown by crosscuts, the width and grade of ore in various parts, a more or less vertical raise *A* (see diagram) is made for approximately 200 ft. This is enlarged to a "Glory Hole," about 30 ft. in diameter, to serve as a runway and storage for broken ore; at the bottom of it a number of chutes are placed, with well constructed gates. About 25 ft. of solid ore for an arch is left at the top of the glory hole. Near the top of the glory hole raises *B* are driven across the orebody, as well as in the direction of its strike, at angles of 45 deg. From both extremes of the transverse raises, small workings *C* are driven, to form an arch; the ore is then broken under this arch down to the raises *B* to a width of 10 m. Surface ore, such as *D*, is quarried and dumped into the glory hole. The stope is now prepared so that miners can churn-drill on the benches on each side of the glory hole, and, when blasted, the ore falls by gravity until it is finally drawn out of the chutes on the adit below *A*. The object of leaving arches over the stopes is to protect workmen from inclement weather in winter. Once the lower system of stopes is prepared for extracting ore, the arches of the preceding stope may be removed, and such of the pillars as are found not to be necessary are knocked down and sent to the mill.

### The Concentrating Mill

The present mill, with a capacity of 250 tons per day, was designed after the most modern practice in the United States—the ore being delivered over a grizzley to receiving bins and fed to a belt conveyer, which delivers it to Blake crushers and rolls for coarse crushing, and thence to mill bins. It is fed automatically to the two sides of the mill, and after screening and hydraulic classification, concentration of the copper minerals is effected on Harz jigs, for the coarse sizes, and Overstrom tables with Wilfley tops, Frue vanners and the Wilfley slimer for the fines. In the lower portion of the mill, the Sherman system of settling slimes is used. Frenier and centrifugal pumps are used for returning middlings and slimes products for supplementary treatment. The ore is automatically sampled after coarse crushing, and a large daily sample of the general tailings is taken after leaving the mill. The concentrates are carried to a system of tanks at the foot of the mill. At an early date, additional tables, jigs, screens and perhaps grinding machinery will be provided to bring the mill up to a capacity of 500 tons per day.

### Power Plant

The company has a plant for 1000 h.p. on the ground to operate under 1000 ft. of head, but is using only 500 h.p. The water comes by flume and pipe line from two lakes situated directly in front of the Teniente mine. During the coldest weather in mid-winter there has scarcely been sufficient water from the Teniente flume above for all requirements, but when the second flume to the Coya river is completed before another winter, there will be plenty for present needs. The cost for power during the first 12 months' operation of the plant was remarkably low, being under $2 per h.p. year, without figuring interest and depreciation. There were practically no repairs of any kind, and two Chileans attended the water wheels and dynamo. Power is provided for running the mill machinery, machine shop, air compressor and electric hoist at the mines and supplying electric lights to the towns, mill and mines.

### Aerial Tramway

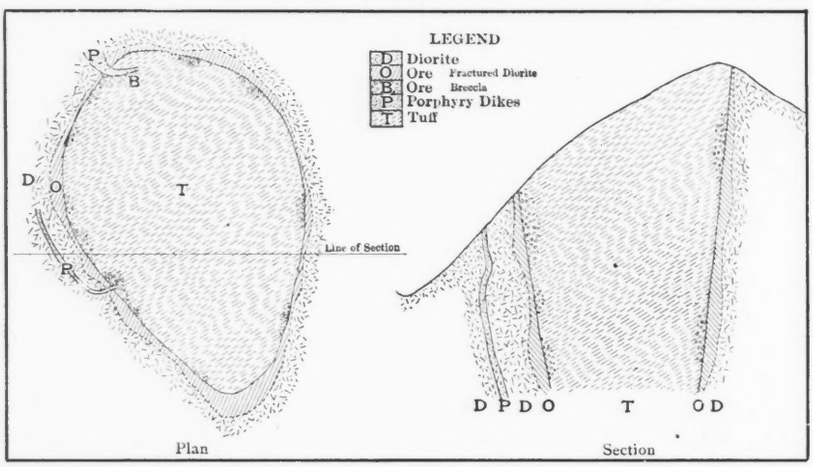
A central transfer station is built at the foot of the mountain where the mines are situated. From the Fortuna and Teniente mines, tramways 500 and 1000 m. long, respectively, drop the ore automatically into receiving bins at the central station; thence the ore is delivered on a main tramway 2000 m. long to the mill. These tramways are designed to handle up to 1000 tons per day, by the placing of sufficient buckets on them. Of course when No. 5 adit (and its connections with the upper workings) is completed, the aërial tramways will no longer be used.

### Railroad Connections

Early in 1906 it was decided to build a railroad connecting the mines with the Chilean State Railway at Rancagua, a distance of 42 miles. Construction was energetically started in September, and it was hoped to complete the work by June 1, 1907, but there were unavoidable delays and the line will not be finished until the spring of 1908. It is probable that the railroad, which is 32-in. gage, will cost $350,000 when completed, including rights-of-way and equipment. With main line and branches, there will be about 45 miles of track. Considering that the road is being built into the heart of the Andes, in some parts with extremely heavy rock work, a cost of $8000 per mile must be considered as remarkably low.

### Treatment of Concentrates

During the past few months approximately 3500 tons of concentrates have been shipped to the United States. Plans for treating the concentrates on the ground are under consideration, the purpose being to take advantage of the special conditions of abundant cheap hydraulic power and the sulphur contained in the concentrates, and avoid the use of fuel and fluxes as far as possible. Experiments carried out at the Baltimore Copper Works have been most promising of success in producing electrolytic copper direct from the concentrates without the necessity of smelting and converting. At present, however, the estimate of cost of production is based upon smelting and converting in the usual manner.




IDEAL PLAN AND SECTION SHOWING THE OCCURRENCE OF THE ORE DEPOSITS AT THE MINES OF THE BRADEN COPPER COMPANY

### Cost of Production

With the railroad and necessary preparatory work in the mines completed, it is believed that the following estimated costs can be realized upon a production of 1000 tons of ore per day. The costs in smelting will depend upon the grade of concentrates and recovery effected in the mill. Assuming the grade to be 3.5 per cent., the mill recovery 70 per cent. and the grade of concentrates 24.5 per cent., we should have 100 tons of concentrates per day. The net production of copper would be 46,550 lb. per day, or 66.5 per cent. of the gross contents of the ore. With mining, tramming and milling cost of $1.50 per ton of ore, smelting and converting cost of $5.75 per ton of concentrate, and 72.5c. per ton of ore for freight, insurance and refining, the cost of production will be only 6c. per lb. of refined copper.

## Copper Mining in Siberia

Special Correspondence

. The progress of work at the Julia copper mine, situated in Abakansk, Yenesei province, Siberia, and operated by an English company called the Yenesei Copper Company, Ltd., has been impeded by all sorts of troubles. For one thing, the company has suffered from shortness of funds; secondly, the nature of the ore has not come up to early expectations; thirdly, scarcity of suitable fuel has made the treatment of the ore a matter of some difficulty. The ore has proved of lower grade than originally estimated and cannot be counted on being higher than 3.3 per cent. copper. The refined copper contains gold and silver equal to £11 per ton of copper. The estimate of ore reserves was also found to be too high, for a considerable amount turned out to be of too low content to warrant its being stoped. A water-jacket smelting furnace was erected early this year and on the commencement of smelting operations the ore was found to be much more silicious than was expected. This, together with the fact that charcoal has to be used as fuel, reduces the duty of the furnace from 100 tons a day to only 60 or 70 tons. The absence of coal and coke has temporarily hung up the Swansea refining plant that was erected, and instead of this plant, resort has been made to treating the matte by heap roasting and smelting in small shaft-furnaces and then refining the black copper in reverberatories.

Up to Oct. 15 last, 11,296 tons of ore had been treated, yielding 870 tons of matte, of which the copper contents are estimated at 40 per cent., giving 3.08 per cent. of copper per ton of ore smelted. Up to the same date, 98 tons of fine copper had been produced by the refining process. A second smelter will be erected shortly. The discovery is announced of coal seams in the neighborhood of the mine, so that in the near future the present difficulty in connection with fuel should be removed. The new manager, Walter J. Stanford, is expected to do great things for the company and he has already organized the development work on a more satisfactory basis. With patience and perseverance this mine should eventually become remunerative to the shareholders.

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According to Le Chatelier the presence of nitrogen to the extent of 0.02 to 0.045 per cent. in steel is enough to cause the metal to break at greatly reduced stresses and to destroy practically all ductility.

## Jigs as Classifiers in Ore Dressing

By J. T. Glidden

In the usual scheme of concentrating an ore it is customary to separate as soon as possible the large particles of unlocked material from the gangue and remove them as finished product. To this end it is always sought to reduce the crushing of ore to a minimum in order to prevent unnecessary sliming, also to restrict each repeated crushing operation to a constantly diminishing amount of ore, the larger particles having been removed by concentration.

The application of these principles has made necessary a very complicated set of mill apparatus, including among other devices, an extensive sieve scale, with a large number of trommels and other types of screening devices. Recently an attempt was made to do away with the necessity of using such a complicated arrangement of milling machines. A simplified system of concentration, developed at the Calumet & Hecla mills, is now being adopted throughout its entire plant and is also being introduced in the mills at Great Falls and at Butte, Mont. The Woodbury type of machines is used and the special features in the new plan are controlled by the National Ore Concentrating Company, of Milwaukee, Wisconsin.

This new concentration scheme involves the elimination of all sizing trommels except one, and the application of jigging through all the steps in the process, except the very final stages in which a few tables are used. This single trommel has a ⅜-in. hole and delivers both its products immediately to jigs.

The first jig, working on the undersize from the trommel, is practically a combination of a classifier and a jig. It is designed to eliminate slimes at once and to deliver a classified product to other jigs where the final concentration can be done. This jig, called by its designers a "slimes classifier," has an accelerated plunger movement at its head which gives the usual pulsation to the water columns. By the movement of the water column, the ore is thrown off the screen and arranges itself according to laws of hindered settling. On the fall of the water the mineral and gangue settle through the water under the influence of gravity. The special feature, however, of the jig is that in the hutch an upward column of water is caused to flow against the sieve of the jig with velocity sufficient to remove and wash out all slime which has managed to settle in the interstices of the coarse material upon the screen. In those compartments of the slime classifier which contain the middlings and the tailings, a large shield extends down into the bed, sealing it against the entrance of the slimes which are forced over the tail of the last compartment for subsequent treatment. This slime classifier has four discharges: A clean slime in suitable condition for treatment on tables, a tailing or middling for subsequent jigging, a clean side discharge concentrate and a hutch concentrate.

Several single sieve jigs usually follow the slime classifier for the purpose of cleaning up any free mineral remaining and for making cleaner middlings and tailing products. It is usual to group these jigs into a unit consisting generally of four machines, as follows: One 24-in. slime classifier and three 48-in. jigs, these having a capacity of approximately 200 tons. The products obtained are as follows: From the first machine of the unit, the slime concentrator, there is obtained a slime product for table treatment, a hutch product, an automatic side discharge product, and a sand product. This sand product goes to the second jig which yields a somewhat lower grade of concentrate from the side discharges and the hutches, and a tailing product which goes to the third and fourth jigs. These last jigs are middling-making machines, and yield a middling for further crushing, a hutch product which goes to tables and a tailing product which is waste.

It will be seen from the above description that it is the aim of this scheme of concentration, to substitute jigs for trommels, elevators, classifiers and the first sets of tables which are to be found in a typical mill. The reason of the success of this process of treatment appears to be that in the jigs there is a classifying action in addition to the usual jigging motion and that in a general way, this classifying action is found to produce the same effects as screens, trommels and separate classifiers.

## Sulphur in the Philippines

Several small sulphur deposits of the solfatara type in the Philippine islands, says the *Far Eastern Review* (Sept., 1907), may possibly become of economic importance. The most important deposits so far reported are those known as San Antonio and Santa Rosalia, located on the slopes of Mount Gviron on the island of Biliran.

In marketing sulphur from these deposits the price of Japanese sulphur at Manila would have to be met, which is about 50 *pesos* per ton. With present transportation facilities it is calculated that the cost of delivering refined sulphur to Manila would be about 37 *pesos* per ton in the case of the San Antonio deposit while the costs in the cases of the other solfataras is estimated to be above the price of Japanese sulphur.

## The Almaden Quicksilver Mines

The financial condition of the quicksilver mine of Almaden in Spain has not been satisfactory of late and a commission was instituted to inquire into the situation. The following recommendations of the commission are taken from *L'Echo des Mines* (Oct. 10, 1907). Above the twelfth level there are blocked out about 400,000 tons of mineral, corresponding to about 1,000,000 flasks of mercury representing supplies for about 25 years. Below this level about 800,000 flasks are available. Recent investigations have demonstrated the probable continuity of the deposits toward the west, as well as in the old workings.

The reforms recommended as necessary for placing the mines on a sound footing are as follows: The adoption of machine drills, modern explosives, artificial ventilation, renewing equipment in the shafts and workings, bettering the means of surface transportation, installation of a new group of Cermak-Spirek furnaces, abandoning the Bustamente furnaces, reducing the working and administrative force, and the appointment of an engineering chief at the mines, as well as four other engineers to be subject to the orders of the directors.

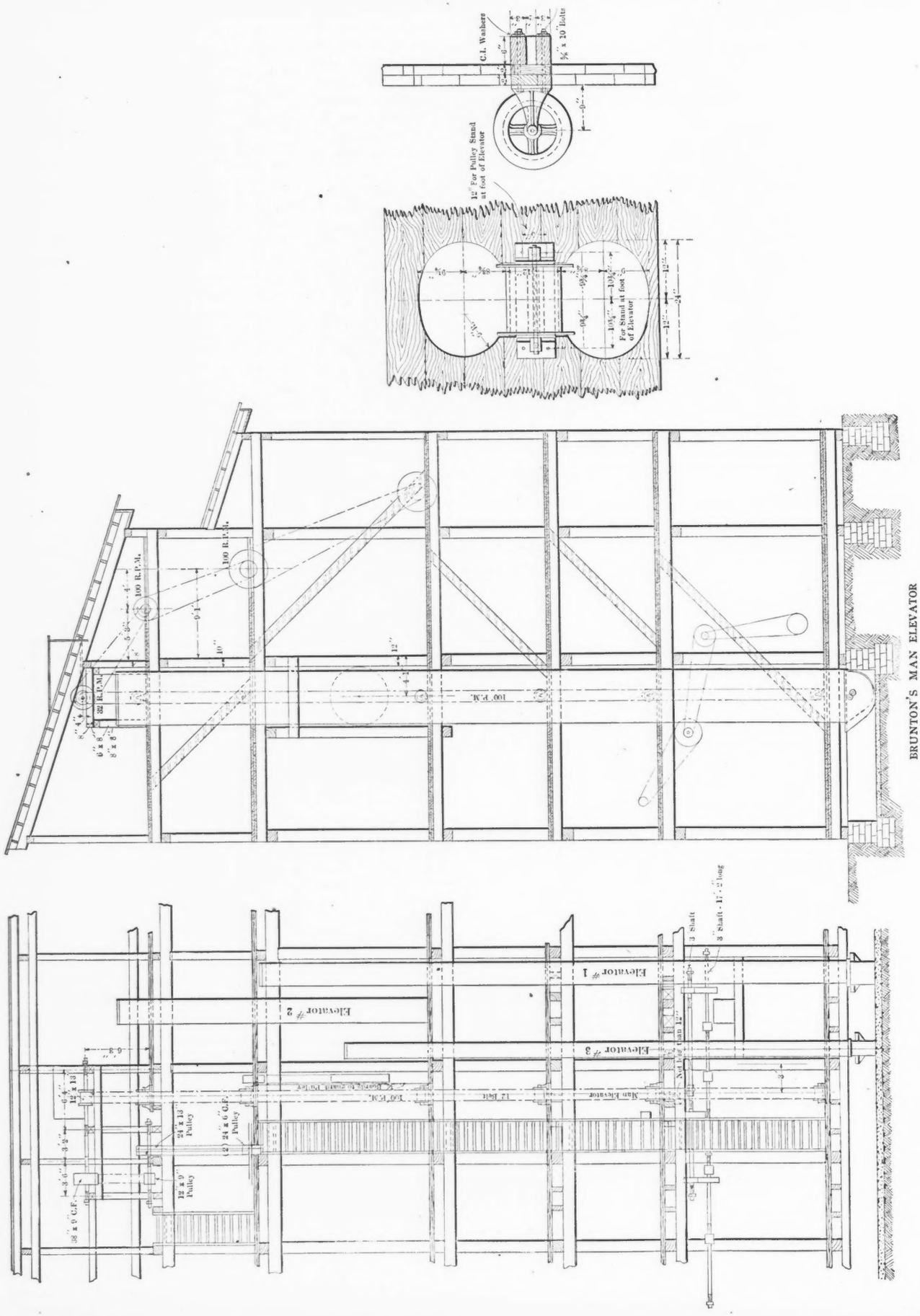
## Accidents in Marquette County Mines

In Marquette county, Mich., during the year ending Sept. 30, an average number of 6744 men were employed in 40 mines, one quarry, two explorations and about 20 drill operations. There were 37 fatal accidents in the year, one to every 189 men, a greater proportion than at any previous time in that county. This increase was due largely to the deaths of 10 men at the Rolling Mill mine, caused by the fall of the skip from the surface to the bottom, about 700 ft. The cause of this accident has not been determined and doubtless never will be.

Among the other causes of death, falls of ground were responsible for 10 fatalities; blasting, 4; jumping moving cage, 2; falling down ladder-way, 2; being caught with cars, 2; and other causes resulted in one death each.

It is claimed that, aside from the accident at the Rolling Mill mine, the other deaths were caused largely through the carelessness of the men themselves or their comrades. Scarcity of labor has compelled the employment of more inexperienced men than in former years and this is thought to account for many of the accidents.

Roscoelite, a vanadium mica, occurs in southwestern Colorado where it was mined and reduced during 1906. The mineral contains about 2 per cent. vanadium.




BRUNTON'S MAN ELEVATOR

## The Brunton Man Elevator

An ingenious device known as the Brunton man elevator is in use in the sampling mill of the Anaconda Copper Mining Company, and perhaps elsewhere. It is designed to save some of the time lost by millmen in walking up and down stairs, and also to make it easier for them to do so. This contrivance is a continuous belt, like an ordinary belt elevator, but the buckets of the latter are replaced by horizontal bars projecting several inches from the surface of the belt affording a foot-rest and a hand-hold. The belt runs at a speed which permits a man to step on and off with safety. The bars are spaced 6 ft. 6 in. apart, a convenient distance for a man standing on one bar to reach above his head to the next support.

At the Anaconda sampling mill a belt carrying 26 of these supports serves six different floors, the holes through which the belt passes being such as to allow a man to step off to the floor conveniently while the belt continues on its way. The construction is clearly shown in the accompanying engravings. The bill of material for constructing the Anaconda elevator is as follows: one cast-iron pulley, one steel shaft, one cast-iron stand with caps, two ⅝-in. set-screws 2 in. long, four ¾x2½-in. studs with nuts, five cast-iron idler guide pulleys, ten ⅝-in. set screws 1½-in. long, six cast-iron shafts, ten cast-iron stands, one counter driving shaft, one cast-iron pulley crown-face key-seat 12x9 in., two 2 15/16-in. standard sets cast-iron collars, one 24x-13 in. pulley crown-face key-seat, 26 composition elevator steps, one standard cast-iron flange coupling, one 3-in. shaft 12 ft. 5 in. long, one 2 15/16-in. shaft 15 ft. long, one 38x9-in. cast-iron pulley crown-face key-seat, two 2 15/16-in. standard sets cast-iron collars, two 3 in. ball and socket hangers 20 in. drop, seven 2 15/16-in. horizontal ring oilers Brown & Sharpe phosphor bronze, two 24x6-in. crown-face set-screws split pulley, one cast-iron pulley.

## Aluminum for Electrical Conductors

F. W. Mahin, of Nottingham, reports that the manufacture of aluminum cables as electric conductors in place of copper has actively begun in Great Britain. The cables and wires being made there are covered with vulcanized bitumen treated by patented methods, and they are, it is claimed, not brittle at low temperatures nor unduly soft at the high temperatures to which they would be subjected in ordinary use.

Most of the platinum exports of Colombia are from Cartagena and Barranquilla; exports through the port of Buenaventura are said to be increasing in quantity.

## Consolidated Mercur Gold Mines Company

The annual report of the Consolidated Mercur Gold Mines Company for the fiscal year ended June 30, 1907, shows assets amounting to $71,986, from which is deducted accounts payable of $4532, leaving a balance of $67,454. The gross value of gold produced during the year was $642,843, and other receipts brought the total revenue to $657,289. Operating expenses were $645,312, from which was deducted unapplied balances, unpaid time checks, etc., amounting to $2577, leaving net operating expenses of $642,736. The net earnings for the year were therefore $14,553, to which was added a previous balance of $127,195. Two dividends of $25,000 each were paid and from the remaining surplus construction costs of $24,294 for the slime plant were deducted. This leaves a balance of assets, on June 30, 1907, amounting to $67,455.

President John Dern in his report says: "We have not been disappointed in developing new orebodies during the year, but unfortunately these new disclosures do not show as high values as the general average during former years. There has been no abatement of the company's policy to keep prospecting well ahead of stoping, and it is hoped that richer ores may be discovered during the ensuing 12 months. It is worthy of note that although our ore during the past year has not been profitable, yet if we had had a process to get lower tailings without materially increasing the expenses,. in spite of all our ill-luck we could probably have maintained our regular dividend. Fully $120,000 of recoverable gold was lost in the tailings, and if this could have been saved at small additional cost, it is obvious that our net earnings would have compared favorably with last year's."

In his report the general manager, G. H. Dern, gives the conditions at the mine and mill together with costs of all operations in great detail. This report is here greatly condensed. The total amount of ore mined and milled, during the year, was 245,169 tons, an average of 672 tons per day, of which 110,069 tons was base ore and 135,100 tons oxidized ore. The extraction was $2.62 per ton and adding the amount lost in the tailings (98c.) the average value of all ore treated was therefore $3.60 per ton. In the supplemental report, dated Aug. 30, it was stated that the new slime plant, of which only one-half was in operation, had reduced the loss in the slime tailings to 45c.; and in the sand tailings to 48c. per ton.

It cost $354,422 for mining, prospecting, repairs and general expenses, an average of $1.45 per ton. Milling costs were $290,124, or $1.18 per ton, making the total operating expense, except construction, $2.63 per ton.

During the year there were several unavoidable delays which had an effect upon the successful working of the property. The most serious single misfortune was the shortage of coal for the roasting furnaces. Operation for two or three months was at a heavy loss and expenses were barely made during several others. An improved system of inspecting and testing the quality of the roast was introduced. Operating costs were: Coal, $74,770 ($0.679 per ton); labor, $32,025 ($0.291); power, $6510 ($0.059); all other items. $21,160 ($0.192); a total of $1.221 per ton.

In the leaching department, 161,300 lb. of cyanide were used, or 0.66 lb. per ton; of lime, 1,323,400 lb.. or 5.4 lb. per ton; caustic soda amounting to 12,895 lb. was used when lime was occasionally unavailable.

An experimental plant was built and a study of the treatment of sand and slime was carried on. As satisfactory results were obtained, a slime plant was constructed which effected a considerable saving of gold at practically the same cost of operation. Briefly stated, the new process consists in separating the sand from the slime, leaching the former, and agitating and filtering the latter. The plant contains some novel features, the most notable of which is the new filter, invented by W. T. Janney, the company's metallurgical engineer, who designed the slime plant.

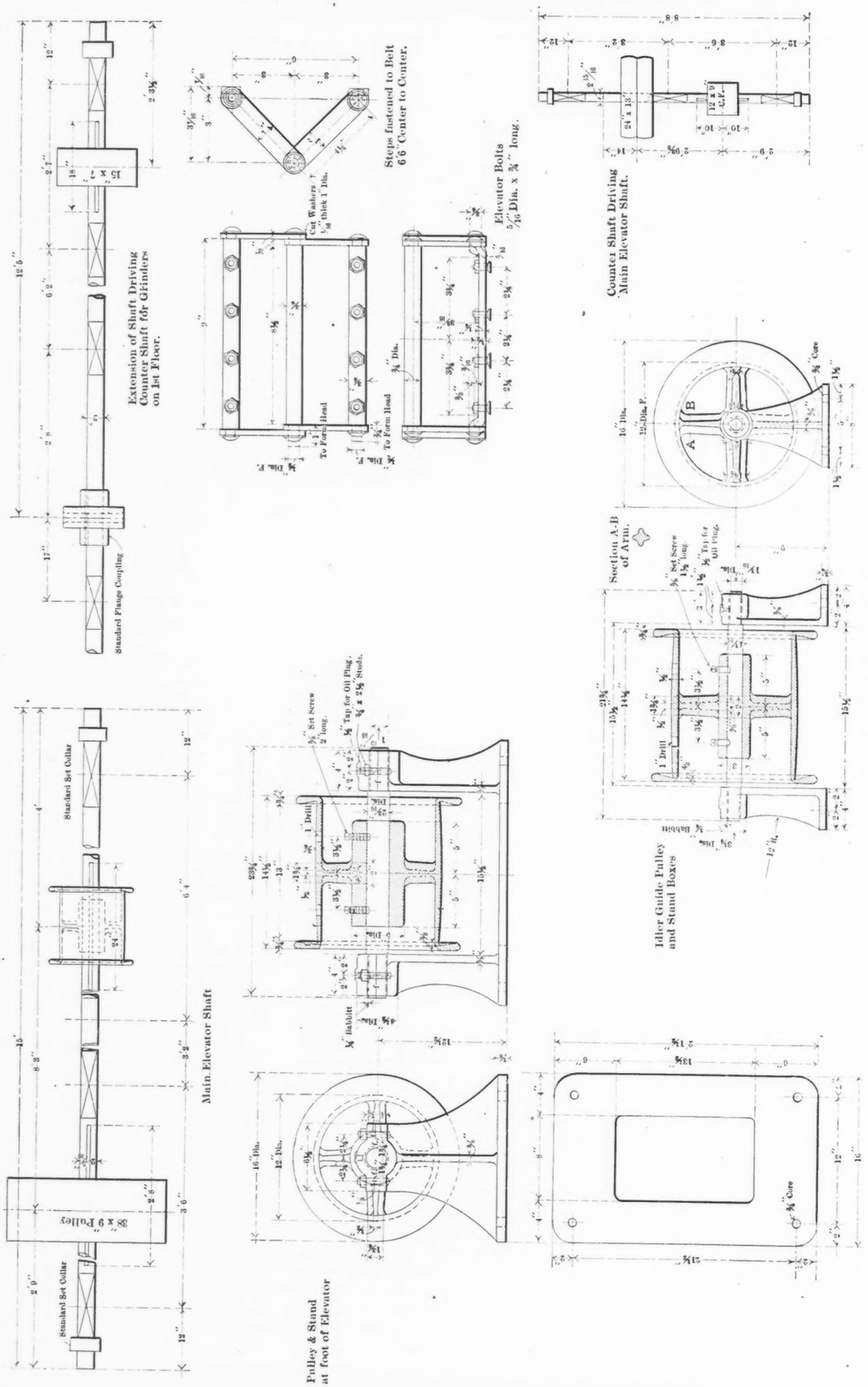
The cost of the slime plant to the close of the fiscal year was $24,294. This amount will be increased several thousand dollars before the installation is completed.

The scale of wages at Mercur has been $2.50 for hand miners, $2.75 for machine men and $2.50 for muckers and trammers per day of eight hours. However, the contract system has been extensively adopted, which resulted in an average payment of $3.27 per shift. A demand for the same scale obtaining in other Utah camps brought about a schedule, adopted July 1, which gives hand miners $3, machine men $3.25 and muckers and trammers $2.75 per day.

The general manager concludes his report with a statement of development as follows:

"There has been no decrease during the past year in the amount of prospecting done. The result is that we have developed a large tonnage of new ore, but most of it is rather low grade. However, as this new ore is principally oxidized, it can be cheaply treated, and we therefore consider that we have added materially to the ore-reserves by our new work. The Lulu orebody, mentioned in last year's report, continued upward to the surface. It was then tested below the Luln level by means of raise 194 workings. The vein is large and forms a heavy item of repairs, both in cost of labor and material."

The old Brickyard mine, which has not been operated since 1901, is to be reopened.


Extension of Shaft Driving Counter Shaft for Grinders on 1st Floor.
Steps fastened to Belt 6'6" Center to Center.
Elevator Bolts 5/16" Dia. x 3/4" long.
Counter Shaft Driving Main Elevator Shaft.
Section A-B of Arm.
Idler Guide Pulley and Stand Boxes
Main Elevator Shaft
Pulley & Stand at foot of Elevator
DETAILS OF BRUNTON'S MAN ELEVATOR

# Genesis of Ores in the Light of Modern Theory

## Importance of Mass, Time, Average Temperature, Climate, Topography, Physical Structure and Depth of Soil as Factors in Enrichment

BY HORACE V. WINCHELL*

It has seemed to me fitting to sketch an outline of the prevalent modern theories of the genesis of ore deposits, laying special emphasis on some portions of the theory which appear to have received less attention than they perhaps deserve, and which have perhaps not all been incorporated in text-books. It is well understood, but often forgotten, that all of the constituents of ore deposits are found in some form in the earth's crust, contained in more or less abundance in the rocks, especially in the eruptive rocks; and that they have been in some way collected from their disseminated condition in these rocks, and concentrated in veins, beds or other deposits. Analyses of fresh eruptive rocks have demonstrated the existence therein of all of the ingredients of our valuable ores and their compounds. Few of them occur native like gold, silver, copper and platinum, and often, because of their minute quantity and fine state of subdivision, it is not possible to determine the precise form in which they are present.

The presence of sulphur, arsenic, antimony and tellurium indicates that there may be many metallic combinations in the eruptive magmas similar to those formed at later periods nearer the surface.

The average composition of the earth's crust has been approximately estimated as follows:[1]

| | Per cent. |
|---|---|
| Oxygen | 47.13 |
| Silicon | 27.89 |
| Aluminum | 8.13 |
| Iron | 4.71 |
| Calcium | 3.53 |
| Magnesium | 2.64 |
| Potassium | 2.35 |
| Sodium | 2.68 |
| Titanium | 0.32 |
| Hydrogen | 0.17 |
| Carbon | 0.13 |
| Phosphorus | 0.09 |
| Manganese | 0.07 |
| Sulphur | 0.06 |
| Barium | 0.04 |
| Chromium | 0.01 |
| Nickel | 0.01 |
| Strontium | 0.01 |
| Lithium | 0.01 |
| Chlorine | 0.01 |
| Fluorine | 0.01 |
| Total | 100.00 |

Copper, lead, zinc, tin, silver and gold, although metals of great importance to man, constitute so small a part that their percentages are expressed by four to eight decimals, that is between hundred thousandths and billionths of a per cent.

In some eruptive rocks, however, the percentage is much higher, and has been determined to be in the thousandths of one per cent. in the case of copper, lead and zinc, and one-tenth to one-hundredth as much of silver and gold.

### Natural Concentration

The amount of metallic content found to occur as a primary constituent in unaltered rock is thus seen to be far too small to constitute workable ores, and indeed is often so insignificant as to be determined with difficulty. You all know that several per cent. of iron, manganese, zinc, lead and copper are required to make an ore valuable, the percentage varying, of course, with the locality, complexity of the ore and other familiar factors.

It is therefore apparent that a process of natural concentration is essential for the production of ore deposits, bringing into limited space the material formerly disseminated through ten thousand or a hundred thousand times that extent of ground, or accomplishing the same result by the removal of the admingled rock impurities.

Wherever this concentration is brought about by assembling of solid particles under conditions that admit of freedom of movement we have placer deposits as of gold, and platinum, of tin, iron and chromium ore, and sometimes of precious stones, such as diamonds, sapphires, rubies, garnets and others.

The ores found in veins, disseminations throughout the rocks and in irregular-shaped deposits in soluble rocks cannot have been collected in any such manner. Their mode of occurrence and relation to the inclosing rocks make it evident that they have been slowly deposited from solution. And the only solvent of general distribution is water, with its varying content of acids and alkalies under changing conditions as to temperature and pressure. Water is the magic instrument by which all the copper in Butte's vast mines, all the gold and silver of the Comstock and of Goldfield were assembled. More potent than the philosopher's stone, more universal than the air we breathe; constantly at work, dissolving, transporting and redepositing. With indefatigable zeal and never-flagging industry it searches through the innermost recesses and penetrates the most closely locked chambers of the rocks, removing treasures through their very walls, and often repairing breaches made in the attack so skilfully as to defy detection, or to make the masonry stronger than when first laid. Small wonder that the ancients regarded it as one of the four prime elements.

But, although for several years water has been recognized as the great agent in the formation of ore deposits, geologists are not agreed as to the source of this water, the conditions under which it is most effective, nor the relative importance of its work in ascending and descending movements.

### Ascending or Descending Waters

Regarding its source, we have those who believe with John Woodward, Franz Posepny and Van Hise that the water in the uppermost layers or outer zone of earth, including the waters on the surface and in the atmosphere, accomplish the formation of ore by means of a perpetual circulation. From the air it falls on the earth as rain; through crevices and fractures it enters the rocks by reason of its head or the weight of more water on top of it, and finds its way deeper and deeper to the very lowest point where the density of the rocks will permit it to penetrate. Down to this depth, which is theoretically not more than five or six miles, the temperature has been constantly increasing, and the water by reason of higher temperature has been gaining strength as a solvent and picking up alkalies or acids that enable it to hold even the most difficultly soluble substances in solution. Finding no escape downward, and urged on by cooler and heavier waters above, these saturated solutions begin to move laterally and upward, expanding and becoming of lower specific gravity because of the forced deposition of dissolved material as they become super-saturated. Following the directions of least resistance, these metal carriers reach the surface as hot springs or geysers through fractures caused by earth movements. Gradually the walls of these fractures become coated with vein minerals, and ores, until the waters stop flowing or the fracture is healed and a vein is formed.

Then there are those like Vogt, Spurr, Weed and Kemp, who maintain that the chief source of underground waters is the unconsolidated magma of molten lava within the earth. These authorities point to the immense volumes of steam emitted from volcanoes; they call attention to the conclusions of European scientists who have decided that many of the hot springs cannot be derived from meteoric waters heated and returned to the surface; they remind us that there is so much watery vapor derived from lavas that possibly the oceans themselves were formed from volcanic emissions. They point out the ease

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Note—From a Commencement address delivered at the Montana School of Mines, June 5, 1907.

*Chief geologist, Great Northern Railway Company, St. Paul, Minn.

[1]F. W. Clarke, *Bull.* U. S. G. S. 148, p. 13. J. F. Kemp, *Econ. Geol.* I, III, 210.

with which such waters, thus derived and so heated, could gather metallic substances at great depths and bring them to the places where they are now found. They mention the fact that there is a very general association between the more important mining regions and eruptive rocks; and they raise several serious objections to the premises of the disciples of the meteoric water school.

On this particular point we shall not dwell further; it is quite probable that both theories contain elements of truth; and that ore deposits have been formed by both magmatic and meteoric re-ascending waters. It is even possible in some cases to determine by the character of the minerals the origin and nature of the causative solutions.

As to the relative importance of the work of ascending and descending waters there is also divergence of opinion. There are few who still doubt the agency of descending waters in the formation of the oxidized ores, such as carbonates, silicates and oxides of copper (as also the native metal in some instances), in the superficial or shallow alteration of sulphides, arsenides or antimonides. The iron ores of the Lake Superior region, for example, are generally believed to owe their concentration to descending solutions, in this respect differing from many of the Scandinavian iron ores, according to recent descriptions.

It is not, however, the oxidized or "dry" ores alone that are now believed to owe their formation in large part to the action of descending waters; but also the base ores consisting of chemical combinations of the metals with sulphur, arsenic, antimony, tellurium and some rarer elements. It is only within the past decade that it has been considered possible that the sulphide minerals are produced by reaction between sulphate or carbonate solutions and undecomposed sulphides or other minerals found in veins. Laboratory experiments have, however, shown that the operation is not only possible but easily accomplished and duplicated under normal conditions as to temperature and pressure.[2] This is a fact of great importance and wide significance for it aids in the explanation of many formerly puzzling phenomena of mines and mining geology.

### Influence of Depth

It has long been noticed by the students of ore deposits that by far the greater number of mines become exhausted at comparatively shallow depths; that veins, instead of continuing downward uniform in size and composition, like dikes of diabase and porphyry, become smaller and of lower value with depth, and often disappear altogether. It is noticed also that the shape of many ore deposits and the distribution and paragenesis of the minerals which they contain can often be better explained on the theory of descending than of ascending mineralizers. Moreover it is apparent that there are changes constantly in progress in those portions of sulphide orebodies lying nearest the surface of the ground. These changes consist in the oxidation of the sulphides and their solution as sulphates. These sulphate solutions percolate downward into the veins or rocks below along the most open channels; and thus by degrees the upper zone of the vein is robbed of most or all of its sulphide minerals, and only a gossan or iron cap remains.

The process of oxidizing and leaching out of the sulphides in the superficial zone of ore deposits tends, first of all, to disguise the nature of the unaltered ore below. In many instances the ore discovered by the outcroppings is gold ore, and gold mills are often erected and operated for years upon such ore, without a suspicion arising that extensive bodies of copper or lead sulphides occur at greater depths. Such was indeed the history of Leadville, Colo., of Bingham, Utah, of Ely, Nev., and of Mount Morgan, Australia. The last is one of the world's greatest gold mines; yet it is now producing copper from its lower levels; and developments have proved it to be a great copper mine. Immense low-grade deposits of copper ore are found below the gossan at Ely, and at Bingham, although it is doubtful whether the most experienced geologist or keenest observer of mineralization phenomena would in either place have felt justified in predicting the existence of the wealth below.

In other localities the metal values have either all been removed, or else the primary sulphide ore was too poor in gold to leave oxidized ores of value. In such cases the discovery of the subterranean treasures is purely fortuitous. Butte may be considered the most conspicuous example of this class. The outcrops of its copper veins contain the merest traces of that metal; and there is seldom enough silver or gold in them to justify mining even under the low costs obtaining here today. The zone of oxidation is generally from 100 to 200 ft. deep; and if it had not been for the presence of another system of veins carrying silver, veins of different age and origin, but closely associated geographically, this greatest of copper camps might not yet have been discovered. It was in the search for silver ore that copper ore was discovered here, and one cannot help wondering how many more camps equal to Butte may be undiscovered and unsuspected where no outcropping silver or gold mines attract the prospector, and reward the efforts of the miner. Here is surely an important and unexplored field for the geologist. The study of oxidized vein phenomena may yield results thoroughly satisfactory from both material and scientific points of view.

### Secondary Enrichment

Below the zone of oxidation the chemical reactions which take place between the descending acid solutions and the unoxidized ores result in the formation of more and richer sulphides, down at least to the level of the lower limit of free circulation, and as far as surface waters penetrate. And as erosion of the surface is continually bringing deeper and deeper sulphides within the reach of oxidizing and dissolving surface waters the operation is in constant progress, and these lower lying ores become more and more enriched until in some cases are formed bonanzas of world renown, and almost inestimable value. It is a fact of much significance that bonanzas are generally limited to depths where descending waters may have penetrated at one time or another. Indeed the very channels through which the enriching solutions came can often be detected; and peculiarities of shape and position observed which can be explained with difficulty on any other theory.

Practiced miners often point to the richness of ore shoots near the junction or crossing of veins. Indeed such pockets and shoots are usually sought and frequently found where two veins come together. This fact alone may not signify the instrumentality of downward moving waters. But when in connection with it we discover that rich ore shoots are also frequently found at the intersection of veins by faults, and zones of movement so recent or of such shallow depth or limited extent that the faults themselves are not veins, and have not been mineralized except near the intersected veins, and when the ore shoots thus formed occur on that side of the fault plane where they could have been formed most naturally by descending waters, and are wanting entirely in the corresponding place on the other side, then indeed, we recognize beyond a doubt the agency of meteoric waters in both situations.

It is often possible where sulphide ores have been deposited in soluble rocks to distinguish between the products of ascension and descension, and here, too, the latter are frequently of much the higher grade.

This theory of secondary enrichment which is so frequently referred to in recent mining literature; and is still so little understood, depends, of course, on the existence of a body of primary ore probably formed by ascending solutions. If there are no ores to be oxidized the downward moving waters will have no metalliferous burden to deposit. But wherever the rocks contain disseminated ore, no matter how small the percentage, there is a possibility of the formation of richer ores through the action of surface waters, and where the primary mineralization was itself comparatively rich, even though not a minable product, there the

[2] H. V. Winchell, The Synthesis of Chalcocite, etc. *Bull. Geol. Soc. Am.* XIV, 269.

downward moving waters may the more readily bring about concentration of high-grade bonanza ore.

### Conditions Governing Secondary Enrichment

Bearing in mind this conception of the meaning of "secondary enrichment," and admitting that it is frequently accomplished through the agency of descending meteoric waters, let us briefly consider the conditions under which they are most active and efficient.

It is a proposition requiring no argument that if by the aid of mineral-bearing solutions the ores occurring in veins are to be enriched, these solutions must enter the veins. And if all the meteoric waters which fall upon the outcrop of a vein or upon rocks containing disseminated ore run off rapidly down the mountain side without remaining to oxidize, dissolve and penetrate the veins with their load of mineral, there cannot be any enrichment caused thereby. Furthermore, if the work of the surface waters is chiefly destructive mechanically instead of chemically there will be little opportunity for the deposition of secondary concentrations of ores within the rocks. If for example the principal effect of the rains and snows is to erode and wash away the exposed portions of veins with all their contained ores, there will be a scattering and wasting instead of an assembling and storing. In other words, secondary enrichment by descending waters depends first of all upon the ratio of oxidation to erosion. Where erosion is more rapid than oxidation the unoxidized sulphides will be found in the rocks and veins at the surface of the ground and in the sands rolling down the beds of torrential streams as in Alaska. While if oxidation precedes erosion the uppermost zone of a sulphide ore deposit will be oxidized and leached of its base minerals, as is the case in Butte, and to varying extent over the larger portion of the temperate zones of the earth.

Assuming that the conditions are such as to permit the entrance of surface waters, and that the ground-water level is at some depth, which depth naturally varies from year to year and age to age because of many common geological phenomena, the factors upon which depend the extent of secondary enrichment are: (1) quantity of water; (2) time; (3) temperature; (4) the physical structure and solubility of the rock containing the primary ore, and of the ore itself.

It is manifest that a large supply of mineralizing solution will accomplish greater results than a small supply, provided it follows the course of the ore. For the metals in solution can hardly escape precipitation by reaction with the primary sulphides present, sooner or later, at some depth; and the oxidizing and dissolving effects will certainly increase with the amount of active oxygen-bearing moisture available. In regions of very little rainfall there may be partial oxidation to the depth of several hundred feet; and yet there may still remain particles of the primary sulphides upon the very surface of the rocks. Chemical activity is great; but the thirsty rocks quickly absorb that part of the water of rains and melting snows which is not evaporated, and the work of oxidation is not so complete as in regions more plentifully supplied with rain. On the other hand there may be such heavy and constant downpourings of rain even in tropical regions that erosion is again the most active agent.

### Time and Temperature

The second of our factors is time, a commodity of which the geologist is accustomed to make most liberal and even extravagant use in his arguments and theories. In this he is frequently justified, and the most astonishing results may be produced by the long continued, but slow operation of natural forces in any given direction. Events of the past few years have, however, reminded us forcibly that catastrophic phenomena must not be forgotten in comprehensive reviews of the earth's history.

The time element enters in a variety of ways into the problem of ore formation by descending circulations. Thus an ore deposit formed in its primary, low-grade constitution during earlier geological periods, such as the Cambrian or Huronian, and during all of the subsequent ages exposed to the action of superficial agencies unhampered by subsequent covering of later rocks, has a thousandfold the opportunity for concentration of its ores that is presented by similar rocks and ores formed during later geological epochs, say the Tertiary. This is exemplified by the iron ores of the Mesabi range as contrasted with the glauconite deposits of New Jersey or Texas. During almost all the ages since the Cambrian, the iron-ore formation of the Mesabi has been exposed to the weather, covered only for a geological moment during a part of Cretaceous time. The result is the largest and purest deposits of iron ore ever discovered, while rocks of similar composition but much more recent formation exhibit only the initial stages of ore formation.

Another way in which time affects ore deposition is in connection with the rate at which the waters move in a vein. Solutions of a given composition may move so rapidly as to produce but little effect, or may move so slowly that they clog up or retard other active waters after their own power is exhausted. Upon a steep drainage slope or mountain the waters may pass off so rapidly, even below the actual top of the ground, as to exert but little influence, or they may move with just sufficient rapidity to accomplish their maximum of chemical effect.

Our third factor, temperature, is of great importance. In the first place, oxidation, which is but another name for combustion, is greatly accelerated or retarded by slight changes in temperature. Sulphides which remain immersed for centuries in water under a glacier in Alaska would be completely oxidized in a few years exposed to the heat of the sun on a southern slope in Colorado or California. In the next place, the rate of solution depends directly upon temperature, increasing as the temperature rises, and, itself a process of heat consumption, is greatly facilitated by heat from external sources. Thus in warm rocks, in mild climates, upon the sunny side of mountains, there will be the most favorable conditions as regards temperature, for the formation of secondarily enriched ore deposits. The experienced prospector will tell you that it is in precisely these localities that they are found, although he never before heard any explanation for it.

### Conclusions

The physical structure and solubility of the rocks and ores affect their susceptibility to later enrichment, for perfectly obvious reasons. A dense rock is not readily entered by mineralizing solutions. Likewise an insoluble one is not easily replaced and does not afford lodgement for ores. And if the ores themselves are not readily attacked by oxidation or by solvents the quantity, time and temperature may all be sufficient to accomplish great results with more tractable ores, but have practically no effect upon these refractory ones. A good example of this again is found on the Mesabi range where the heat of an eruptive rock has so altered a portion of the iron formation for many miles that it has resisted surface solution and concentration, and is a worthless low-grade mixture of rock and magnetic ore still; while away from the influence of the eruptive have been formed the iron-ore deposits which have given to the iron and steel industry of this country the raw material required to make it preëminent in the markets of the world.

Reduced to more simple language and ideas the foregoing remarks amount to a statement that climate, sun, rain, average temperature, topography, depth of soil or surface, debris, erosion, glaciation and other common and often unobserved influences and conditions have a decided bearing upon the important question of ore formation.

These are the phases of our modern theory that have received little attention hitherto; and are yet of practical value that can hardly be overestimated. We find few bonanzas of high-grade ore in Siberia, Russia, Alaska, British Columbia, Washington or northern Ontario. Our

theory tells us why they are not to be expected, and why such enriched ores as are found seldom extend downward to great depths. We turn to regions of milder climate, less glaciation, gentler topography, and we find the rocks altered and softened and oxidized to some depth below the surface. We find that the veins wear "iron hats" and beneath them we find bonanzas reaching to great depths. We find our best ore shoots on the sunny sides of the mountains, while the veins on the northern, shaded sides, where the snow lies till mid-summer and the rocks are cold, produces no such rich ore. We begin to realize that our theory is based on fact and proved by observation; and that it justifies us in placing confidence in it, and in acting upon it within reasonable limits. And we marvel that facts so simple and of such easy comprehension and yet of such practical value should receive so little attention from the writers on ore deposits.

No one realizes more keenly than myself that the ideas here suggested are crude and incomplete, that they are not supported as they should be by a convincing array of analyses, chemical and mathematical equations and formulas. They will, however, have served their purpose if they convey the idea that common sense and practical observation are useful in economic geology, and to others act as a stimulant for further investigations in this most fruitful field.

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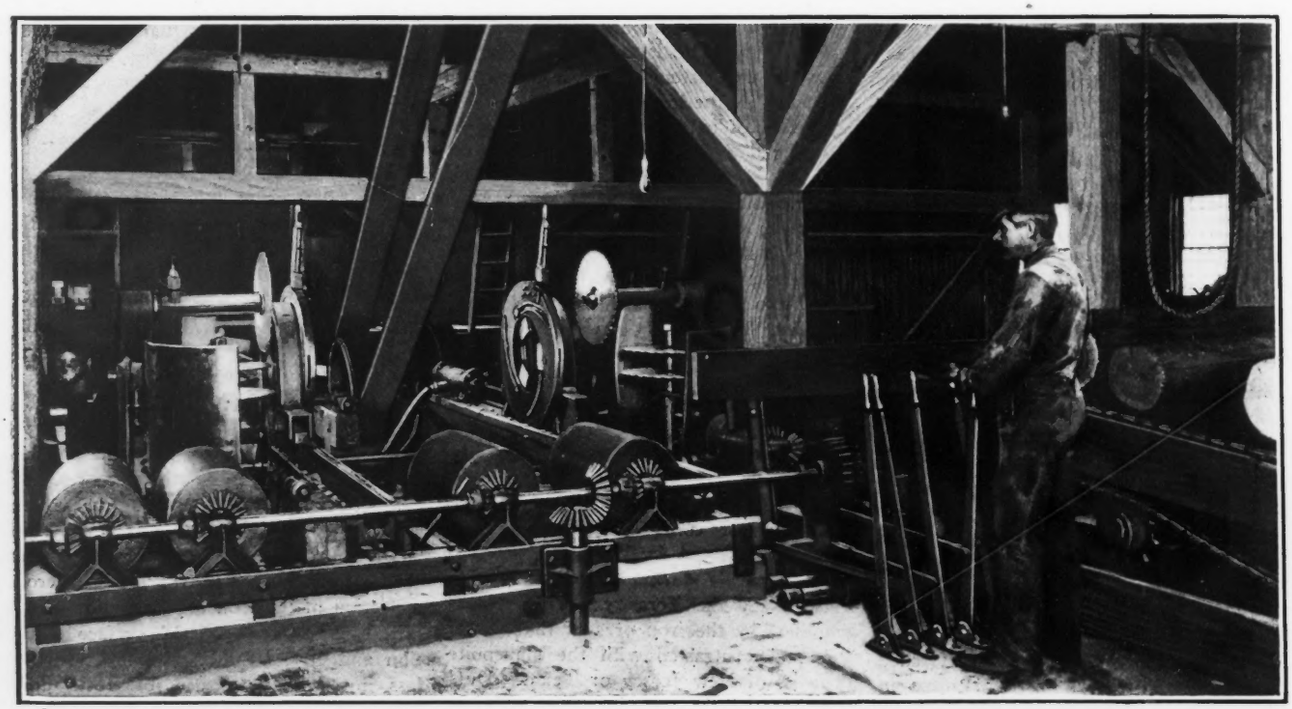
Vanadium salts are used in medicine, in ink and dye making, in coloring and in chemical work.

## The Hendy Timber Framing Machine

An improved timber framing machine manufactured by the Joshua Hendy Iron Works, of San Francisco, and in use at several large mines in the West, may be adjusted for handling either square or round timbers by changing the form of the chuck in which the timbers are held. The latest type of the machine is designed to work on pieces up to 24 in. in diameter and 4 to 9 ft. between shoulders. Horizontal and vertical cuts are obtained by turning the chuck through an angle of 90 deg. The chuck and its cylinder are rotated by means of an air cylinder.

The operating cost of the machine in use at the Original mine at Butte, Mont., is $7.50 per shift of eight hours for the labor of two men and 30 h.p. required in framing 450 caps or 500 posts round or square timber. When the timber is delivered and taken away from the machine automatically the cost of framing at this mine is 2.5c. per piece of timber handled.



FRONT VIEW OF FRAMER AT THE ORIGINAL MINE

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A note in the *Iron Age* states that the National Foundry Company, Erie, Penn., is now pouring from 200 to 270 molds per heat in its steel foundry. It recently broke the record by pouring 275 molds from an 18-ton heat in 1 hour and 35 min. Although some of them weighed but 2 lb. apiece, the castings would average about 60 lb. each, there being 580 pieces in the heat. The usual record for steel foundries is from 100 to 200 molds from each heat.

## Brazilian Manganese Ore

According to the *Min. Journ.* (Aug. 24, 1907) the state of Bahia in Brazil is rich in deposits of manganese ore of excellent quality, but owing to cost and difficulty of transporting the ore only one such deposit is being worked in this state at the present time. This deposit is situated in the Nazareth district, about 30 miles to the south of the bay of Bahia. It consists of two mines known respectively as Pedras pretas and Sapé. Both mines are owned by the local Companhia de Manganese de Bahia, which has a nominal capital of 400 contos of reis ($125,000), of which amount one-half is paid up.

The company has constructed a private railway track some 2 km. in length, which connects the mines with the Nazareth railway system at a point 27 km. distant from the town of that name. The ore is loaded by means of lighters into ocean-going vessels, which are able to approach comparatively close to the town of Nazareth.

Of the two mines in question, one only —Pedras pretas—has been worked hitherto, and that only on a small scale. During 1906 that mine was worked only during the last six months. During that period the shipment of manganese ore was 4800 tons, all of which went to the United Kingdom. The Pedras pretas mine is estimated to contain some 100,000 tons of ore and the Sapé mine some 250,000 tons of ore. Analysis of the ores from the two mines yielded the following percentages: manganese, 47; silica, 7.2; phosphorus, 0.038; moisture, 1.65.

# The Operation of Coal Mines in Montana

## The Mines at Red Lodge Have a Steam Car-pusher and a Cylindrical Revolving Tipple Operated by a Motor

BY FLOYD W. PARSONS

Three great coal-forming periods are responsible for the fuel supplies of our country. The zone within which conditions favorable for the formation of coal prevailed, extended over that portion of the country lying east of the one-hundredth meridian, during the Carboniferous period. This coal-forming zone gradually shifted westward and during the Cretaceous period, extended over that region lying between the one-hundredth and the one hundred and fifteenth meridian, forming what is known as the Rocky Mountain field. During the Tertiary period, the coal zone had shifted further westward and formed the coalbeds of the Pacific coast. This latter field is small in area, totaling about 1000 sq.m.

### Chemistry of Montana Coals

The coalbeds of Montana vary in thickness from a few inches to 25 ft., and except in the foothills the seams are nearly horizontal. The coalbeds of the plains are principally lignite, due to the fact that the coal has not been subjected to much pressure or folding. In the hilly country and along the edge of the mountains the coal is chiefly bituminous, due to the intense folding and intrusion of igneous rock. The accompanying table shows the composition and the general quality of the various coals.

COMPOSITION OF MONTANA COALS.

| Locality. | Fixed Carbon. | Volatile Matter. | Ash. | Moisture. | B.t.u. |
|---|---|---|---|---|---|
| Anaconda | 35.00 | 45.00 | 15.04 | 5.00 | 9,225 |
| Aldridge | 58.00 | 30.61 | 10.43 | 1.00 | 10,960 |
| Belt | 55.22 | 23.00 | 17.50 | 2.40 | 10,398 |
| Bridger | 55.00 | 25.50 | 12.00 | 7.02 | 10.830 |
| Bull Mountain | 44.00 | 41.00 | 7.20 | 7.42 | 10,060 |
| Chestnut | 51.00 | 23.50 | 17.90 | 8.20 | 10,980 |
| Drummond | 36.40 | 41.20 | 14.00 | 8.76 | 9,170 |
| Gebo | 48.01 | 21.25 | 23.90 | 6.42 | 10.160 |
| Havre | 40.10 | 35.07 | 9.50 | 15.50 | 9,862 |
| Lewistown | 51.90 | 36.00 | 8.20 | 3.27 | 10,886 |
| Mountainside | 48 70 | 27.00 | 20.20 | 2.66 | 10,650 |
| Missoula | 39.50 | 41.09 | 10.00 | 8.80 | 9,405 |
| Red Dodge | 50.54 | 37.06 | 10.11 | 2.30 | 10,371 |
| Sandcoulee | 55.11 | 30.81 | 9.90 | 3.50 | 10,974 |
| Sanford | 31.97 | 61.40 | 5.30 | 1.90 | |
| Spring Creek | 55.00 | 37.16 | 5.00 | 3.00 | 11,270 |
| Trail Creek | 49.99 | 31.55 | 8.88 | 10.06 | 10,074 |

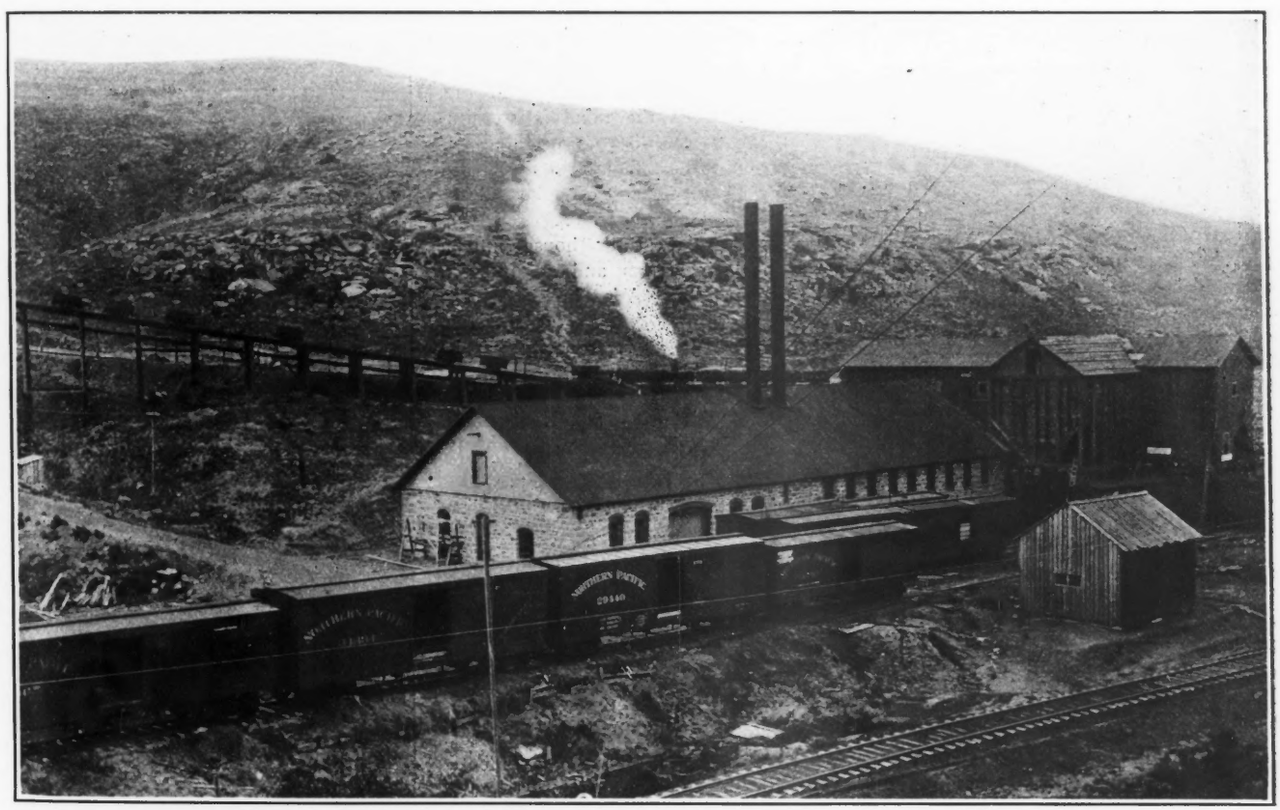

FIG. 1. POWER HOUSE AND LOWER END OF BEAR-CREEK COAL COMPANY'S TRESTLE

A peculiar feature in the formation of our coalfields is the fact that the fuel ratio, which is obtained by dividing the percentage of fixed carbon by the percentage of volatile combustible matter, seems to decrease from east to west. In the small Rhode Island fields, the coal has been so highly metamorphosed that it has practically been converted into graphite; the anthracite coal in Pennsylvania shows an average fuel ratio (the ratio of fixed carbon to volatile matter) of about 15. Going farther west, the product from the coalbeds shows a ratio varying from 5 in central Pennsylvania, to about 1.5 in the northern interior fields and 1.3 in the western interior fields. In the Rocky Mountain field, which comprises the coalbeds of Montana, the fuel ratio varies considerably, the abrupt changes in composition being due to the different degrees of alteration which the coal has undergone.

### Coal Operations in Carbon County

The greatest activity in opening new mines and developing additional territory is taking place in Carbon county. This district contains over 3000 sq.m. of coal lands, lying in the Laramie and the Fort Union formations. The mines of this region are reached by a branch of the Northern Pacific Railroad connecting with the main line at Laurel, about 15 miles

west of Billings. Another railroad has recently been built from Bridger to Bear Creek, and is known as the Yellowstone Park Railroad. This line is owned by private individuals and will probably be extended further south into Wyoming, tapping the coalfields of that State.

The first mines of importance in entering this field are at Coalville (formerly Gebo) in the Clarks Fork district. The company operating these mines is now known as "The Bituminous Coal Company."

Since the present owners have taken hold, the method of mining has been radically changed so that the irregular system which formerly caused the rooms to cave before reaching their limit has been changed and at present few falls or squeezes are encountered. The rooms are 42 ft. center to center and are 200 ft. long. Haulways are protected by 40-ft. pillars. The coal has no face or butt and is of the lignitic bituminous variety. The cover varies from 800 to 1000 ft. in thickness, and it is particularly noticeable that the poorer coal is found under the lightest cover. Both steam and electric fans are used for ventilation. The mines are dry and contain no gas. The company at present employs 56 miners and 48 day men and is producing 200 tons a day.

### Bridger Coal Company

About two miles from the town of Bridger and four miles from Coalville are the operations of the Bridger Coal Company. This concern employs about 100 men and is working a 7-ft. seam of fairly clean coal. The bed in this district lies on a 12-deg. dip, and is capped with a brown sandstone cover. The tipple is located one mile nearer the town than the mine, the coal being hauled to the dump by a Link-Belt locomotive. Seven electric chain-breast machines are used in mining the coal and ventilation is secured by means of a 30-h.p. electric fan. The tipple is equipped with shaker screens and a box-car loader. The Bridger mines were taken over by Senator W. A. Clark in 1899, and until recently have been a failure financially.

### Bear Creek Field

Greater activity in the development of new coal lands has recently been shown in the Bear Creek district than in any other Montana field. In this locality, the International Coal Company is at present producing about 100 tons per day; the McCarthy mines have an output about equal to that of the International; the Smith property will soon be shipping 200 tons per day, while the two mines being opened by the Washoe Copper Company, a subsidiary corporation of the Amalgamated Copper Company, are practically completed and ready to produce.

One of these latter mines, which are generally spoken of as belonging to the Amalgamated Copper Company, is to develop 80 acres, the output being intended to relieve the fuel situation at Butte; this property will produce about 450 tons per day. The other mine of the Washoe company has reached the coal with a 30-deg. slope and is equipped to produce 400 tons daily. This property will not be actively operated until the depression in the copper industry has been relieved. The townsite shown in Fig. 4 was laid out by the Washoe Copper Company at one of these mines. When the curtailment in the production of copper was enforced, orders were given to build houses only on every other foundation.

The largest producer in the Bear Creek district is the Bear Creek Coal Company, which at present has an output of 400 tons daily. This company has a large acreage which is underlain with eight demonstrated coal seams, aggregating over 50 ft. in thickness. The tipple and general outside plant of this company is shown in Fig. 1. A McEwen engine and Goodman generator of 250 h.p. capacity are used for lighting the mine workings and for running the surface plants. The hauling is accomplished with a third-rail 80-h.p. motor and a 50-h.p. traction motor. As shown in Fig. 1, the mouth of the mine is so situated that the coal is run on a downgrade from the pit mouth to the tipple. The power house is built of stone and has a ground plan 50x100 ft. A stone partition divides the power house into a 50x50-ft. engine room and a 50x100-ft. boiler room. Two Atlas boilers of 150 h.p. capacity are used, but the plant is so arranged that the power capacity may be more than doubled.

### Red Lodge Mines of the Northern Pacific Railroad

One of the most important operations in Montana as well as one of the best equipped coal plants in America is that of the Northwestern Improvement Company, at Red Lodge. The mines here worked are owned by the Northern Pacific Railroad Company and the fuel output is almost entirely used in the engines of that system. The general plant is shown in Fig. 2, while Fig. 3 is a view of the washery building. The entire installation cost upward of $1,000,000 and was evidently built with the intention of doing, as far as possible, all work by mechanical means.

The mines have developed four seams known as Nos. 1½, 2, 4 and 5. No. 4 was first opened and averages 10 ft. of fairly clean coal; No. 2, which shows 8 ft. of coal, was opened next, while No. 5, the third seam to be opened, shows 12 ft. of coal; the last bed developed was No. 1½, which shows a 5-ft. seam. The No. 5 seam has a bad top and bottom, and as a consequence many creeps have occurred, entailing the loss of considerable coal.

FIG. 2. MINES OF NORTHERN PACIFIC RAILROAD COMPANY, AND TOWN OF RED LODGE, MONTANA

The general scheme in working this latter seam is to leave 5 ft. of coal as a supporting roof and work the remaining 7 ft. In the No. 2 bed the top is good while the bottom is poor. This condition necessitates leaving large pillars to prevent the bottom from heaving or the coal from sinking into the 12-ft. seam of clay underlying the seam. Most of the coal produced in this field comes from the No. 4 seam, although more men have been hurt in mining this coal than any other. In addition to the beds here mentioned, there is a small dirty vein which comes in between Nos. 4 and 5 just as No. 1½ was found between Nos. 1 and 2. None of the seams are entirely clean, for each bed contains several small partings of bone and shale. The entire product of the mines is picked although only the smaller sizes are washed.

### No Machines Used

The miners on the No. 2 seam undercut the coal before shooting, but in many other places the coal is shot from the solid, probably one-half of the entire output being thus obtained. None of the seams show face or butt cleavage so that the rooms can be driven in any direction. The average shipment at present is about 1800 tons per day, although it is stated that 2500 tons will be produced each day after Jan. 1, 1908.

The ventilation is accomplished by two fans; the one ventilating the No. 2 seam is driven by steam and is 24 ft. in diameter; a 14-ft. electric fan ventilates the No. 4 seam.

### Unique Tipple and Washery Arrangement

The coal from the No. 2 slope is delivered directly upon the tipple floor, close to the dump, while the coal from the No. 4 slope is brought up and dropped back to an outside parting, from which point a trip haul takes the loaded cars and lands them on the tipple floor. The cars are fed to the dump by a chain feed, while a steam car-pusher engages one car at a time and sends it to the rotary dump. This system works without any trouble whatever and handles three cars a minute.

After the car is pushed upon the cylindrical tipple, the operator releases the dump which is turned by means of a 240-volt, direct-current, Westinghouse motor. The dump makes one complete revolution and then automatically locks itself into position to receive the next car. This second loaded car pushes the empty off the dump and causes the empty to pass down a short slope to the kick-back, from which it is sent through a three-throw switch to the No. 2 or No. 4 car haul. The latches of the three-throw switch are operated from the dumping platform. The empty cars, after leaving the kick-back, travel by gravity to the empty up-haul chain which raises them over a knuckle and sends them down to the empty trip. The cars are here coupled and oiled and after being hooked to the rope, a car-pusher pushes the trip over the slope knuckle, from which point they go to the No. 2 side. On the No. 4 side the empties are sent by means of the up-haul chain to the down-haul, which delivers them on the outside parting where they are coupled and attached to the rope.

After the coal is dumped by the rotary tipple, it is fed into the shaking screen. A trap is located in the hopper so that when it is desired to feed the coal to a locomotive, the gate is thrown open and the fuel delivered into a conveyer that takes it to a rubber belt conveyer which runs at right angles to the first conveyer; the belt conveyer delivers the coal to a bin located at the side of the railway track.

If a car of rock is to be dumped, the trap is thrown into the same position as for locomotive coal and the rock is delivered upon the same rubber-belt conveyer, which, at the locomotive bin is doubled back over two pulleys in such a manner that the outside end of the conveyer is lower than the inner end. At the point where the belt passes over the higher pulley, a chute with a fly gate is located. This chute runs from the higher end to the lower or outgoing end of the conveyer. When rock is being disposed of, the gate at the head of this chute is closed and the rock passes down the chute and is delivered on the same belt conveyer beyond the two pulleys referred to, and thus does not interfere in any way with the chute that delivers the coal to the locomotive bins. At the exreme end of this rubber belt conveyer, a rock bin is located, and it is here that the refuse is dumped. An electric larry carries the rock from this bin and deposits it on a dump about a mile below the plant.

### Method of Preparation

The lump coal that goes over the shaking screen is delivered upon picking tables where all rock and bone is removed. After leaving the picking tables, the coal goes over a loading table into a chute from which it is loaded into the railway cars. At the side of the tipple building is a Smith gravity box car loader which consists of a table or cradle supported on four roller-bearings set in a pit of the proper size. The operation of tilting the cradle is accomplished by means of four wire cables, one end of each of which is fastened to the cradle and the other end to the head of two hydraulic cylinders. When the cylinders travel to the right, the cables fastened to the left side of the cradle pull that side down, and when they travel to the left, the cables on the right side pull that side down.

The coal that goes through the shaker screens is fed into an elevator that carries the screenings to the top of the building where they are fed into another set of shaker screens. Everything that passes over this set of screens is fed into six spiral separators which remove all bone and rock, and deliver the clean coal into a chute from which it is loaded into railway cars on the opposite side of the tipple from that on which the box car loader is located. The coal that passes through these second screens drops into a hopper and is fed upon a conveyer which carries it to the washery. The washery

FIG. 3. WASHERY AT NORTHERN PACIFIC MINES

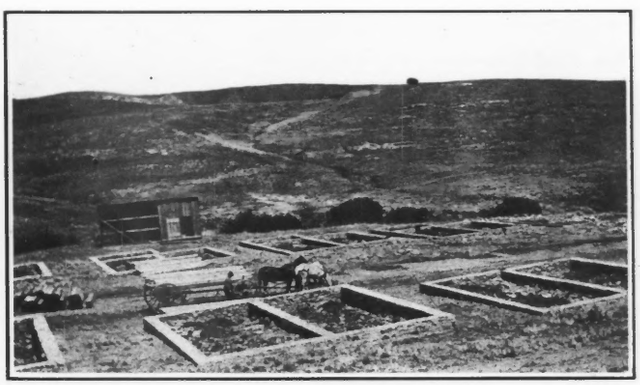

FIG. 4. TOWNSITE AT COAL MINES OF WASHOE COPPER COMPANY

is of the Luhrig type and is capable of handling 500 tons of coal in ten hours. The same electric larry that handles the mine rock also carries away the refuse from the washery. All the machinery and equipment about the tipple and mine is driven by electric current generated in the company's power plant. The deepest of the workings are now down about 2700 ft. on the incline.

### A Mine Failure

Montana has its quota of mine failures even in the coal industry and conspicuous among these is the plant at Storrs, near Bozeman. When coal in this vicinity was first discovered and tested, it was found to be of excellent quality and valuable for coking purposes. A large and elaborate plant was built, the Amalgamated Copper Company spending about $700,000 in opening and equipping the property. A beautiful town was laid out and 200 coke ovens were constructed. Since that time much interest has been centered in playing a game called "Coal, Coal, Who Has the Coal." The beds seem to be only in pockets and pitch from 60 to 80 deg. The Montana Coal and Coke Company has a proposition much like that of the Amalgamated Company at Storrs, the coal so far seeming to occur only in patches.

### Sulphur in the Coal Utilized

Cascade county, having 3500 sq.m. of coal land within its borders, is the largest producer of coal in the State, the product being shipped over the Great Northern Railroad. Much of the coal in Cascade county cannot be developed because of a lack of shipping facilities; this need will be partially remedied by the Burlington Railway which is building into Great Falls from Billings.

The coal beds in this district lie in a practically horizontal position. The coal camp of Stockett is three miles south of Sandcoulee, which latter place is the oldest coal camp in the county. The operation at Stockett, known as the Cottonwood Coal Company, is a subsidiary concern of the Great Northern Railway and is one of the largest producers in the entire State. About 400 men are employed at these mines, which produce approximately a half million tons of coal per year. Practically the entire output of the Cottonwood company goes to supply the Great Northern Railroad system with fuel for its engines through Montana, Idaho and North Dakota.

The coal mines of the Amalgamated Copper Company, located at Belt, 24 miles southeast of Great Falls, on a branch of the Great Northern Railway, commenced operations in 1893 and have produced more than 5,000,000 tons of coal. The Belt mine has a tail-rope haulage system about 1¾ miles long, while some of the coal is hauled nearly three miles from the point of extraction to the dump. The surface plant includes a tipple capable of dumping 3500 tons per day, a 1000-h.p. steam plant, Luhrig washer, having a daily capacity of 600 tons, a Jeffrey-Robinson washer with a capacity of 1200 tons per day, which latter has been used for preparing steam coal, while the former was originally used for coking coal; 100 coke ovens were built, but have not been used recently. The reason for building coke ovens at this plant was the fact that the seam here operated originally showed 18 in. of coking coal in the bottom of the bed; this coal will no longer coke successfully, so that the ovens have been abandoned. The Belt mine is an old property and can be counted on to produce for probably eight years longer. One peculiar fact in connection with this property is that the coal contains numerous sulphur balls which the company found it profitable to wash out and ship to Butte for use in the smelters.

### Labor and Transportation

Two months ago nearly every mine in Montana was short of labor, but the present depression in business and especially the closing down of metal mines and of smelters has caused such a change in the situation that very few of the properties are now complaining of a scarcity of men. All of the mines employ union labor, and so strong are the labor organizations, that heretofore the mine operators have hardly dared to call their souls their own. The wage scale is high and in some instances the check-off system has been forced upon the operators.

Many of the miners in Montana are Finns; in fact, at some mines, such as the Northern Pacific mines at Red Lodge, 50 per cent. of the labor employed is of this nationality. At the Bituminous Coal Company's property at Coalville, which has been described, the majority of employees are from Montenegro and are inferior as miners. The men in most of the camps are fairly sober, which is probably due to the fact that each camp contains but one saloon if any at all. This is an improvement on Pennsylvania, where in some coal towns there is one saloon for every 12 voters. In Schulykill county, Penn., there is one saloon for every 50 adults.

When compared with the problem of a proper and sufficient car supply and satisfactory transportation, all other questions affecting coal mining in Montana dwindle into insignificance; even the labor question is entirely overshadowed by the transportation problem. All kinds of cars are used to carry the product, and in Fig. 1 it may be seen that much of the coal shipped from the Bear Creek district is loaded into box cars.

The Yellowstone Park Railway, which was previously mentioned as an independent road running from Bridger through the Bear Creek field, has no equipment of its own. For this reason, the Northern Pacific railroad has refused to transfer cars to the Yellowstone Park line because the latter road has nothing with which to make an exchange. Such conditions as this are most aggravating to the operators who have built plants at Bear Creek and cannot secure sufficient cars with which to ship their product. There is no doubt that the position of the Northern Pacific is technically correct, but the time for enforcing its rights seems unfortunate and short-sighted, for such action is sure to cause a fuel shortage in many localities.

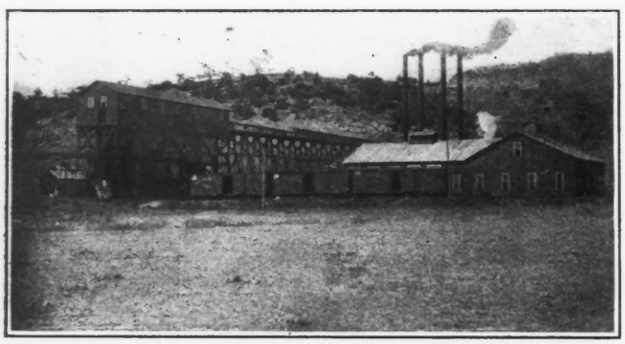

FIG. 5. PLANT OF BRIDGER COAL COMPANY AT BRIDGER

FIG. 6. INTERNATIONAL COAL COMPANY'S TIPPLE AT BEAR CREEK

## The Watering of Dust in Welsh Coal Mines*

By W. N. Atkinson†

This is one of the most important subjects affecting the safety of mines in South Wales, where there are many large collieries which are naturally dry, and very dusty, and where in the past, numerous devastating explosions have occurred in such mines.

The importance of the subject is generally recognized, as appears from the fact that in most of the dusty mines systems of pipes have been installed carrying water under high pressure, for watering the haulage roads. The method in which the water is usually applied is by means of a flexible hose pipe attached to the water mains at intervals of about 25 yards. Many permanently fixed sprayers have been tried, and a few are still used, but generally they were found to be troublesome and unreliable, and have been abandoned in favor of the hose pipe. In some collieries there are fixed sprayers for watering the loaded trams as they passed under them, generally at the inbye partings from which the journeys of trams are drawn by engine power. I have also seen sprayers applied near the top of downcast shafts, to prevent dry dust from the screens being carried down.

There is probably more watering of coal dust in South Wales than in all the rest of the country together. The result of the watering, I regret to say, is far from satisfactory, and so far as I have seen, it is doubtful whether, in many of the collieries, the watering would be effectual in preventing the extension of an explosion by coal dust. This conclusion is to some extent borne out by the fact that there have been explosions in collieries provided with thousands of yards of water pipes, where the water had little or no effect in preventing the extension of the explosions along the roads in which the pipes were fixed.

The chief reason for this state of affairs is the insufficient manner in which the watering is carried out. In many collieries there are, without doubt, serious difficulties in the way of the effectual watering of the dust throughout the haulage roads. The chief difficulty is the deleterious effect of water on the strata forming the roof, floor, and sides of some of the roads; and in some cases, the fact that the roof is formed of broken strata and old timber for a considerable hight up, the interstices of which are full of dust to which it is difficult or impracticable to apply water. Other reasons for the inefficiency of the watering are more or less completely within the control of the management. One is the large amount of coal, coal dust and débris which is allowed to accumulate on the haulage roads. In many cases these deposits are found to such an extent that it is practically impossible to keep them damp throughout. In some cases these deposits appear to be allowed to accumulate until it is absolutely necessary to remove them to keep the roads available for haulage purposes. The trams used, and the method of loading them from one to two feet above the top, are responsible for the scattering of much coal and coal dust along the haulage roads. Many of the trams are still open ended, and even when both ends are closed, they are so built as to be far from dust tight. Another reason is the way in which the actual application of the water is done. This seems to be left too much to the discretion, or want of discretion, of the men appointed to water roads. The result is that some parts of the roads are found with a large pool of water on the floor, and other parts absolutely dry.

That it is possible efficiently to water mine roads on an extensive scale, was proved to me by what I saw in Westphalia, in October last; and although the difficulties encountered in the mines I saw there, were not so great as in many of the South Wales steam coal collieries, I am satisfied that by modifications and greater care the system of watering here could be made of real value for the prevention of the extension of explosions by coal dust. As matters are, much of the money spent on the operation is practically wasted.

*From the reports of Government Inspectors of Mines.

†Government Inspector of Mines, Swansea and Cardiff District.

## Coal Mined by Machines

According to a recent report by E. W. Parker, of the U. S. Geological Survey, one of the notable features presented by the statistics of bituminous coal production in 1906, as in 1905, was the increase in the use of machines and in the quantity of machine-mined coal. In 1906 the quantity of machine-mined coal was 15,451,075 short tons greater than in 1905, while the total production of bituminous coal increased 21,534,643 tons, showing that over 72 per cent. of the increase in 1906 over 1905 was in the machine-mined product. The statistics also show that the average output for each machine in use increased from 10,258 tons in 1904 to 11,258 tons in 1905, and to 11,638 tons in 1906.

The total quantity of coal produced by the use of machines in 1906 was 118,847,527 short tons, as against 103,396,452 short tons in 1905 and 78,606,997 short tons in 1904. The increase in 1906 was 15,451,075 short tons, or 15 per cent. The increase in 1905 over 1904 was 24,789,455 short tons, or 31.5 per cent., while that of 1904 over 1903 was only 623,103 tons, or 0.81 per cent. The number of machines in use increased from 7663 in 1904 to 9184 in 1905 and to 10,212 in 1906.

The percentage of the machine-mined tonnage to the total production in the States in which machines are used has increased steadily each year. In 1899 this percentage was 23; in 1900 it was 25.15; in 1901, 25.68; in 1902, 27.09; in 1903, 28.18; in 1904, 28.78; in 1905, 33.69, and in 1906, 35.1.

Of the 10,212 machines in use in 1906, 5911, or 58 per cent., were of the pick or puncher type; 4144, or 40.5 per cent., were chain-breast machines, and 157, or 1.5 per cent., were longwall.

In the number of machines in use and in the amount of machine-mined tonnage, as in the total production of coal, Pennsylvania stands far in the lead, with 45 per cent. of the number of machines and 45.6 per cent. of the machine-won product in 1906. Ohio stands first in the percentage of machine-mined coal to the total product.

## Russian Coal-mining Regulations

On March 17, the Minister of Trade and Industry published the following decrees relating to the organization of rescue corp and the installation of rescue apparatus in coal mines:

1. In every coal mine a rescue squad must be organized and to it is entrusted operations in foul gases. (a) In every mine which has connection with a central organization for the inspection and supervision of rescue corps, the number of workers belonging to the corps must be 4 per cent. of the enrollment of the largest shift. For every four mines belonging to the corps there must not be less than one breathing apparatus and one electric handlamp. In isolated mines, however, it is required that there shall not be fewer than three complete rescue equipments. (b) In mines which are not affiliated with such a central organization, the number of mines required to belong to a corps shall, in general, be the same as in mines of the first category. However, there shall not be less than six men to a corp and for every three members at least two breathing apparatus and two handlamps shall be provided. In mines having a total force of only 50 men, a corp may consist of three men, having two breathing apparatus and two handlamps, provided the approval of the district inspector has been secured. Mines of this last class must, however, be within 1.5 versts (5250 ft.) of mines having normal size corp and be in telephone connection with them.

2. Every gold mine with underground workings and any other mines except those not requiring any timberings must also organize a rescue corps. The size of the corps in these cases, the number of apparatus, electric lamps and other necessary equipment is to be determined by the local inspector after consultation with the mine authorities.

3. The choice of the particular type of breathing apparatus rests with the mine owners, subject to approval by local authorities.

# 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

Experience has shown that where electric firing machines are used, misfires are usually due to the use of an inferior battery or the failure of the blaster to push the rack bar down as hard as possible. The best blasting machine is the cheapest in the end.

Experience has shown that the common practice of taking hitches in electric fuse wires should be avoided, as it is apt to injure the insulation of the wires and cause the current of electricity to pass from one wire to the other, without passing through the cap, and thus hazarding a mis-fire.

One authority on diamond core drilling claims that better results may be obtained by setting the carbons in groups of twos or threes, leaving between each consecutive group a space large enough to put in iron plugs, which, when they are securely tamped in place, will project a little over the exposed portions of the carbons. The advantage of this method is that the iron plugs are gradually worn away before the carbons come into operation, and each stone comes into working order without undue strain and the risk of fracture, as often happens when a hole passes from soft into hard stratum.

In all cases where a miner has been overcome by the gases in a mine an emetic should be at once administered if the victim can still voluntarily swallow. To enforce this emptying of the stomach it is recommended that a solution of sulphate of zinc containing 30 grains to the ounce, be administered in doses every ten minutes until emesis is produced. After this treatment has been administered, it is advisable to put two teaspoonfuls of the aromatic spirits of ammonia in a cup of water and cause the patient to swallow this solution. Ammonia acts as a stimulant more satisfactorily and quicker than alcohol.

At a central station where a large amount of power is generated to supply power for motors and lamps, the whole current should not be generated by a single dynamo, but by several. For instance, if a plant is designed to have a maximum load of 1000 h.p., five machines might be installed, each driven by a separate engine, and each capable of generating 250 h.p. This arrangement would allow one dynamo for reserve in case of repairs or break-downs. Whereas if only one large machine was installed, there would be no provision for accidents and it would have to run at times when only a small amount of power was required.

When resharpening drills, great care is necessary to form the cutting edge evenly, and to preserve the full form and shape. If the corners get hammered in, they are said to be "nipped" and the drill will not free itself in cutting. When a depression of the straight or curved line forming the edge occurs, the tool is said to be "backward," and when one of the corners is too far back it is known as "odd cornered." When any of these defects exist, as they very commonly do, not only does the drill work less effectively on the rock, but the force of the blow is thrown upon a portion only of the edge, which, being over-strained, is liable to fracture.

It has been shown that the preservative treatment of a rope during its manufacture is a matter of the highest importance, and has considerable influence on the life of the rope The core, of tarred Russian hemp, should be thoroughly soaked in an acid-free lubricant. The wires should also be well lubricated while they are being laid up, and the whole rope when finished should also be lubricated. If the dressing is thick enough and heavy enough, it is sufficient to resist the corrosive action of damp mine atmosphere. A good rope dressing wards off corrosion and reduces the frictional wear. Dressing should be applied to the shaft cage rope once in two weeks, except in case of wet shafts, when it should be applied every week.

Blue prints may be protected from moisture and drippings in wet mines in the following manner. Immerse the print in melted wax, or better still, saturate pieces of absorbent cloth, a foot or more square, in melted paraffin. Withdraw and cool. When cooled place a dry blue print between two pieces of the waxed cloth, lay on a smooth surface and iron with a moderately hot flat iron. The paper will become saturated with the paraffin and will be translucent and highly water-proof. There will be no shrinking or distortion and the lines of the print will be intensified. The process of immersing the print in melted paraffin is somewhat quicker, but ironing is still necessary to rid the surface of surplus wax.

Experience has shown that a good steam-pipe covering for underground use is made of two layers of non-conducting wood (white pine free from all sap), bound together by steel wire and separated by two layers of heavy non-conducting paper. The insulating character of the covering is also greatly increased by the presence of a thin layer of air between each layer of wood and paper. On low-pressure steam and hot-water pipes this covering, unlined, gives good results, but if it is to be used on high-pressure steam pipes, it should be lined with asbestos, in which case, no matter how high the pressure of steam, no other covering or wrapping is necessary. This loss of heat from underground radiation is reduced to a minimum where this covering is used.

Experience has shown that pure coke would be absolutely worthless. In fact, coke could not exist if ash was not present, as it is the nucleus around which the atoms of carbon arrange themselves while coking. Lowness of ash is probably one reason why some of the purest of coals do not make the finest cokes. The absence of sulphur and phosphorus also makes coke unsuitable for many purposes. Hence, it would seem that the coking properties of any coal do not wholly depend on conditions resulting from the presence of different elements in certain properties. Many scientists have thought that a more important factor is the position or angle in which the atoms composing the coal seams lie. The best coal for coking, is that having a prismoidal or vertical structure which permits a free mixing of the particles and a free diffusion of the gases.

Experience has shown that a long belt will transmit more power than a short belt of the same width and tension, hence long belts are always best if it is possible to use them. A one-inch belt traveling 800 ft. per min. and with proper tension will transmit 1 h.p. If the same belt travels 1600 ft. the power will be doubled, each additional inch to the width will also add one horse-power, at the same speed and tension. A belt under right conditions will deliver 97 per cent. of its efficiency. If a belt is too tight, there will be quite a loss from friction of the journals, if too loose, there will be still more loss by slipping. Excessive slipping dries out the leather and reduces the adhesion. A double belt lasts longer than a single belt and takes double the tension, besides transmitting 7/10 more power as the ability to transmit power is governed by the frictional width of the belt and its pulling strength. A raw-hide belt will transmit from 25 to 50 per cent. more power than a tanned belt and is more economical than tanned belting for straight non-shifting work, but is not adapted to cone pulleys or countershaft work.

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## Contents

PAGE

Editorials:
A Bureau of Mines ..... 1077
Some Features of the Industrial Situation ..... 1077
The Waste in Mining Anthracite .... 1078
Iron and Steel Prices ..... 1078
The Naomi Mine Disaster ..... 1078
*The Silver-lead Mines of Eureka, Nevada .....*Walter Renton Ingalls* 1051
Aluminum Instead of Carbon for Safety Explosives ..... 1058
*The Braden Copper Mines in Chile. *William Braden* 1059
Copper Mining in Siberia. *Special Correspondence* 1062
Jigs as Classifiers in Ore Dressing. *J. T. Glidden* 1063
Sulphur in the Philippines ..... 1063
The Almaden Quicksilver Mines ..... 1063
Accidents in Marquette County Mines 1063
*The Brunton Man Elevator ..... 1065
Aluminum for Electrical Conductors ... 1065
Consolidated Mercur Gold Mines Company ..... 1065
Genesis of Ores in the Light of Modern Theory ....*Horace V Winchell* 1067
*The Hendy Timber Framing Machine 1070
Brazilian Manganese Ore ..... 1070
*The Operation of Coal Mines in Montana .....*Floyd W. Parsons* 1071
The Watering of Dust in Welsh Coal Mines .....*W. N. Atkinson* 1075
Coal Mines by Machines ..... 1075
Russian Coal-mining Regulations ..... 1075
Colliery Notes ..... 1076
Correspondence:
Negative Results in Pyritic Smelting .....*H. O. Hofman* 1079
Suspension of Mine Assessment Work .....*Alex. Denny* 1079
The Barnes-King Fiasco ....*A. R. T.* 1079
Publicity in Mining Promotion. *J. T. G.* 1080
The Steel-rail Question. *Geo. A. Grover* 1080
The Industrial Prospect ..... 1080
Personal, Obituary, Societies and Technical Schools, Industrial, Trade Catalogs, Construction News ..... 1081
Special Correspondence ..... 1082
Mining News ..... 1084
Markets, etc ..... 1088
Prices Current, Chemicals, Minerals, Rare Earths, etc ..... 1094
Dividends ..... 1095
The Mining Index ..... 1096

**Illustrated.*

## A Bureau of Mines

The President's message has inspired confidence even among the alarmists, although it declares no recession from previously announced policies. It contains several recommendations of importance to the mining industry, to which we shall refer later. Among other things, the President has fulfilled his promise to recommend the establishment of a bureau of mines in the following words:

"A bureau of mines should be created under the control and direction of the Secretary of the Interior; the bureau to have power to collect statistics and make investigations in all matters pertaining to mining and particularly to the accidents and dangers of the industry. If this can not now be done, at least additional appropriations should be given the Interior Department to be used for the study of mining conditions, for the prevention of fraudulent mining schemes, for carrying on the work of mapping the mining districts, for studying the methods for minimizing the accidents and dangers in the industry; in short, to aid in all proper ways the development of the mining industry."

A bill to carry out the President's recommendation will be introduced at this session of Congress and strong pressure will be exerted to secure its passage. The necessity for the great care with which this bill must be drafted is manifested by the President's message itself. The President recommends one function for the bureau which directly covers an existing function of the Geological Survey. This is the collection of statistics.

If a bureau of mines is to be established it is highly important to coördinate it with the Geological Survey, and the utmost care must be taken to see that the well proved usefulness of the latter does not suffer. Indeed, it is almost inevitable that the Geological Survey and a bureau of mines must be conducted under one head if efficiency and absence of friction are to be insured. In this respect the Canadian experience may profitably be studied.

The recommendation of the President that the proposed bureau make investigations particularly as to the accidents and dangers of the industry is praiseworthy. This is one of the most rational functions of such a bureau. On the other hand the recommendation that it should concern itself with the prevention of fraudulent mining schemes opens the way for a great variety of meddling with honest mining schemes. Why is there so much harping on this association of "fraudulent" and "mining," which is calculated to make us ashamed of our great industry? Are there no fraudulent real-estate schemes, promotions of inventions, etc.?

The recommendations "to make investigations in all matters pertaining to mining," and "to aid in all proper ways the development of the mining industry," are broad enough to satisfy everyone who wants the Government to do any and all kinds of things. We are aware that we have mixed up the recommendations for a bureau of mines with those for additional appropriations for the Interior Department if a bureau can not now be created. But after all, what is the difference? Such additional appropriations would make the technologic branch of the Geological Survey a bureau of mines in all but the name.

## Some Features of the Industrial Situation

Some highly significant light upon the extent of the depression in business is given by frequent notes in the daily papers, and by the observation of travelers. In the face of the immediate and crucial difficulty of deficiency in currency, the medium of exchange, these have not, perhaps, attracted the measure of attention that otherwise they would have done.

There has been a general reduction in the wages for labor, especially in the metal-mining districts, and whereas up to mid-summer the complaint was a scarcity of labor, there are now many idle men. This is also true of the industrial districts of the East. The extraordinary emigration of foreigners who have been thrown out of work has taxed the capacity of the outgoing steamships to the utmost. In New York there is stagnation in the building trade, and many men are idle, but in this strongly unionized industry there is no talk of any reduction of the high scale of wages that has been created. This is an interesting and important economic problem. When the capitalistic trusts are compelled to abandon their attempt to regulate prices in spite of the law of supply and demand, will the labor trusts prove stronger?

The cost of living already shows changes favorable to the consumer. For several months the index numbers have been declining. November will doubtless show a further and larger decline. At first it was only the decreases in the values of the metals that affected the general average, but later other commodities participated and now every householder knows that things are going to be cheaper. Certainly this will be a satisfactory consummation.

A little while ago the shortage of railroad cars was everywhere the burden of complaint. The congestion of freight was perhaps worst at Pittsburg, Penn. It was reported from Pittsburg last week that there is now an abundance of cars. Anyone traveling in the middle West is able now to observe a greater number of empty cars on sidings than three months ago, and it is also apparent that fewer freight trains are moving.

The reports from engineers, consulting and constructing, indicate positively a disagreeable restriction in the demand for their services.

All of this is evidence of the slackening of trade and of the industrial depression with which we are now confronted. An interesting article on this subject is reprinted from *The Evening Post* elsewhere in this issue. The general situation is not to be confused with the immediate difficulties created by the shortage of currency. Many operations had to be suspended simply because the cash could not be secured with which to pay the men. With the great influx of gold from Europe, the regular addition to the supply of gold from our own mines, and the reappearance of hoarded currency the amount available for circulation will soon be sufficient for the needs, and operations that were suspended on this account will be resumed as indeed is being done already.

## The Waste in Mining Anthracite

The tremendous waste that accompanies the mining of anthracite coal continues unabated. Some minor improvements in breaker construction have resulted in slightly greater economy of separation and preparation, and fortunes are being made from the utilization of culm banks heretofore considered almost valueless, but mining operations proper are not materially changed from the methods formerly used.

Some of the anthracite companies have astonished themselves by preparing figures showing the amount of coal that is lost. The loss is not so much in the best qualities of coal, as it is in the gobbing and wasting of the bony matter which forms a large part of many seams. This bony coal often runs more than 60 per cent. fixed carbon, and is no higher in ash or moisture than 75 per cent. of the best varieties of Western bituminous coal, which are mined and sold at a good profit.

That this bony material will burn satisfactorily and furnish considerable heat has been proved by hundreds of experiments, and is conceded by all intelligent mine operators. Their principal reason for not hoisting and selling this poorer coal is the idea that it would reduce the demand for good anthracite. Certainly this argument does not justify the present waste. The question is one that deserves more consideration than has apparently yet been given to it.

## Iron and Steel Prices

The maintenance of iron and steel prices will not be left to chance, and there will be no cutting in competition for such business as may come forward on a declining market, if the plans of the leading interest are carried out. An important meeting was held in New York last week, at which all the larger steel companies were represented. The meeting was informal and no regular organization or combination was attempted. It is stated, however, that an understanding was reached that prices should be kept up nearly or quite to the present level, and that production should be restricted to such an extent as to avoid the accumulation of stocks and undue competition for orders. The only approach to organization was the appointment of an "advisory committee," which is intended, apparently, to act as a regulating body, and perhaps also to aid in apportioning work among the different interests.

The important point about this meeting is that it seems to secure the continued coöperation of the leading independent companies with the Steel Corporation. If this continues as promised, there will be only moderate reductions in prices and a stable market. There is more than one "if" in such a forecast, however. For the present, when practically no new business is coming forward, there will be little difficulty. This condition cannot last very long, and we shall doubtless see at least a moderate revival of trade. This could be helped to some extent by a lower level of prices; in fact it will demand such a level. If the Steel Corporation will not make concessions, it is probably too much to expect that the independent interests will stand fast. Their disposition will be to step in and take what is coming at such lower rates as will secure the business. This will be the natural course of trade.

The Steel Corporation, as we recently stated, showed a praiseworthy moderation during the hight of the upward movement. Whether it can control a declining market, as it did a rising one, is doubtful. The probability is that its policy, as now announced, will be modified, and that iron and steel prices will follow those of the other metals in a downward movement. A change from present conditions, however, can hardly be expected before the opening of the new year.

## The Naomi Mine Disaster

Another terrible explosion is added to the unending list of coal-mine disasters. The same heartrending scenes at the pit mouth have occurred, and the usual quota of brave men have risked their lives to aid the almost forlorn hope of rescue. It is believed that all of the 43 miners entombed are dead, in fact, 19 bodies have already been located. No effort will be spared until it is definitely known that life no longer exists among the entombed.

Exact details as to the cause of the explosion are lacking; but that it was due to the ignition of a considerable body of gas is highly probable. The barometer Friday night registered 30.30, having risen steadily for several days; Saturday morning the pressure was slightly lower and by Saturday evening had fallen about 0.20 in. A slight decrease in pressure occurred again Sunday morning, which was followed by a fairly steady barometer all day. The explosion occurred at 8 o'clock Sunday evening, the barometer reading about 30.03. The following morning the atmospheric pressure had again increased and the barometer read 30.15.

# 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

### Negative Results in Pyritic Smelting

Referring again to the article by G. F. Beardsley in the JOURNAL of Aug. 24 and to my reply in the issue of Sept. 14, I wish to call attention to a letter from Professor Hofman which I submit giving the melting points of our copper-nickel pyrrhotite as compared with the pyrrhotite of the Tennessee Copper Company. The Tennessee pyrrhotite does not contain nickel and is being smelted raw, producing a 15 per cent. matte from a 2½ per cent. ore. The Sudbury pyrrhotites contain from 5 to 7 per cent. of copper and nickel and will not concentrate to more than 10 to 12 per cent. matte when handled in the same manner. The Tennessee ore is smelted with cold blast and at the plant of the Mond Nickel Company the hot top gases warm the blast to about 150 deg. F. Mr. Beardsley's theory of the lower melting point of the nickel pyrrhotite is not confirmed by Professor Hofman's test; neither is my theory of a higher melting point, so that as far as we are concerned it may be called a drawn discussion. With regard to the gentlemen who have written on the subject since, offering various suggestions not founded on actual experience in smelting copper-nickel pyrrhotites, I wish to say that Mr. Beardsley has had ample opportunity while associated with Mr. Sticht at Mount Lyell to acquire considerable experience in pyritic smelting. As regards myself I am not exactly what would be called a metallurgical spring chicken. There is some good reason why these ores will not concentrate into a matte of higher grade when smelted in the same manner as a copper ore, but as yet the reason has not been determined. Repeated trials have been made by a number of men and the best that has been done has only resulted in making 12 to 15 per cent. matte out of 6 per cent. ore. This low concentration is not satisfactory, and is the reason why the ores are pile-roasted before smelting. HIRAM W. HIXON.

Victoria Mines, Ontario, Can., Nov. 7, 1907.

The following is the letter to which Mr. Hixon refers:

I have determined the melting points of the two samples received from you and from the Tennessee Copper Company. In making the tests I took 100 grams for a charge, used graphite crucibles, a charcoal cover and heated in a gas-furnace. Both samples showed the same behavior. Upon heating there ran to the bottom a matte-like substance, while on top there collected a gummy slag which would not become fluid at 1400 deg. C. As this interfered with a satisfactory determination of the melting points of the two mattes, the crucibles were cooled, the mattes separated from the slags and their melting points determined. In both cases the melting point of the matte was found to be the same, 1050 deg. C. I have some specimens of matte and slag on hand which I can mail you, if you so desire.

H. O. HOFMAN.

Boston, Mass., Oct. 20, 1907.

### Suspension of Mine Assessment Work

Efforts are being made to have Congress suspend assessment work requirements for 1907. It is not difficult to recognize the class of prospectors who are at the bottom of this movement. Between 90 and 95 per cent. of the legitimate prospectors have done their work for this year, and it is those who wait until the last to do theirs, if at all, and are just as able or more so to do their work, that are trying to evade their obligations.

Such a law would be a detriment to the mining regions. I have talked with many here about the proposed law and all agree that it should not be passed. Most of the agitation comes from Nevada and California corporations holding from 50 to 150 claims as a basis upon which to sell stock. They use the term "poor prospector" to get on the sunny side of Congressional generosity. I have been in the business of prospecting and mining for 30 years, and can knowingly say that there is not a more independent set of men in the West than those who follow my business. They are not whining for special legislation, but expect a spirit of equity to be extended to all. In my opinion it is about time that the term "poor prospector" should be dropped when discriminating legislation is sought.

It remains to be seen whether or not Congress will lend itself to furthering the cause of these special pleaders. I wonder whether the would-be law-makers will forget to place a rider on the bill to the effect that work done for 1907 would render the claim-holder exempt for 1908. Equity we demand. ALEX. DENNY.

McCabe, Arizona, Nov. 18, 1907.

### The Barnes-King Fiasco

Considering all that has been written about the Barnes-King affair, it is surprising that the crucial point of the whole matter should be still unexplained. As nearly as I can tell from the reference to the affair in the technical and daily press, the case is as follows:

Two promoters, Campbell and Lalor, had an option on the property and sold it to the Barnes-King Development Company, organized by a group of Wall street men to purchase and operate the property. The Daly estate is mentioned as being one of these interests. These men seem to have acted in good faith and to have lost their own money in the enterprise. Influenced by the advice and actions of the leaders, a large number of persons of small means have invested their savings and have lost them.

Was the property purchased on the advice of an engineer, and if so, who was it? That point has not been made clear. Was the failure due to the shortsighted policy of trying to save the cost of an examination in a transaction involving a million dollars, or did the purchasers protect themselves as far as they knew and were they ruined because some engineer was deficient in his judgment or his honesty? Mr. Lamb's letter, though he does not distinctly assert it, raises the presumption that the property had already been purchased when his services were engaged. He refers to the report of William Word; did Mr. Word examine the property for the purchasers? And, if so, what were the conclusions reached in his report? There are a good many people who would like to know.

That the price of the property should have been far in excess of the value is not surprising. The promoters were not desirous of benefiting mankind; they wanted to make money. They may have known the property was worthless or may merely have suspected it. In no event should the purchasers have taken the promoters' estimate of the value of the property. The promoter is sometimes a scoundrel, and often more or less of an optimistic, well-meaning fool. It is hardest to protect oneself against the latter, but no matter what one's confidence in a vendor may be, a large sum of money should not be spent on anything without spending a certain percentage as a species of insurance. A. R. T.

New York, Nov. 23, 1907.

## Publicity in Mining Promotion

The State of Wyoming in 1905 enacted a law relating to the operation and organization of mining companies. This statute embodied an original idea and was confessedly an experiment to test the feasibility of obtaining definite facts concerning the financial and business administration, also the physical condition of the property of a mining company which is soliciting funds from an investing public.

In brief, the law provides that any mining company may voluntarily file with the State Geologist a sworn statement of facts relating to its location, property, method of organization, distribution and allotment of stock, general condition of its property and similar facts. For each statement sworn to, a fee of one dollar is to be paid. The statement filed may be incomplete, or may be evasive in certain respects. This is a matter for the prospective investor to consider and from which he must draw his own conclusions. The authority of the State will be brought into play only when a willful and deliberate misstatement of facts appears in the deposition of the company, in which event its officers can be prosecuted for perjury.

It would seem as though here is a means of preventing the evils of wild cats and fraudulent flotations that is at once simple and efficient. It may be assumed that the honest enterprise which is engaged in raising capital for legitimate exploitation would seek publicity of this sort and that a company which was unwilling to file such a statement would be worthy of considerable suspicion. At the same time the State itself is not placed in the position of guaranteeing the worth of a concern which has filed a statement, as its function is merely to prosecute in cases of perjury.

As a matter of fact, the recent report of the State Geologist shows that 52 filings have been made to date. In a few instances where the matter submitted was personally known to the State Geologist to be erroneous or misleading the statements were rejected, but in no case was any attempt made to force the filing of a statement or to interfere with the matter contained therein. The working of the law seems to show that those promoters and companies which are coming before the public as a solid and legitimate business proposition, seek publicity rather than avoid it and are glad of the chance to take advantage of the law in question.

A statute of this sort seems to be an easy solution of the vexed question of putting a quietus on pernicious stock-jobbing schemes which put mining in such a bad light. The essential thing to make the law effective is to educate the public at large to know that such a statute is in existence, to know where the information is to be obtained and to realize that the State merely supplies sworn facts from which each individual must draw his own conclusion as to the merits of the proposition. Such a course of education does not appear especially difficult.

J. T. G.

Cheyenne, Wyoming, Nov. 15, 1907.

## The Steel Rail Question

I have noticed much comment recently in the columns of the JOURNAL concerning the breakage of steel rails, but there is one question that I have not seen touched, viz., is the present cross-section suited to present needs?

It seems to me that the impact of a heavy train on the outside rail of a curve must cause a tremendous torsional stress in the web just where the rail is weakest, the stress increasing rapidly with heavier and faster trains.

I do not pretend to have figured out the stresses, and doubt if I could, but I offer the suggestion for what it is worth.

GEO. A. GROVER.

Wadena, Saskatchewan, Nov. 1, 1907.

## The Industrial Prospect

The following is from the New York *Evening Post* of Nov. 30:

The present week has brought plainly within sight the end of the partial suspension of cash payments by this country's banks. Experienced bankers in the Clearing House committee have generally fixed on Dec. 7, the end of the coming week, as the approximate date for full resumption of payments at New York. Whether the banks of other cities will or will not return to a cash basis simultaneously with New York, is a somewhat disputed question; but they are known to have expressed their willingness to do so, and in any case their resumption could not be long delayed. With such resumption, not only will the currency premium disappear throughout the country, but the huge sums of hoarded cash will return to bank deposits. Blockade of exchange between interior cities will be broken; the wheels of commercial machinery will again move freely; "token money" will disappear, and mills, shut down merely for outright lack of currency, will start up; Stock Exchange prices will seemingly declare that the panic of 1907 is over.

What then? There was published on this page, last week, Leroy-Beaulieu's prophecy, in the Paris *Economiste*, that "a season of reaction is in store, not for a few weeks or a few months, but for several years." Not many American prophets have publicly taken so positive ground as this.

* * * * * * *

What have we ahead of us? In his heart, every financial and business man of experience will answer, A long period of slackening trade, with incidental industrial depression, and a slow recovery. He feels this to be true, for two good reasons —one, that a blow to credit such as has occurred means that the whole credit system has been so injured that it cannot recover its old position except after prolonged liquidation; the other, that general trade, quite as truly as financial values, has long been on an unnatural and inflated basis. This second assumption does not mean that the country's merchants have as a class been doing business in a speculative way. The fact seems to be that they have not; that they had distrusted the reckless tendencies of the day, and were sailing reasonably close-reefed when the hurricane broke on them.

Had they not been doing so, we should have heard a vast deal more of mercantile failures since Oct. 24. But what the man of experience knows quite as well, is that even where producers and middlemen have not been rashly abusing credit, consumers have. The buying capacity of the community as a whole has been radically cut down by the shock of the past six weeks; excesses in the scale of living must be abandoned by force of necessity; retrenchment instead of lavish expenditure will become the social virtue; and all this means that trade demand will contract for a good while to come, and that production will decrease. The community as a whole must now set at work to pay its debts, and debt-paying does not mean continuance of a "boom."

There are reasons for hoping that the parallel with the panic episodes of 1893 and 1873, so remarkably close up to the present week, may not be as exact in the longer sequel. The aftermath of those older American panics was three years of genuine hard times on the one occasion and four on the other. But we are not burdened with the bankrupt industrial West of 1893; the West is today considering, not where it will borrow when panic is over, but where it will lend. Nor is the country as a whole the semi-insolvent debtor to Europe which the sequel showed it to be in 1873; we are still very largely in command of the international exchanges; we have paid off our foreign debt, and we have a vast reserve of real resources which Europe, willingly or not, must buy from us. The extent to which these considerations will in the next few years offset the inevitable hardships of forced and prolonged industrial liquidation, is a question soon to meet its test.

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The results of an investigation by Mr. Eckels, of the United States Geological Survey, on the composition of sand lime brick shows that the bricks consist of sand grains held together by a network of hydrous lime silicate and lime hydrate or a mixture of lime and magnesia hydrates.

## Personal

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

Geo. H. Barnhart, of Nelson, B. C., formerly manager of the Ymir mine, is on a visit to Colorado.

R. B. Brinsmade, recently of St. Louis, has been appointed director of the new State Mining School at Platteville, Wisconsin.

L. T. Beecher has been elected secretary and treasurer of the Tennessee Coal, Iron and Railroad Company, with headquarters at Birmingham, Alabama.

S. Mitsui, an electrical engineer of Tokio, Japan, is visiting Montreal in the course of a tour for the study of electrical development in America.

Hamilton Wilson and Patrick J. Dwyer, formerly connected with the Rand mines of South Africa, have completed a three-months' inspection of the Larder Lake district, returning this week to Europe.

H. V. Croll has resigned from the Wellmen-Seaver-Morgan Company, and has accepted a position as consulting engineer with Howell Hinds, of Cleveland, Ohio, Mr. Croll is now at Tuolumne, California.

Albert I. Goodell is manager of the Sullivan company's lead smelter at Marysville, East Kootenay, B C. He retired on Dec. 1, from the management of the Le Roi Mining Company's smelting works at Northport, Wash.

A. C. Gardé, formerly manager of the Payne Mining Company, Sandon, B. C., has been appointed manager of La Plata Mines, Ltd., with silver-lead mine near Nelson, in succession to Capt. T. H. Trethewey, resigned.

Dr. A. P. Low, deputy minister of mines of Canada, who has been in ill-health for some time, has been granted six months' leave of absence. During this time R. W. Brock will be acting director of the Canadian Geological Survey.

R. G. Drinnan, of Fernie, B. C., has resigned as general superintendent for the Crow's Nest Pass Coal Company, to take a similar position with the Pacific Coal Company, which is opening a coal mine near Hosmer, also in the Crow's Nest Pass.

W. A. Cornelius has been made general manager of the National Department of the National Tube Company at McKeesport, Penn., succeeding George C. Crawford, recently appointed president of the Tennessee Coal, Iron and Railroad Company.

George C. Mackenzie, formerly of Brantford, Ont., but now of Nova Scotia, has been commissioned by the Ontario Department of Mines to prepare a report on the iron ores and the iron industry of Ontario, paying special attention to the problem of utilizing the magnetic ores of the eastern and northern sections.

O. E. S. Whiteside, of Blairmore, Alberta, Canada, manager for the West Canadian Collieries, Ltd., has resigned to become manager for the International Coal and Coke Company, Ltd., at Coleman, in the same district. His successor at Blairmore is to be L. Rameau, who lately arrived from France. The change will take place Jan. 1, next.

## Obituary

William Robertson Boggs, Jr., was killed near Topia, Mexico, where he was in charge of a mine, on Dec. 1. Owing to financial stringency he had not been able to pay the miners in his employ promptly. A mob of them met him on the road and stoned him to death. A number of the men have since been arrested. Mr. Boggs was born in Augusta, Ga., March 12, 1857. He graduated from the Virginia Polytechnic Institute in 1877, and afterward studied two years at the Columbia School of Mines in New York. After serving a year as professor of chemistry at Howard College in Alabama, he went to Colorado, where he was metallurgist for the Fryer Hill smelter at Leadville, and afterward for the Grand View smelter at Rico. In 1888 he went to Mexico, as agent, later as manager for the St. Louis & Zacatecas Ore Company. In 1893 he returned to Leadville, as manager of the Harrison reduction works, but two years later went back to Mexico, where he had since remained, in connection with different companies at Catorce, Sultepec, La Maroma and elsewhere, except for a period when he was engaged in Argentina. He had at different times done much work as a consulting engineer, in examining mines and designing reduction works.

## Societies and Technical Schools

*American Institute of Mining Engineers*—The institute will hold its 94th meeting, for the reading and discussion of papers, at New York City, beginning Tuesday evening, Feb. 18, 1908.

*American Ceramic Society*—This society will hold its annual meeting at Columbus, Ohio, Feb. 3-8, 1908. The National Paving Brick Manufacturers' Association will meet at the same time and place.

## Industrial

The Wharton Steel Company was incorporated on Nov. 18 under the laws of New Jersey with $10,000,000 of authorized capital stock, to take over the iron, steel and coke interests in New Jersey and Pennsylvania owned by Joseph Wharton, of Philadelphia. Practically all of the stock will be owned by Mr. Wharton. Par value of shares $100. The property is unmortgaged and unbonded. The following is an authorized statement: The properties to be merged into the new company include 5000 acres of mineral lands owned by Mr. Wharton in Sussex and Morris counties in New Jersey, including the Hibernia mine range, the Hurd and Orchard mine range and the Teabo and Allen mines; the Wharton & Northern railroad; the three furnaces at Wharton, N. J., and one at Phillipsburg, N. J., and concentrating mills, which constitute the largest and most efficient plant of its kind in the East; a large coal tract near Coral, in northwestern Pennsylvania, with its coke ovens; another tract near Smithfield, Penn., and the Rossi iron tract in Northern New York. The officers are: Joseph Wharton, president; J. Bertram Lippincott, vice-president; Harrison S. Morris, treasurer; Henry C. Wenner, secretary, and Edward Kelly, general manager.

## Trade Catalogs

Receipt is acknowledged of the following trade catalogs and circulars:

Risdon Iron Works, San Francisco, Cal. Catalog No. 8. Bryan Roller Quartz Mill. Pp. 44, illustrated, paper, 7x10 in.; 1907.

Chalmers & Williams, Chicago, Ill. Catalog No. 1. Section J. The Rapid Cyanide Filter. Pp. 16. Catalog No. 1. Section K. Chile Mills. Pp. 12. Both illustrated, paper, 7x9 inches.

## Construction News

*Black Hawk, Colorado*—The Fifty Gold Mines Corporation intends to enlarge its mill and to install a desulphurizing plant. O. B. Thompson, Black Hawk, Colo., is manager.

*Gregory District, Colorado*—The lessees of the Hunter No. 266 property are going to install an electric hoisting plant and erect new shaft buildings. Charles Cox, Central City, Colo., is to be manager.

*Clear Creek County, Colorado*—At the Blue Bird mine New York people are interested and they propose the erection of an aërial tramway from the mine to the mill. A. H. Kidney, Nederland, Colo., is manager.

*Apex, Colorado*—The Derby Mining and Milling Company will install a steam plant of machinery. O. S. Storres, Apex, Colo., is manager.

The Evergreen Gold and Copper Mines Company will erect a concentrator with a daily capacity of 60 tons, intending to use rolls, Wilfley tables and frue vanners; the mill to be ready inside of 90 days. W. H. Grayson, Empire building, Denver, Colo., is president and manager. The ores of the property are copper, chiefly bornite.

# 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

*Nov.* 27—The productive gold mines of the State are making rapid clean-ups and shipping their bullion direct to the United States Mint in this city, or to the Selby Smelting Company, getting gold coin in exchange within a few days, so that men can be paid off in coin and other expenses met. So the miners are doing without clearing house certificates for circulating medium. The mint is crowding work, and during 15 days of this month coined $14,500,000, nearly a million a day. It still has the Alaska assay office shipments, which are yet to be coined, and large quantities are constantly coming from the mines of California and Nevada.

A ledge of some richness has been found in an abandoned mine, apparently not worked for 50 years, at Floriston in the eastern portion of Nevada county. As soon as the find was announced a number of people came into the section and 40 or 50 claims have been located. The ore thus far found is of fairly high grade, for the size of the ledges, which are by no means small.

A number of prospectors sent out by San Francisco men, are testing the sands in the Death Valley region, Inyo county. The valley is a basin surrounded by mountains containing minerals and it is supposed that there should be spots where the sands of the basin, would pay for gold mining.

The shareholders of the Mohawk Consolidated Leasing Company, holding a lease on the Mohawk property in Goldfield, Nevada, met this week in this city. A reorganization was effected and notice was given the lessors to that effect. The lease will be held in the name of John A. Hammersmith, and the following board of directors: A. Hockwald, C. W. Rohrhand, Charles C. Schnepfe, William Dwinell, John D. Evans, A. H. Holzheld, William V. Bryan and A. S. Hassell.

Several prominent men of the Diamond Match Company have been for a year prospecting the Snow gravel mine in Nimshew district, east of Stirling City in Butte county, and have recovered the ancient channel. The mine is located in a once-famous mining district, and is near the present Sky High property. The old Snow mine once paid well, but the channel was lost and work ceased. About a year ago prospecting operations were started. Developments on a large scale are now looked forward to as all interested are men of money.

Up in Plumas county, the Jamison mine at Johnsville has declared another dividend; and the Plumas-Eureka at the same place, after being idle for some years, is again ready to start its mill running. News reaches Quincy, in the same county, of another rich strike that has been made in the Angelo Martini claim, now owned by Harry Hafner, of Crescent Mills. This mine lies near the property of W. F. Roedde and Stampfli on Soda creek, about seven miles from Greenville, where rich ore was recently struck in the old Plumas National ledge.

A long pipe-line for the transmission of compressed air has been completed for the company operating and owning the Plumbago mine, north of the Middle Yuba, in Sierra county. The line is 7000 ft. in length and furnishes power for the drills, fire-pumps and the short tramway hoist. The company is operating through a series of four tunnels and is extracting sufficient ore to keep 20 stamps dropping. Recently the company put in a 7000-ft. pole-line, taking electric power from the Yuba to the property.

The California Lime Company has been incorporated in Siskiyou county with A. W. Tennant of Yreka as general manager. The company has 640 acres of land on which are four hills or masses of limestone. The property is situated about three miles from Gazelle, within a short distance of the Southern Pacific tracks. The company is now excavating preparatory to erecting kilns, and will be in actual operation within a short time. This will add one more important industry to Siskiyou county.

### Salt Lake City

*Nov.* 30—The Colorado Mining Company, with properties in the Tintic district, has been made defendant in a suit filed in the Federal court, which involves the adjudication of a claim involving upward of $1,000,000. The plaintiff is Joseph Wilson, one of the incorporators of the original Colorado company in 1898, who claims that none of his holdings were issued to him except 15,000 shares and now he sues for the balance, which the company has refused to issue. The plaintiff wants 233,336 shares, which the complaint alleges is worth $3 a share, or $700,008. For a time the company paid dividends to the amount of $120,000 monthly and is now disbursing them at the rate of $60,000 monthly.

The Ohio Copper Company is pushing work on the construction of its mill in the camp of Bingham, and Thomas Weir, a director, says it will be ready for commission about March 1. It is said officially that the bonds of the company have been underwritten and that available money has been secured to carry out the project as planned. The plant will treat 2000 tons of ore daily.

The Utah Copper Company has seven sections of its Garfield mill in operation and Manager D. C. Jackling says the November production will exceed 3,000,000 lb. of copper.

The Yampa smelter, at Bingham, is going at full blast again, and is shipping its matte to the United States Smelting Company for final disposition. The plant is handling about 700 tons of ore daily.

### Denver

*Nov.* 29—In the case of the Government against the promoters of the Lost Bullion Spanish Mines Company, oral arguments upon the motion for a new trial, based on errors alleged to have been made in the first trial, which resulted in the conviction for fraud of the different persons connected with the company, were concluded on Nov. 28, before Judge Lewis of the Federal Court, and the defendants were given until Dec. 26 to prepare and file a brief in support of their contentions. It will be remembered that during the trial of the case in August, testimony was given by certain officials of the United States Geological Survey to show that the "mine" was only a cave in limestone, containing no ore of commercial value. Since that time, the defendants have shipped to Denver a lot of ore alleged to have been taken from the Lost Bullion Spanish mine, with the returns of which they are to attempt the refutation of the testimony of the Geological Survey officials. The attorneys for the Government make answer to this, however, by saying there is nothing to prove that this ore was mined from the cave, and in any event it is not a commercial product, for the reason that the expense of mining, transportation and treatment exceeds by about 50 per cent. the smelter returns on the same.

Reports from Cripple Creek indicate that the operations of the recently built Wishbone mill, on Spring creek, are successful. This mill is treating by cyanide low-grade ore from the Black Diamond, on Galena hill, north of the town of Cripple Creek.

Harrison & Seaver, the former lessees of the W. P. H. during its palmy days, have taken a lease on a claim on Tender-

foot hill, just east of the Hoosier, and not far distant from the property which made them such handsome returns for their work about three years ago. This is further evidence of the revival of interest now being manifested in the northern portion of the Cripple Creek district.

The Government attorneys in charge of the prosecution of Judge Pereles and associates, of Milwaukee, for alleged coal-land frauds in Routt county, Colorado, have taken steps to appeal the case to the Supreme Court of the United States. The defendants in this case were discharged last week by Judge Sanborn, of the western district of Wisconsin, for lack of sufficient evidence of fraud.

On Tuesday morning, Chas. F. Caswell, associate justice of the Supreme Court of Colorado, died as the result of a brief illness. Judge Caswell came to Colorado in 1881, locating at Grand Junction, where he developed, aside from his law practice, one of the model farms of that district. Four years only of his life were devoted to mining, but, like most of the residents of Colorado, he kept in close touch with that industry.

## Scranton

*Dec. 2*—A number of improvements are being planned by the Delaware & Hudson company in Plymouth. Last May work was suspended in No. 2 shaft for the purpose of making repairs; the shaft has been concreted in the meantime from top to bottom, while the breaker has been thoroughly overhauled. An adit has also been driven to the Susquehanna river for the purpose of supplying water.

New ambulances are being provided by the Reading Coal Company at the collieries included in the system, which are being built from the designs of Dr. G. H. Halberstadt. They are 9 ft. in length by 4 ft. in width. There is a 16-in. panel at the bottom and a 10-in. top panel, with a 3½-in. belt rail. The entire wagon weighs 1200 lb. Four men can be carried on litters, or two men can occupy litters and five men seats at one time. A medicine locker is provided underneath the driver's seat.

John Fahy, of Shamokin, president of the Mine Workers of the Ninth district is a candidate for the office of national secretary-treasurer of the organization, and is opposed by William D. Ryan, of Springfield, secretary-treasurer of the Illinois Mine Workers.

A strike took place at No. 6 colliery of the Pennsylvania Coal Company, the men claiming that they were excessively docked. They returned to work in a few days, after being promised that their grievances would be carefully considered. They also asked that the docking boss be removed, for the reason that he had sought money from men in consideration of being lenient with his work.

The next meeting of the Conciliation Board will be held in Wilkes-Barre on Dec. 9, when the trouble with the miners at the No. 9 colliery of the Pennsylvania Coal Company will be investigated.

Six men were injured by an explosion of gas at No. 5 mine of the Pennsylvania Coal Company at Inkerman. The mine had been idle for three days owing to a strike and after one of the miners had fired a shot in his chamber he was returning with a naked light and set fire to a body of gas.

Abandoned coal workings in Pittston underlying the Central Railroad of New Jersey and the Delaware & Hudson tracks are to be filled in to prevent curving of the surface supporting the tracks. Holes are to be bored from the surface and the workings flushed with culm and water.

## Toronto

*Nov. 28*—The Provincial Government of Saskatchewan, acting on reports submitted by J. J. Davies on the coalfield in the Eagle lake district, has decided to operate the mine for the benefit of the settlers in the district. It proposes to begin development without delay. The deposit is situated 40 or 50 miles from the nearest surveyed line of railway in a country quite destitute of timber.

The Ontario Government has awarded contracts for the building of winter roads from the line of the Temiskaming & Northern Ontario Railroad to the Montreal river. Twenty miles will be built through Bryce and James townships to the river, six miles from Thornloe, through Cane and Barber townships, and seven miles from Charlton, to the Earlton and Outlake road.

Owing to the monetary stringency, the mica factories in the country around Ottawa have closed down. Those in Ottawa, though still running, have considerably reduced their staffs.

The Copper Cliff smelter of the Canadian Copper Company will treat Cobalt ores on terms that are regarded as reasonable by the mine owners. Payment is to be made in two instalments of 45 and 90 days respectively, after sampling the ore, and is based on the official value at New York on the first day of settlement. The purchaser reserves the right to pay in silver bullion delivered at New York in place of cash. The price is fixed on a sliding scale according to the grade of ore, the highest figure being 94 per cent. of the silver contents when the assay shows 4000 oz. or more to the ton, and the lowest, 80 per cent. when the silver is less than 300 oz. Payment will also be made for cobalt at the rate of $30 per ton of ore when it contains 12 per cent. of cobalt and over; $20 per ton for 8, and $10 for 6 per cent. of cobalt; but no payment will be made for a smaller amount of cobalt nor when the nickel content is higher than that of cobalt.

## London

The accounts of Oroville Dredging, Ltd., for the year ended July 31 last, the second year of the company's existence, have just been published. The net profits were $502,362, out of which $350,000 has been distributed as dividend, and $94,774 carried to reserve. This reserve fund now amounts to $250,000. It will be remembered that the policy of the company was to build up a reserve fund of this amount before further increasing the dividend. It is seldom that a mining company knows its future so accurately; with the 12 dredges at work, the land will last 13 years from the present date. The annual report of the manager, W. P. Hammon, has not yet been received

Broken Hill Proprietary Block 10 Company reports a profit of £66,000 for the half year ended Sept. 30. The orebody continues to increase in size at the 1300-ft. level, and is adding rapidly to the ore reserves. Block 14 Company reports a profit of £72,000 for the same period. The ore reserves are given as 202,000 tons sulphide and 10,000 carbonate.

A few weeks ago I referred to the exceellent results obtained at the Zeehan Montana Mine, Tasmania. This week the report of the original parent company, the Mount Zeehan Tasmania Silver Lead Mines, Ltd., for the year ended June 30 has been published. This company has also done very well. About £21,000 net profit has been made, to which must be added £11,287 received as dividend on the company's holding in the Zeehan Montana Company and £1500 received as interest on the company's reserve fund. The company was originally floated in 1889, and during early years went through some vicissitudes, with the result that it is saddled with an onerous charge on the profits in the shape of preference shares. The issued preference shares amount to 41,982, of £1 each. They are entitled to a 20 per cent. dividend, together with half of the profits after this dividend is paid. The remaining half of the profits is divisible as dividend on the 151,140 ordinary shares. This year the preference shares obtain a total dividend at the rate of 47½ per cent., while the ordinary shares receive a dividend of only 7⅓ per cent. During the 18 years' life of the company just £200,000 has been distributed as dividends. Of this amount the preference shares have taken about two-thirds. During the last few years the high prices of lead and silver have accounted for a large part of the profits. Now that the prices are going down, the prospects of the company are not so bright. The mine continues to open up some large bodies of ore at one or two points, but most of this ore is of second grade. Developments are systematically carried out at various levels, and expectations are that other bodies of high-grade ore will be available before long.

# Mining News from All Parts of the World

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

## THE CURRENT HISTORY OF MINING

### Alaska

SHUSHITNA RIVER

A Tacoma despatch reports that a winter rush to the Shushitna river country has been started by the arrival of two miners with a quantity of gold taken out on Valdez creek, a tributary of the Shushitna. A number of men have gone from Valdez and Fairbanks to the new district, which is about 200 miles by the trail from Valdez.

### Arizona

COCHISE COUNTY

*Calumet & Arizona*—The directors on Dec. 2 voted to declare a dividend of $1.50 per share, for the fourth quarter of the year. This compares with $5 for the preceding quarter, and makes a total of $16.50 for the year, against $13 in 1906, and $8.50 in 1907.

### Arkansas

BOONE COUNTY

*Anna*—A two-thirds interest in this mine on Crooked creek, three miles from Harrison, has been purchased by H. P. McAntire and P. H. Stern, of Denver.

MARION COUNTY

*Beatty*—This mine near Yellville in the Dodd City district has been bought by A. B. Whitman and associates, of Chicago, the purchase including the fee of 40 acres and a lease on 164 acres. A 75-ton mill will be erected. The ore averages 64 per cent. metallic zinc. Extensive mine development is planned.

### California

AMADOR COUNTY

*Fremont*—At this mine, near Drytown, a fire started near the foot of the shaft on Nov. 30, and extended rapidly in the timbering. There were 11 men in the mine who were unable to escape. At latest accounts the fire had been nearly extinguished, but it was still impossible to enter the mine. Consequently it is not known whether the men were alive, though it is believed that they have been suffocated.

BUTTE COUNTY

The Nantz ranch, a few miles west of Biggs, in the Sacramento valley, has been leased for dredging purposes to P. Kneirm, of San Francisco.

*Blue Lead*—At this property, near Honcut, considerable development work is being done. The channel will be drained by a tunnel driven in from the Kentuck ranch.

CALAVERAS COUNTY

*Hill Top Mining and Leasing Company*—This Mokelumne Hill company has secured a lease on the Blue Jay and Fisher mines, and will move to them the old Fannie Marie 10-stamp mill, now at Glencoe. C. H. Blake will be manager.

*Kenrose*—On this property, at Whiskey Slide, a large force of men are at work on a six-mile ditch and reservoir.

*Orange Grove*—This deep gravel property, near Whiskey Slide, owned by R. Wise, has been bonded by Oakland men, who will do extensive work upon it.

EL DORADO COUNTY

*Sherman*—This mine, near Placerville, has closed down for the present, though the mill will be kept running for some time to crush the ore on hand.

MARIPOSA COUNTY

*Yosemite Mining Company*—This company is digging a pit for its new dredge on the Henderson land just above the Snelling bridge. L. K. Vaughn is manager.

MODOC COUNTY

*Fort Bidwell Gold Mining Company*—This recently organized company, of which W. R. Hall is president, is building cabins for its men and will start shafts on several of its claims.

NEVADA COUNTY

*Bella Union*—Work has been commenced on the development of this mine. A drain tunnel has been started which is expected to cut the ledge 300 ft. in.

*Lincoln*—On this mine a new hoist is being erected and the shaft will be deepened as soon as this is finished.

*Mountaineer*—The ore taken out of this mine above the drain tunnel is keeping the 10-stamp mill well supplied.

PLACER COUNTY

*Big Giant*—The old tunnel of this mine is being cleared out and re-timbered. The ledge is 14 ft. wide in places.

*Downing*—G. B. Dunning has bonded this mine to parties who have run a 600-ft. tunnel and several prospect tunnels. Good pay has been taken from one channel, but a large back channel is being sought for.

PLUMAS COUNTY

*Southern Eureka*—At this group, south of Greenville, Standard & McGill have struck a shoot of gold-bearing ore. This mine is in the eastern quartz belt of the county.

*Walker*—This gold and copper property, near Beckwith, has been closed down for the present.

SAN BERNARDINO COUNTY

*Von Trigger Gold Mining Company*—This company has struck tungsten ore in one of its group of claims in Signal district, 40 miles northwest of Needles. Three small veins have been encountered.

SIERRA COUNTY

*Cleveland*—After a test run on ore from this mine at Sierra City, Nevada men have bought the property and are putting the machinery in order.

*Telegraph*—A new shaft is to be started at this mine, near Downieville; machine drills and a compressor are being added to the equipment.

TRINITY COUNTY

*Bonanza-King*—Another rich pocket has been found in this mine at Trinity Center.

*Brown Bear*—Leas & Paulson, leasers of the property at Deadwood, have struck $100 rock between the China and Watt tunnels.

TUOLUMNE COUNTY

*Jumper Gold Syndicate*—At this property, Stent, underground work will shortly be started again. When the company is reorganized new machinery will be added and the plant generally improved.

YUBA COUNTY

*Bessie*—At this property, Browns Valley, the shaft is down 200 ft. and drifting will now commence.

### Colorado

LAKE COUNTY—LEADVILLE

*Greenback*—The closing down of the Bingham smelter in Utah has been the means of stopping work in this property. When this mine was sold to a Utah syndicate early in the fall arrangements were made with this smelter to handle the output, about 500 tons daily.

*Hibschle Shaft*—At this shaft, East Seventh street, the new orebody to the southeast of the Elk fault becomes wider and more in place. Manager Covey is now shipping 50 tons daily of first-class ore, and development work is being pushed.

*Mammoth*—This property, Big Evans gulch, was closed down during the week. It is understood that the Wellington Leasing Company operating the property will resume operations at an early date. Unfortunately for those connected with the enterprise the shaft seemingly was sunk to the north of the fault and when it reached the mineral there was so much dolomite sand to contend with that sinking was an expensive item; when the shaft reached 600-ft. there was little or no let-up to the flow of the sand and it has continued during the developing of the property. To handle the water under such circumstances was a heavy handicap so the leasing company decided to abandon the shaft. It is at present being bulkheaded and the pumps are being pulled. Within the next 30 days the company will start a new shaft several hundred feet to the east and this time sink in the fault, so that the shaft will be in solid formation. The shaft will be sunk to 700 ft. depth.

*Ontario*—This company, operating the Iler group of claims on Mt. Elbert, near Twin Lakes, during the week opened a good body of ore in the Laseter tunnel. This tunnel is now in 200 ft., and has gained in depth foot for foot driven. At this point a vein about 3 ft. wide was opened that carries gold, silver and lead.

*Rock Hill*—Development work in this section is meeting with success in several properties. At the Bessie Wilgus a vein of fair ore has been opened in one of the lower levels and is being followed, the management being of the opinion that it will lead to the main orebody to the south. The drift that was run from the lower level of the Reindeer to the Coon Valley, has just tapped the orebody in the latter claim. At the Alhambra shaft prospecting recently has been carried on by upraises from the levels to the south, and a few days ago a good body of pay ore was caught in one of them. Sufficient work has not been done yet to determine the extent of the discovery. La Plata is shipping a good grade of hard carbonate ore and some excellent iron is being sent out from the Dome and Stone shafts. Sinking still continues at the Delaware. The Crecentia is shipping 30 tons daily of iron and lead ore.

*Swisher Tunnel*—This tunnel, at the north end of Sugar Loaf, is now in over 1000 ft. During the week the vein widened to 5 ft. carrying good values in silver. During the month several carloads of ore were shipped.

*Yak Tunnel*—This property, has still a large force of men at work and sending out about 10,000 tons of mineral per month. A heavy tonnage of zinc goes to the American Extracting Company's mills. The company is carrying on considerable development work from its numerous laterals.

## Idaho

BINGHAM COUNTY

*Robinson*—This mine, on Mount Pisgah, has been sold to New England parties, who intend to consolidate it with adjoining properties.

BLAINE COUNTY

*Idaho Consolidated*—Manager Rockwell has let the contract to build and equip a plant to generate electricity to supply power and light to his mines. The work on the dam has been begun. It is across Wood river, one mile south of Hailey. The electric machinery has been ordered.

SHOSHONE COUNTY

*Hecla*—This company, at Burke, has declared its regular monthly dividend of 2c. per share, amounting to $20,000. The total paid by the company to date is $1,460,000, of which $460,000 have been declared this year. This last makes the 53d dividend declared.

*Morning Mine*—The Federal Mining and Smelting Company has closed this mine at Mullan. The suspension is supposed to be only temporary and for the purpose of curtailing the lead output pending uncertain market conditions. The Morning has been shipping 3500 tons of concentrates per month.

## Indiana

GREENE COUNTY

Five mines in the Linton field have now been connected by underground channels. It is now possible for a miner to enter the Summit mine, two miles northwest of Linton, and go to the Island City mine two miles southeast of the city, without coming to the surface. Summit breaks into Glenburn, Glenburn into Vandalia No. 5, the latter into Benton and Benton into South Linton, and South Linton into the Island City mine. The distance is eight miles. The work of making these connections required skilful engineering, the removel of millions of tons of coal and the expenditure of several million dollars; but it has resulted in making Linton the greatest coal-producing field in the State.

## Michigan

COPPER

*Calumet & Hecla*—The directors on Dec. 2 voted to make the dividend for the last quarter of the year $10, which compares with $15 for the third quarter and $20 each for the first and second. This makes a total of $65 per share paid in 1907, against $70 in 1906, $50 in 1905, and $40 in 1904.

*La Salle*—The No. 1 shaft, on the Tecumseh property, is down nearly 1400 ft. and is bottomed in good stamp rock and small mass copper. A new hoisting engine has been installed which is capable of hoisting from a depth of 2000 ft. As a result of this additional hoisting facility 3-ton skips will be installed. No. 2 shaft has been abanded, but it is likely that a new site will be located and the second shaft started. A new 15-drill air compressor has gone into commission.

*Ojibway*—The ledge in the new No. 1 shaft of this property has been reached after passing through about 25 ft. of overburden. No. 2 shaft is down about 150 ft. and is being sunk on the angle of formation.

*Osceola*—The new combined machine and blacksmith shop that this company is erecting is nearly completed. All the tools are to be driven electrically. The power will be furnished by the company's new electric plant, which went into commission a short time ago. This plant consists of a 220-volt, direct connected, 100-kw. generator delivering direct current. Underground operations are confined to No. 5 shaft only, the company having but 14 drills in operation. A force of men is at work in No. 6 shaft putting the skip road in line from the 43rd level to the surface.

## Missouri

JOPLIN DISTRICT

Many of the mines have reopened and are running at a reduced wage scale. In many cases the reduction was proposed by the miners.

*J. P. Newell Mining Company*—This new corporation with a capital of $48,000 has been organized to work at Porto Rico on a 10-acre lease acquired from the American Zinc, Lead and Smelting Company. A 170-ft. shaft has been sunk, cutting a 14-ft. face of sheet ore. A 250-ton mill is to be erected.

*Gerke Mining Company*—A contract for a 200-ton mill for this company's mine on the Continental ground west of Joplin has been awarded to H. O. Neff.

*Old Apple Tree*—Selden and McLaughlin of the copper county of Michigan struck 76 ft. of desseminated zinc and lead ore in two drills. The ore begins at 222 ft. and continues to 298 ft. A 45-deg. slope has been driven to the orebody and 100 ft. of prospect drifts have been driven. A mill run shows the dirt to average 12.5 per cent. ore. Several of the 11 acres of the lease are underlain by this 76-ft. ore face and as soon as the orebody is blocked out sufficiently it is proposed to erect a 500-ton mill.

## Nevada

ESMERALDA COUNTY—GOLDFIELD

*Ore Production*—The production of the Goldfield district for the week ended Nov. 23 is reported as follows: Shipped to smelters, 2415 tons; to Western Ore Purchasing Company, 2364; to Nevada Goldfield Reduction Works, 302; Com-

bination mill, 595; Kinkead mill, 125; total, 5801 tons, of $674,200 estimated value.

NYE COUNTY—BULLFROG

*Amethyst Extension*—Operations have been resumed on this property, which adjoins the Amethyst on the north, and is close to the Shoshone. A large amount of surface prospecting will be carried out, with the view of locating the Shoshone vein before a new main shaft is started.

*Central*—This mine has added another shift to its working force, and is vigorously pushing the crosscut from the 200-ft. level. The property is situated near the Homestake.

*Gibraltar*—Several portions of this property are being operated by lessees with satisfactory results. A shipment of high-grade ore is ready to go forward to the smelters.

*Shoshone*—The new mill continues to work satisfactorily. Owing to the various rumors as to the results of the first clean-up, the company has issued a preliminary report. The official figures covering the mill run during the last week in October and the first two weeks in November are as follows: Treated at the mill, 800 tons, estimated value, $20,000; raw ores shipped to Salt Lake, 175 tons, estimated value, $17,500; concentrates shipped to Salt Lake, 50 tons, estimated value, $15,000; two gold bricks, shipped to San Francisco mint, $15,000; gross output, 7 days, $67,000; actual output for week, less concentrates and bullion, was $37,500; estimated output for first 15 days in November, $75,000; treated daily, with two shifts working, about 150 tons.

*Tramps Consolidated*—The winze from Tunnel No. 4 Consolidated is now 250 ft. below this level, aggregating 550 ft. in vertical openings from the upper workings. The winze will be continued to the 300-ft. level below No. 4, and when this is reached a crosscut will be started for the vein. This is among the deepest workings in the district. In addition to the sinking, a drift is being carried on the vein from the 200-ft. level.

NYE COUNTY—MANHATTAN

*American Flag*—The shaft is down to the 50-ft. level, and driving is progressing in both directions on a strong vein carrying good values in gold and silver with the latter metal preponderating.

*Emerald*—A large amount of surface prospecting work is being done and several promising gold-bearing veins have been discovered. The company has under advisement a plan for developing this property on an extensive scale at depth.

*Thanksgiving*—Thanksgiving day was celebrated in this property by the discovery of one of the richest bonanzas yet opened on the Manhattan field. Ore containing many specimens thickly studded with gold is being sacked for shipment. Some magnificent gold specimens have been despatched to the company's office in Tonopah for exhibition. This orebody, while small at present, promises to develop well.

NYE COUNTY—TONOPAH

*Ore Shipments*—Ore shipments over the Tonopah & Goldfield Railroad for the week ended Nov. 23 were: Tonopah Company, 1112 tons; Tonopah Extension, 87; Belmont, 154; Jim Butler, 68; Midway, 211; West End, 57; total, 1689 tons. Shipments to district mills were: Tonopah Company, 2728; Belmont, 1180; Montana Tonopah, 1100; total, 5008 tons.

*Atwood*—Everett and party, who have been developing mines in the Atwood district for the past six years, report the discovery of a deposit of tungsten in one of their mining leases. Some of the specimens of the ore now being exhibited in Tonopah average 62 per cent. of tungsten.

*Hannapah*—The mines of this company, controlled by Samuel Newhouse, have been closed on account of the monetary stringency. The mines have been under development during the past five years. The lower workings are showing good ore and look better than at any previous period.

*Nevada-Alpine*—The new ore-shoot in the lower workings continues to develop well and promises to become a large body. A shipment amounting to over six tons of high-grade ore broken during the week has been despatched to the smelters.

*Tonopah Extension*—Rapid advance is being made in driving the north crosscut on the 1050-ft. level. The face of the crosscut is now in the lode porphyry, or lower andesite, which is cut by numerous quartz stringers which carry satisfactory values. The west drift in the 600-ft. level, on which work was recently resumed, is out 600 ft. from the shaft, at which point the ledge shows a width of 10 ft. and carries good shipping values.

*West End Consolidated*—The new station in the main shaft at the 320-ft. level has been completed, and the new cage has been installed. Sinking operations can now proceed uninterruptedly. Connection has been established between the shaft and the 275-ft. level, with a consequent improvement in ventilation. Mining operations are confined to opening out stopes at the 400-ft. level, and to breaking stripping ore in the old workings. About 60 tons of ore are being shipped weekly.

## New Mexico

LINCOLN COUNTY

At White Oaks, 12 miles from Carrizozo, on the El Paso & Southwestern Railroad, both the North and South Homestake mines are active. Both mines show good ore in their bottom workings. The Old Abe, the biggest mine of the camp, with a record of over $1,000,000 in gold and a depth of 1400 ft., is still idle.

*Nogal*—In this district south of White Oaks, the Vera Cruz mine will soon start its mill to utilize its newly developed ore-body. At the Eagle mine, near Parsons, the Mines Management Syndicate, of El Paso, has started its new 200-ton cyanide mill and should have no diffculty in keeping it running from the newly discovered vein of $7 ore, which is 6 ft. thick.

RIO ARRIBA COUNTY

The new leaching mill of the Tusas Peak Company will not be started till copper prices improve. The Santa Fe tunnel has been stopped for the winter, but drifting in the Tampa mine will be continued, as will also be the case in the H. S. P. mine of the Empire Mining and Smelting Company.

SOCORRO COUNTY

*Mogollon District*—The daily capacity of the Ernestine Mining Company's mill is being increased to 100 tons and a contract for 500 ft. of exploration work in the mine has recently been let. The management of the Little Fannie has raised a large sum of money and expects to complete its mill and to have it running within the next year.

OTERO COUNTY

*Jarilla District*—At the Copper Hill, a crosscut has been started in the shaft, from the 100-ft. level, to strike at depth the copper vein. M. H. Dirks, the company's president, recently purchased the High Five ground to the east of the Copper Hill and also the Red Hill group, north of the Cuprite mine. Fred Leiser-ing and partners have been sinking a shaft on a 4-ft. vein of copper-silver ore, which they have on their Little Pearl claim.

## Pennsylvania

BITUMINOUS COAL

*Naomi*—In this coal mine at Fayette City an explosion occurred on the night of Dec. 1. It affected the main gangways, bringing down the timbering and blocking the passageways by falls of roof and coal. There were 60 men in the mine at the time, and it is believed that they are all dead, although it has not yet been possible to enter the mine. It is supposed that the explosion was caused by a man carrying a naked light into some of the old workings, where a quantity of gas had accumulated.

## South Carolina

GREENVILLE COUNTY

Gold has been found on the Wham property, near Fountain Inn. The indications are sufficiently promising to warrant further development.

YORK COUNTY

*Clawson*—Work on this old gold mine was recently begun by W. D. Turner, who has opened up a new vein carrying free gold.

## South Dakota

CUSTER COUNTY

*Westinghouse*—Although in the hands of a receiver, work is going on in the mica mines and factory at Custer as fast as help can be secured. New machinery has been installed in the factory and the mine will be further taxed to add to the supply of raw material.

*Globe Group*—Machinery for the operation of the mine has been purchased and work will be resumed as soon as the drills are installed. The property lies eight miles northwest of Custer.

LAWRENCE COUNTY

*Nahant*—George M. Johnson has encountered a good looking body of copper in his gold property south of here. He has been sinking a shaft and ran into a pyritic body at a shallow depth. It is in the copper belt of the hills.

*Gold Queen*—At a point 116 ft. in from the shaft, a quartz ledge with gold running about $7 was found and is being developed.

*Kicking Horse*—The new milling plant is nearly ready for machinery. Work of laying two miles of pipes from the mill to the cyanide re-treatment plant has commenced.

*Lucky Strike*—It is proposed to start the new 30-stamp mill on Box Elder creek by Jan. 1. A new 10-drill air compressor has been installed.

*Mogul*—The new electric hoist at the Mogul shaft of the Mogul Mining Company is in commission.

*Branch Mint*—The 800-ton mill is finally started and so far is running as well as a new mill could. There are 120 stamps, about 60 of which are now in operation and the rest will go into commission some time this winter. The property includes 1800 acres, formerly owned by the Union Hill Company. James D. Hardin, of Deadwood, the manager, and New York City capitalists are the present owners.

*Imperial*—The shaft on the Gunnison claim is now down over 400 ft. and sinking at the rate of 50 ft. a month. There is about 35 ft. more of porphyry to be penetrated before quartzite will be encountered some time next month, when the lower orebodies will be developed. At the end of the present month mill operations will be shifted from the Imperial to the Dakota mill and the former will undergo extensive and modern improvements before spring. The Dakota mill can be operated more economically at present.

PENNINGTON COUNTY

*Continental Copper Company*—A diamond drill has been started on the Dakota-Calumet and extensive exploiting of the lower workings will commence at once. The drill was started from the 500-ft. level, where a new station was cut.

*O. K.*—Klein & Burton have resumed work on the property, attempting to crosscut the ledge in a tunnel now in over 100 ft. Free milling gold values run high.

*Lena*—Superintendent Arundel is preparing to start up the mill. Extensive repairs to both mine and mill have been made and the force of miners is being increased.

*Mayflower*—Hayes Bros. & Hopkins have started active development. Gold ore averaging $4.50 per ton shows on several of the 10 claims, part of which are in the copper belt and show signs of copper at greater depth.

## Wisconsin

ZINC-LEAD DISTRICT

*Meekers Grove*—This company has begun milling with a two-jig 75-ton concentrator. It has been decided to run for a month at least and if the ore market does not improve by that time, mine and mill will be closed down until spring.

*Kohinoor*—This company has recently uncovered several sheets of solid lead and jack which measure from 3 to 6 in. in thickness.

*Pine Tree*—The jigs have been bedded at the two-jig, 100-ton mill. Joseph Winter, Randall P. Bronson and other capitalists of Ishpeming and Negaunee, Mich., are among the principal owners.

*Vinegar Hill*—This company's 100-ton mill has been put into commission, recovering a product which tested 53.50 per cent. metallic zinc.

## Canada

ONTARIO—COBALT DISTRICT

*Ore Shipments*—Shipments of ore for the week ending Nov. 23 established a new record as follows: La Rose, 994,545 lb.; Temiskaming, 63,000 lb.; total, 1,057,545 lb. The La Rose shipment, the largest that ever left the camp, was consigned to the Denver smelters.

*Cobalt Contact*—George Leyson, formerly superintendent of the Silver Queen, has taken charge as manager.

*Little Nipissing*—The annual meeting of bondholders was held on Nov. 27. Manager Madden reported that seven new veins had been opened, one being of calcite 5 ft. wide which had been stripped for 500 ft. It was proposed to work it by a drift in the hillside. Another strong lead of calcite 18 in. wide was showing near the McKinley-Darragh property.

*McKinley-Darragh*—The financial statement of the company to Nov. 1, shows total receipts of $289,386, of which $127,081 was from the sale of ore, beside $125,000 the estimated value of ore not yet paid for. The cash in hand amounted to $53,536.

*Silver Leaf*—The shaft is down 28 ft., at which depth the vein is 6 in. wide and rich in native silver. A quantity of high-grade ore is being taken out.

*Silver Queen*—The management has reduced the staff to 18 men for the winter and has cut wages to $3 per day for machine men and $1.75 for surface men.

## Mexico

CHIHUAHUA

*Justicia y Anexas*—It is reported that these mines including the Francisco Diaz, adjoining the Hathaway, have been sold to Ross D. McCausland and E. N. Funston, who have lately begun work on the properties and have ordered machinery. Operations will be carried on in the name of the Chihuahua Copper Company, incorporated in Arizona.

GUANAJUATO

*El Cubo*—The pumping capacity at this mine and at the Tajo de Dolores was recently increased giving access to lower levels than hitherto explored by the present owners. Good ore was found in quantity in both mines. Other workings at still greater depths remain to be unwatered and explored.

## Australia

NEW SOUTH WALES

The strike started in the Newcastle district has become general. Nearly all the miners are out, and the coal mines are practically all idle. The dispute turns upon the question of wages, which have been for a number of years on a sliding scale, based on the selling price of coal. The men claim that the operators have accepted an unreasonably low price on export coal, thereby reducing wages below a reasonable point, and below the minimum contemplated when the present scale was arranged.

## New Zealand

Exports of gold for August and the eight months ended Aug. 31 are reported by the Mines Department as follows, in ounces of bullion:

| | 1906. | 1907. | Changes. |
|---|---|---|---|
| August | 41,660 | 50,951 | I. 9,291 |
| Eight months | 370,369 | 330,787 | D. 39,582 |

The bullion reported this year was equal to 311,398 oz. fine gold, or $6,436,590. Exports of silver were as follows, in ounces:

| | 1906. | 1907. | Changes. |
|---|---|---|---|
| August | 186,735 | 152,478 | D. 34,257 |
| Eight months | 916,511 | 1,045,923 | I. 129,411 |

The greater part of the silver comes from the gold mines of the Hauraki district.

# 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, Dec.* 4—The coal trade in the West is in good condition in some respects. Car supply is better than it has been at this season for several years, and shipments from mines are moving freely almost everywhere. There are signs of a decreased demand for steam coal, but this has not yet seriously affected the markets. There has been a little trouble in some quarters on account of payment of labor in checks, but this will pass over as currency becomes more plentiful.

The Eastern bituminous trade shows little change, beyond a falling off in the coastwise trade, which is usual at this season. A notable feature is that the talk among the miners of an increase in wages has ceased. The men realize apparently that conditions just now point the other way, and that they will be doing well to hold the present schedules.

The chief incident in the anthracite trade has been the withdrawal by the New York, New Haven & Hartford of through rates on traffic by way of the New York harbor ports. The intention is to promote shipments of anthracite by the Poughkeepsie bridge line. The New Haven road has periodical trouble at its New York terminals, and is almost always at odds with its connecting lines. New England consumers suffer, but they are at the mercy of the company.

#### Coal Traffic Notes

Coastwise coal shipments from the principal Atlantic ports for the nine months ended Sept. 30 are reported by the Bureau of Statistics as follows:

| | Anthracite. | Bituminous. | Total. |
|---|---|---|---|
| New York..... | 12,225,530 | 8,667,504 | 20,893,034 |
| Philadelphia... | 1,760,249 | 3,726,818 | 5,487,067 |
| Baltimore..... | 181,647 | 2,791,011 | 2,972,658 |
| Newport News.. | ..... | 1,789,477 | 1,789,477 |
| Norfolk ..... | ..... | 1,259,386 | 1,259,386 |
| Total..... | 14,167,426 | 18,234,196 | 32,401,622 |
| Total, 1906.... | 11,302,735 | 16,696,867 | 27,999,602 |

The total increase this year was 4,402,020 tons, or 15.7 per cent. The proportion shipped from the different ports was: New York, 64.5; Philadelphia, 16.9; Baltimore, 9.2; Newport News, 5.5; Norfolk, 3.9 per cent. New York includes all the New York harbor shipping ports.

Shipments of coal and coke originating on the Pennsylvania Railroad Company's lines east of Pittsburg for the year to Nov. 23 were as follows, in short tons:

| | 1906. | 1907. | Changes. |
|---|---|---|---|
| Anthracite..... | 4,056,818 | 5,049,291 | I. 992,473 |
| Bituminous..... | 28,933,391 | 35,497,082 | I. 6,563,691 |
| Coke..... .... | 11,407,067 | 12,402,440 | I. 995,373 |
| Total..... | 44,397,276 | 52,948,813 | I. 8,551,537 |

The total increase this year to date has been 19.3 per cent.

Coal tonnage originating on the lines of the Southern Railway for the nine months ended Sept. 30 was: Tennessee district, 1,284,182; Alabama district, 1,602,820; total, 2,887,002 short tons.

### New York

#### Anthracite

*Dec.* 4—The anthracite market shows considerable slackening in the volume of business, especially in prepared sizes. Among these egg is again flat and the others are none too active. Pea coal is scarce and so are buckwheat Nos. 1 and 2, but all of these are in better supply than they were a week or 10 days ago. Prices are quoted as follows: Broken, $4.50@4.75; egg, stove and chestnut, $5; pea, $3.25@3.50; buckwheat No. 1, $2.75@3; buckwheat No. 2 or rice, $2.15@2.25; barley, $1.75; all f.o.b. New York harbor.

#### Bituminous

The soft-coal business shows a falling off all along the line. Heretofore, only the poorer grades of coal felt the depression, but now the better grades are also in smaller demand. However, there are sufficient orders for the better grades to carry business for at least two months. In New York harbor business is especially dull and fair grades of steam coal can be purchased as low as $2.50, while the best grades bring $2.60@2.70.

Trade in the far East continues quite active, but the demand is less and shippers seem to be catching up with their order-books. Ocean freights are still high but there is every indication that these will be reduced, especially on light-draft vessels which have been closing business at $1.50@1.75 per ton. Trade along the Sound is fairly active. Transportation from mines to tide is rather slow, but car supply seems to be quite good. There is quite a good demand for coal in the all-rail trade.

Both large and small vessels in the coastwise trade are in better supply, and there is every indication that lower freight rates should soon prevail. Current rates of freight are quoted as follows: From Philadelphia to Boston, Salem and Portland, $1; to Lynn and Newburyport, $1.25; to Portsmouth, $1.05; to the Sound, 85c. per ton.

### Birmingham

*Dec.* 2—The curtailment of the coal production in Alabama has not as yet amounted to much. The demand for coal, except at coke ovens and furnaces, continues brisk and while collections are not what they should be, the coal operators appear to be satisfied with conditions. There has been no general reduction in quotations. No orders have been received by the operators recently, but old orders yet stand which will require a steady operation of mines. The receivers of the Southern Steel Company have shut down the Virginia City and Graves mines and one or two other places are either closed, completely or running on slack time. This is practically the total of the curtailment in this district.

### Chicago

*Dec.* 2—The coal market is not yet strong, but there is a better feeling and the coming of freezing weather has increased the demand for the leading grades. Many large consumers are buying only for immediate needs. Supplies for this market are generally lessened, so prices are but slightly lower.

Illinois and Indiana operators have curtailed production, and the amount sent to this market has been lessened so that demurrage charges are no longer the formidable feature of the trade. Lump and egg bring $2.15@3, run-of-mine $1.75@2 for most of the coal sold and screenings remain at $1.15@1.40. The demand for prepared sizes is increasing, though fine coals hold their own because of their low price and the lack of severely cold weather.

Prices remain about the same on Eastern coals, as last week, with indications that the market will be steadier though not strong. The present conditions turn many users of coal, not under contracts, to lower-priced Western grades. Anthracite sells well, with the demand for nut in advance of supplies.

### Cleveland

*Dec.* 3—Coal dealers reported a slightly softer condition of the market. The closing of navigation is nigh, and, with the exception of a few wild cargoes, it is not figured that more coal will be shipped up lake. No. 8 district coals are quoted on about last week's prices. Slack brings 65

@70c.; mine-run $1.10@1.20, and ¾-in. $1.20@1.25. Hard coals, in the Cleveland market, are reported in good demand.

Considerable weakness is noted in coke, which has sagged from $3.50 to $3.25 and $2.75 for foundry grades. Furnace coke is also weak.

### Indianapolis

*Dec. 2*—The coal trade during the past week was unusually active, due in part to a probable advance in price Dec. 1. The output at the mines was less than the preceding week, as miners in several fields refused to work because they were paid partly in clearing-house checks. This condition, however, is not expected to last long and the mines will soon be working to full capacity. The operators and railroads are anxious to do their best to get coal forward. The car situation is showing a decided improvement, except on the Southern Indiana road, but an improvement is expected on this line since the court has issued an order compelling the company to conform to the rules for car distribution promulgated by the Indiana Railroad Commission. Some of the independent mines that were not operated more than two or three days in the week because of lack of cars, lost nearly all their miners, who went to favored mines; and now that they can secure plenty of cars they cannot get a full quota of men. Because of this discrimination and loss of miners they threaten suit against the Southern Indiana railroad for damages.

### Pittsburg

*Dec. 3*—There has been a decided slump in the coal trade and the large producers issued a new schedule of prices effective Dec. 2. The maximum prices are as follows: Mine-run, $1.30; ¾-in., $1.40; 1¼-in., $1.50; slack, 50c., all f.o.b. mine. These prices are being shaded considerably and for slack almost any price is accepted. There is an ample supply of railroad cars, but the mines are not being operated to capacity, owing to the heavy decrease in demand,. The river mines continue in full operation and likely will be operated steadily all month, as there is a good supply of empty coal boats and barges in the pools and harbor.

*Connellsville Coke*—There is absolutely no market for coke, and it is not possible to quote prices with any degree of accuracy. Standard Connellsville furnace coke has been offered as low as $1.75, and it is believed producers would be willing to make contracts for delivery next year at $2. Foundry coke is quoted at $2.25@2.75, although one large producer reports that he has sold some of a high grade at $3 a ton. The H. C. Frick Coke Company has about 12,000 ovens on the idle list this week. The *Courier*, in its summary for a week ago gives the production in both fields at 207,154 tons. The shipments for the week amounted to 7,956 cars distributed as follows: To Pittsburg, 2967 cars; to points west of Connellsville, 4418 cars; to points east of Connellsville, 571 cars.

## Foreign Coal Trade

Coal shipments from Nova Scotia mines for the 10 months ended Oct. 31 are reported as follows, in long tons:

| | 1906. | 1907. | Changes. |
|---|---|---|---|
| Dominion Coal Co.. | 2,710,757 | 2,763,603 | I. 52,846 |
| N. S. Steel | 518,750 | 543,726 | I. 24,976 |
| Acadia | 262,230 | 219,398 | D. 42,832 |
| Intercolonial | 222,547 | 236,464 | I. 13,917 |
| Inverness | 198,874 | 167,522 | D. 31,352 |
| Total | 3,913,158 | 3,930,713 | I. 17,555 |

Shipments were very nearly the same in both years, the total increase being only 0.4 per cent.

The foreign coal trade of France for the nine months ended Sept. 30 is reported as follows, in metric tons:

| Imports: | 1906. | 1907. | Changes |
|---|---|---|---|
| Coal | 10,587,120 | 11,005,190 | I. 418,070 |
| Coke | 1,694,180 | 1,564,740 | D. 129,440 |
| Briquets | 406,170 | 491,040 | I. 84,870 |
| Total | 12,687,470 | 13,060,970 | I. 373,500 |
| Exports: | | | |
| Coal | 1,002,260 | 870,010 | D. 132,250 |
| Coke | 124,750 | 114,300 | D. 10,450 |
| Briquets | 96,350 | 83,280 | D. 13,070 |
| Total | 1,223,360 | 1,067,590 | D. 155,770 |

The exports this year included 80,520 tons of coal and 56,570 tons of briquets bunkered, or furnished to steamships engaged in foreign trade; a total of 137,090 tons, 115,620 furnished to French vessels and 21,470 to foreign steamers.

Imports and exports of fuel in Belgium for the 10 months ended Oct. 31 were, in metric tons:

| Imports: | 1906. | 1907. | Changes. |
|---|---|---|---|
| Coal | 4,426,454 | 4,400,677 | D. 25,777 |
| Coke | 293,317 | 300,893 | I. 7,576 |
| Briquets | 110,191 | 123,372 | I. 13,181 |
| Total | 4,829,962 | 4,824,942 | D. 5,020 |
| Exports: | | | |
| Coal | 4,210,105 | 3,942,510 | D. 267,595 |
| Coke | 713,139 | 713,847 | I. 708 |
| Briquets | 386,575 | 355,104 | D. 31,471 |
| Total | 5,309,819 | 5,011,461 | D. 298,358 |

The total exports exceeded the imports by 479,857 tons in 1906, and by 186,519 tons this year.

## Iron Trade Review

*New York, Dec. 4*—The iron and steel markets continue under the effect of the financial stringency, and business is not coming forward. In pig iron the only sales are of small quantities needed to make up deficiencies. In finished material there have been some contracts placed for structural steel, but they were for bridge and building work already in progress, which must be completed. No orders for steel rails are reported, the railroads still holding back until differences with the makers are adjusted.

An important meeting was held in New York last week, at which all the leading iron and steel companies were represented. It was informal, and no organization was attempted, but the general opinion was expressed that demoralization, harmful to all, must follow any efforts to capture an undue share of business or an invasion of a rival's territory. It was the unanimous opinion of all present that the underlying conditions are sound, and that the recession which the industry is now experiencing will not be long continued. The point was made that stability of prices is the greatest consideration, from the standpoint of the permanent interests of the producer, and that buyers generally approve it, when they have the assurance that others do not have advantages over them. It was voted to appoint the following committee of five: Judge E. H. Gary, W. E. Corey, president of the United States Corporation; Powell Stackhouse, president of the Cambria Steel Company; E. C. Felton, president of the Pennsylvania Steel Company, and Willis L. King, vice-president of the Jones & Laughlin Steel Company. This committee has power to add to its number and to appoint subcommittees. To this committee everyone interested in the trade may at any time appeal for advice. Through it the trade will coöperate for the best of the industry, and conciliate any differences arising.

### Baltimore

*Dec. 4*—Imports for the week included 300 tons of ferromanganese and 120 tons of silicon-spiegel. Arrivals of iron ore were 14,450 tons, from Cuba.

### Birmingham

*Dec. 2*—The plan of curtailment is well in effect in pig-iron production in the Birmingham district. This week the Sheffield Cast Iron Pipe and Foundry Company closed down its large plant at Sheffield. On the other hand, the cast-iron pipe plants at Bessemer and North Birmingham continue in active operation. It is hardly believed that there will be any further curtailment of production. Operations at many of the ore and coal mines continue and bins at the furnaces are being filled. The receivers of the Southern Steel Company are keeping the steel plant at Gadsden and the steel rod, wire and nail mills at Ensley in full blast.

More labor is being put at work on the construction of the new open-hearth furnaces and new steel plant at Ensley. There is a fairly good demand for steel.

### Chicago

*Dec. 2*—The market for pig iron continues dull, though a few melters are figuring on first-half supplies, instead of buying only for the needs of the next two or three weeks. A feeling of returning confidence in growing. With the production of iron curtailed, there seems no probability of a falling of the prices of pig iron

below the present prices—$15@16 Birmingham on Southern No. 2 ($19.35@20.35 Chicago) and $20@21 on Northern No. 2 coke.

It is apparent in the local market that a reaction from the period of large demand at high prices is in full swing. The melter, to all appearances, will be cautious about re-opening his foundry or increasing his output, for a long time to come. Meantime there appears no anxiety on the part of furnace agents to force sales. It is recognized on both sides that the waiting period must be allowed to run its course.

Coke is in small demand but supplies are also small and the nominal price of $5.90 is still quoted on the best Connellsville.

## Cleveland

*Dec.* 3—With good weather conditions prevailing at the mines during November and the fact that shipping on the Great Lakes has not as yet been seriously retarded, it is probable that the regular run of business will continue well into the middle of December. The Steel Corporation boats are not expected to be laid up until that time. Storage capacity has been reached at the docks here, though the ore continues to pile up.

*Pig Iron*—The market is as near dead as it has ever been in this locality. The large local concerns are cutting production. The Valley furnaces are all running light and a general effort is being made on the part of producers to cut production to a point where it will meet demand. Spot and No. 2 furnace are the most active. The following prices are quoted for this month: Bessemer, $20.90; No. 1 foundry, $20@20.50; No. 2, $19.50@20; No. 3, $19@19.50; No. 2 Southern, $19.35@19.85; gray forge, $19@19.25 per ton.

## Philadelphia

*Dec.* 4—The trade has been treated to an agreeable surprise within the last few days by unexpected purchases of pig iron of special brands from customers who have secured unexpected orders and who bought just enough to see them through. Apart from this, there has been no notable change in the situation. A few lots of foundry iron have been asked for. The inquiries for basic iron denote some interest in that product, but no orders have been placed. Quotations at present might as well be omitted as they signify very little.

*Steel Billets*—Very few steel billets are selling and there is no prospect for much business for some time. The quoted price is $28. Forging billets are very low in stock, and some business is promised next week.

*Bars*—Bar iron is rather dull excepting in a retail way. As the bulk of our business is in small lots, there is no particular shading in prices.

*Sheets*—Small lots are selling all the time and there are inquiries for large quantities for delivery during the first quarter of the year.

*Merchant Steel*—There is a steady absorption of merchant steel out of stock.

*Pipes and Tubes*—Both pipes and tubes are stronger this week, though neither higher nor lower in price.

*Plates*—The car-builders are following the wise policy of covering requirements and some of the plate mills in this State have recently closed contracts for considerable quantities. Prices on boiler plate have shown a little weakness.

*Structural Material*—The only encouraging feature is the recent development of quite a number of inquiries for material, some of it for bridge construction.

*Steel Rails*—In light rails recent inquiries point to the placing of orders before the closing of the year.

*Scrap*—Some of our yard men have worked off a lot of scrap, mainly wrought scrap, turnings and No. 1 machinery. They have concluded to clean out and have made prices to attract buyers.

## Pittsburg

*Dec.* 3—It now seems certain that conditions in the iron and steel markets will continue dull the rest of the year, but the outlook for the opening of the coming year is regarded as encouraging. Consumers are not taking any more material than they actually need. That some new business is being booked was shown by the resumption of the big bessemer steel plant of the Republic Iron and Steel Company, at Youngstown, yesterday. The Valley and the Brown-Bonnell plants of this company are still in operation. It is likely that all of these plants will be closed during the coming week for extensive repairs. The American Sheet and Tin-Plate Company is operating but 50 of its 242 tin-plate mills this week and not more than 40 per cent. of its 172 sheet mills. The independent mills seem to be doing better than the large producer. The McKeesport Tin-Plate Company has been running steadily all year and it was announced today that it will not close its plant for the holidays. The Pope Tin-Plate Company, the largest independent tin-plate producer, which closed its plant three weeks ago, started in full yesterday, and it was given out that all of its mills will be run indefinitely. No stocks are being accumulated in any line of finished products and all production is for immediate consumption. The only suspension of operations of any consequence this week was the closing of the big plant of the Youngstown Sheet and Tube Company at Youngstown. The company has ordered shipments of pig iron discontinued indefinitely. This company has been taking about 40,000 tons a month, including the output of several furnaces that it contracted for last spring.

*Pig Iron*—The market continues dull and uninteresting and in the absence of transactions of any note it is not possible to quote prices. The ascertained bessemer average for November was announced yesterday to be $19.75, Valley furnaces, or $20.65, Pittsburg. As there were no sales of 1000 tons or more, on which the average is based, last month, it is presumed that the average was estimated according to market conditions. Some furnaces are holding bessemer iron at $19, Valley furnaces, but it is believed $18 can be done. No. 2 foundry is quoted at $18.50 and gray forge at $18, Valley furnaces. The United States Steel Corporation has blown out three additional furnaces and now has 58 out of 95 on the idle list, six of which are banked and may be started if the iron is needed.

*Steel*—There is no change in the crude steel market, both bessemer and open-hearth billets being quoted at $28, Pittsburg. Steel bars remain at 1.60c. and plates at 1.70c.

*Sheets*—The sheet market is dull, but some new business is being taken by independent producers at about $2 a ton under the regular rate for black sheets. Quotations remain at 2.60c. for black and 3.75c. for galvanized sheets No. 28 gage.

*Ferro-Manganese*—The market is quiet and for prompt shipment $52.50 is quoted.

## London

*Nov.* 20—Exports of iron and steel, and of machinery, from Great Britain for the 10 months ended Oct. 31 are valued by the Board of Trade returns as follows:

| | 1906. | 1907. | Changes. |
|---|---|---|---|
| Iron and Steel.. | £32,369,712 | £39,735,133 | I. £7,365,421 |
| Machinery..... | 21,968,521 | 26,207,166 | I. 4,238,645 |
| New Ships..... | 7,943,743 | 9,047,086 | I. 1,103,343 |
| Total..... | £62,281,976 | £74,989,385 | I.£12,707,409 |

The quantities of iron and steel exported were 3,792,508 long tons in 1906, and 4,451,148 tons in 1907; an increase of 658,640 tons. Exports of pig iron to the United States this year were 415,667 tons, an increase of 220,035 tons; of tinplates, 52,988 tons, an increase of 4291 tons.

# Metal Market

### Gold and Silver Exports and Imports

NEW YORK, Dec. 4.
At all United States Ports in Oct. and year.

| Metal. | Exports. | Imports. | Excess. |
|---|---|---|---|
| Gold: | | | |
| Oct. 1907.. | $ 3,112,539 | $ 4,480,910 | Imp.$ 1,368,371 |
| " 1906.. | 7,074,544 | 27,250,852 | " 20,176,308 |
| Year 1907.. | 52,992,352 | 35,343,130 | Exp. 17,649,222 |
| " 1906.. | 42,864,506 | 139,026,869 | Imp. 96,162,363 |
| Silver: | | | |
| Oct. 1907.. | 5,053,997 | 3,566,634 | Exp. 1,487,363 |
| " 1906.. | 3,549,017 | 3,882,522 | Imp. 333,505 |
| Year 1907.. | 53,024,790 | 38,054,858 | Exp. 14,969,932 |
| " 1906.. | 48,990,356 | 36,876,591 | " 12,113,765 |

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 Nov. 30 and years from Jan 1.

| Period. | Gold. | | Silver. | |
|---|---|---|---|---|
| | Exports. | Imports. | Exports. | Imports. |
| Week.... | $ ..... | 16,542,078 | $ 856,383 | $ 91,062 |
| 1907..... | 34,818,544 | 66,124,307 | 48,189,103 | 2,818,990 |
| 1906..... | 6,050,234 | 92,852,298 | 47,426,561 | 2,282,255 |
| 1905..... | 34,604,003 | 10,564,732 | 31,822,482 | 3,929,326 |

There was no gold exported for the week; the silver went chiefly to London. Imports of gold were chiefly from France and Great Britain; of silver from Mexico and South America.

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

| | In Treasury. | In Circul'n. |
|---|---|---|
| Gold coin (inc. bullion in Treasury) ..... | $ 173,917,898 | $ 640,577,952 |
| Gold certificates..... | 71,582,660 | 675,636,209 |
| Silver dollars..... | 37,433 | 90,979,549 |
| Silver certificates..... | 2,733,880 | 468,953,120 |
| Subsidiary silver..... | 3,221,533 | 132,979,612 |
| Treasury notes of 1890... | 8,933 | 5,537,067 |
| U. S. notes..... | 1,998,059 | 344,682,957 |
| Nat. Bank notes..... | 7,323,079 | 648,895,117 |
| Total..... | $260,823,475 | $3,008,241,583 |

Population of the United States, Dec. 1, 1907, estimated at 86,666,000; circulation per capita, $34.71. For redemption of outstanding certificates an exact equivalent in amount of the appropriate kinds of money is held in the treasury, and is not included in the account of money held as assets of the Government. This statement of money held in the treasury as assets of the Government does not include deposits of public money in national-bank depositories to the credit of the treasurer of the United States, amounting to $224,384,881. The total amount in circulation Dec. 1 shows an increase of $131,872,887 over that reported Nov. 1, 1907; and of $139,167,328 over Dec. 1 of last year.

Specie holdings of the leading banks of the world, Nov. 30 are reported as below, in dollars:

| | Gold. | Silver. | Total. |
|---|---|---|---|
| Ass'd New York | ..... | ..... | $170,554,600 |
| England..... | $161,224,865 | ..... | 161,224,865 |
| France..... | 540,069,655 | $186,417,715 | 726,487,370 |
| Germany..... | 143,695,000 | 39,825,000 | 183,520,000 |
| Spain..... | 78,075,000 | 128,275,000 | 206,350,000 |
| Netherlands.... | 38,220,500 | 24,895,500 | 63,116,000 |
| Belgium..... | 17,110,000 | 8,550,000 | 25,650,000 |
| Italy..... | 190,730,000 | 23,798,000 | 214,528,000 |
| Russia..... | 626,325,000 | 25,560,000 | 651,885,000 |
| Aust.-Hungary. | 228,445,000 | 58,035,000 | 286,480,000 |
| Sweden..... | 20,355,000 | ..... | 20,355,000 |

### Silver Market

SILVER AND STERLING EXCHANGE.

| Nov. | Sterling Exchange. | Silver. New York, Cents. | Silver. London, Pence. | Dec. | Sterling Exchange. | Silver. New York, Cents. | Silver. London, Pence. |
|---|---|---|---|---|---|---|---|
| 28 | ..... | .... | 26 1/16 | 2 | 4.8605 | 57 3/4 | 26 1/16 |
| 29 | 4.8600 | 57 3/4 | 26 1/16 | 3 | 4.8580 | 57 3/4 | 26 1/16 |
| 30 | 4.8650 | 57 7/8 | 26 3/16 | 4 | 4.8600 | 57 7/8 | 26 3/4 |

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

Shipments of silver from London to the East are reported by Messrs. Pixley & Abell as follows, for the year to Nov. 21:

| | 1906. | 1907. | Changes. |
|---|---|---|---|
| India..... | £ 14,173,296 | £10,173,904 | D. £ 3,999,392 |
| China..... | 430,700 | 217,350 | D. 213,350 |
| Straits.. ..... | 1,750 | 645,950 | I. 644,200 |
| Total..... | £ 14,605,746 | £11,037,204 | D. £ 3,568,542 |

Receipts for the week were £5000 from the West Indies and £132,000 from New York; £137,000 in all. Exports were £40,000, all to India.

Indian exchange is still weak, in view of the money market conditions in London, and the depressed state of business in India. For the second time in succession, no Council bills were sold in London last week. The buying of sliver for India was light, also.

There is no special feature in the market. Silver is quiet at current figures but owing to Government purchases here, and to some curtailment in production, it is quite probable, that the amounts offered for sale may be reduced in quantity during the next two or three months.

### Prices of Foreign Coins

| | Bid. | Asked. |
|---|---|---|
| Mexican dollars..... | $0.46 1/4 | $0.49 |
| Peruvian soles and Chilean..... | 0.41 | 0.45 |
| Victoria sovereigns ..... | 4.85 | 4.87 |
| Twenty francs. ..... | 3.87 | 3.90 |
| Spanish 25 pesetas... ..... | 4.78 | 4.80 |

### Other Metals

| Nov.-Dec. | 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. |
|---|---|---|---|---|---|---|---|
| 28 | ..... | ..... | 64 1/4 | ..... | ..... | ..... | ..... |
| 29 | 13 5/8 @14 | 13 3/8 @13 3/4 | 62 3/4 | 30 1/2 | 4.05 @4.15 | 4.55 @4.65 | 4.40 @4.50 |
| 30 | 13 3/8 @14 | 13 3/8 @13 3/4 | ..... | 30 1/2 | 4.00 @4.10 | 4.50 @4.60 | 4.35 @4.45 |
| 2 | 13 3/8 @13 7/8 | 13 3/8 @13 5/8 | 60 3/4 | 30 | 4.00 @4.10 | 4.45 @4.55 | 4.30 @4.40 |
| 3 | 13 3/8 @13 7/8 | 13 1/4 @13 1/2 | 61 1/2 | 30 | 4.00 @4.10 | 4.40 @4.50 | 4.25 @4.35 |
| 4 | 13 1/2 @13 3/4 | 13 1/4 @13 1/2 | 60 | 30 1/4 | 4.00 @4.10 | 4.40 @4.45 | 4.25 @4.30 |

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 made with consumers, basis, New York, cash. The price of cathodes is 0.125c. below that of electrolytic. The quotations for lead represent wholesale transactions in the open market. The quotations on spelter are for ordinary western brands; special brands command a premium.

*Copper*—The market continues to be dominated by the demand for export, domestic business still being insignificant. Manufacturers here may realize that copper is cheap, but they are in no position to buy, and although their stocks are small, they are not yet forced to buy. During the last week the demand for export has shown some signs of relaxation, which has led to concessions by sellers. However, the total volume of business has been small. There has been but little doing in lake, and since Monday the market for it has been quite nominal. The close is undecided at 13½@13¾c. for lake and 13¼@13½c. for electrolytic. The average for casting copper is 13⅛@13¼c.

The London standard market has also displayed some weakness, but business there is becoming more and more normal, which is reflected in rather narrow fluctuations. The close is steady at £60 for spot and £61 15s. for three months.

Refined and manufactured sorts are quoted: English tough, £57; best selected, £64; strong sheets, £68.

Statistics for the second half of the month show no change as compared with the report cabled on Nov. 15.

Exports of copper from New York and Philadelphia for the week were 5860 long tons. Our special correspondent gives the exports from Baltimore for the week at 95 tons.

*Copper Sheets and Wire*—The base price for copper sheets is 20c. per lb.; for wire, 16½@16¼c. per lb.

*Tin*—There were no special features, and business in this country has been as unsatisfactory as it has been for some time past. Spot tin at the close can be bought at about 30¼c., while the London market is cabled at £133 10s. for spot and £134 10s. for futures.

Statistics for the month of November show an increase of 1600 tons.

Supplies of tin in sight on Dec. 1 are reported as follows, in long tons:

| | In Store. | Afloat. | Total. |
|---|---|---|---|
| London..... | 4,696 | 3,758 | 8,454 |
| Holland..... | 1,839 | 257 | 2,096 |
| United States..... | 1,110 | 1,180 | 2,290 |
| Total..... | 7,645 | 5,195 | 12,840 |

United States stocks do not include those at Pacific ports.

*Lead*—Absence of buying power on the one hand and anxiety to liquidate the large holdings of the different sellers on the other, have caused a further decline in the market, the close being weak at 4@4.10c., New York.

The London market has had a sharp decline during the week, owing to liquidation of large arrivals, and the close is weak at £15 15s. for Spanish lead and £15 17s. 6d. for English.

*St. Louis Lead Market*—The John Wahl Commission Company reports as follows: Lead is very dull; quotations are 3.95@4c., with practically no business doing.

*Spelter*—Prices are crumbling away from day to day under forced selling by holders who are compelled to liquidate. In spite of the low offerings business has been of small proportions, as supplies in the hands of consumers are so large they are not inclined to anticipate their requirements still further. The close is weak at 4.40@4.45c., New York and 4.25@4.30c., St. Louis.

Fear of exports from this side has put a damper on the European market, where the close is cabled at £21 for good ordinaries and £21 15s. for specials.

*Zinc Sheets*—The base price is $7 per 100 lb.—less discount of 8 per cent.— f.o.b. cars at Lasalle and Peru. The freight rate to New York is 27.50c. per 100 lb.

*Antimony*—The market is dull and prices are lower, but very little business is being done. Prices abroad are higher than in New York, which precludes importation at local prices. Quotations are as follows: Cookson's, 10@10½c.; Hallett's, 9½@9¾c.; ordinary brands, 8@8¼c. per pound.

*Nickel*—For large lots, New York, the chief producer quotes 45@50c. per lb. according to size and terms of order. For small quantities, 50@65c., same delivery.

*Quicksilver*—New York quotations are $45 per flask for lots of 100 flasks or over, and $46 for smaller orders. San Francisco quotations are $44.50@45.50 for domestic orders; for export nominal, at about $1.50 lower. The London price is £8 5s. per flask, with £8 3s. 9d. quoted from second hands.

*Platinum*—Dealers are not encouraged over the situation and report very little business. Manufacturers of jewelry and electrical supplies are not using nearly so much platinum. The metal is in strong hands, however, hence the price is being maintained with comparative ease. Quotations are as follows: Hard metal, $28.50; ordinary, $26; scrap, not more than $18 per troy ounce.

### German Metal Imports and Exports

Imports and exports of metals in Germany for the nine months ended Sept. 30 are reported as follows, in metric tons:

| | Imports. | Exports. | Excess. |
|---|---|---|---|
| Copper | 90,441 | 4,434 | Imp. 86,007 |
| Copper alloys, etc. | 15,504 | 41,383 | Exp. 25,879 |
| Tin | 9,539 | 5,219 | Imp. 4,320 |
| Lead | 61,433 | 26,430 | Imp. 35,003 |
| Spelter | 22,665 | 45,882 | Exp. 23,217 |
| Zinc alloys, etc. | 1,059 | 23,000 | Exp. 21,941 |
| Nickel | 1,960 | 939 | Imp. 1,021 |
| Aluminum | 3,070 | 1,658 | Imp. 1,412 |

Imports and exports of metallic ores for the nine months were as follows:

| | Imports. | Exports. | Excess. |
|---|---|---|---|
| Gold ore | 76 | ..... | Imp. 76 |
| Silver ore | 2,919 | 46 | Imp. 2,873 |
| Copper ore | 15,392 | 18,150 | Exp. 2,758 |
| Tin ore | 7,934 | 97 | Imp. 7,837 |
| Lead ore | 97,270 | 1,095 | Imp. 96,175 |
| Zinc ore | 131,091 | 25,529 | Imp. 105,562 |
| Nickel ore | 24,994 | ..... | Imp. 24,994 |
| Tungsten ore | 1,689 | 185 | Imp. 1,504 |
| Uranium ore, etc. | 895 | ..... | Imp. 895 |
| Chrome ore | 14,742 | 76 | Imp. 14,666 |
| Manganese ore | 287,187 | 2,648 | Imp. 285,539 |
| Iron ore | 6,441,919 | 2,962,026 | Imp. 3,479,893 |

Imports of slag and slag products were 426,924 tons; exports, 34,518 tons. Imports of pyrites were 573,683 tons; exports 16,695 tons.

## Missouri Ore Market

*Joplin, Mo., Nov.* 30—The highest price reported paid for zinc was $38 per ton; on an assay base no higher than $36 and running as low as $32 per ton of 60 per cent. zinc. Lower prices are all the hope held out for next week. The average price was $33.16 per ton for all grades. The highest price paid for lead was $44 per ton for a few bins, generally not exceeding $42@43, and averaging, all grades, $41.82 per ton. Additional mills were closed down tonight owing to the decisive reduction in price announced following Thanksgiving day. If another cut in price follows with the coming week it is doubtful if there is a mill in the district that can make a profit, even at the present low rate of wages. The district affords a measure of relief to the miners who are also prospectors, and many of them are forming partnerships and re-entering abandoned shallow mines from which a few thousand pounds of ore per week may be made at little expense in addition to the labor of the men, thus enabling them to make fair wages.

Following are the shipments of zinc and lead from the various camps for the week ending Nov. 30:

| | Zinc, lb. | Lead, lb. | Value. |
|---|---|---|---|
| Webb City-Carterville | 2,333,150 | 303,930 | $ 46,045 |
| Joplin | 1,615,170 | 275,130 | 34,043 |
| Oronogo | 914,510 | 1,610 | 16,959 |
| Duenweg | 728,820 | 143,770 | 15,408 |
| Galena | 808,880 | 67,800 | 14,736 |
| Alba-Neck City | 445,650 | ..... | 8,031 |
| Quapaw-Baxter | 402,860 | 6,530 | 7,106 |
| purgeon | 306,270 | 53,660 | 5,275 |
| Badger | 245,690 | ..... | 4,914 |
| Granby | 500,000 | 14,000 | 4,300 |
| Aurora | 287,820 | ..... | 4,033 |
| Prosperity | 130,730 | 72,540 | 3,745 |
| Peoria | 134,150 | ..... | 1,600 |
| Carthage | 83,070 | ..... | 1,495 |
| Zincite | 64,500 | 5,590 | 1,279 |
| Wentworth | 60,740 | ..... | 1,032 |
| Sarcoxie | 60,670 | ..... | 1,031 |
| Totals | 9,122,680 | 944,560 | $171,032 |
| 48 weeks | 540,889,650 | 79,619,740 | $14,838,534 |

Zinc value, the week, $151,281; 48 weeks, $12,025,838
Lead value, the week, 19,751; 48 weeks, $2,812,696

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 | 40.11 | September | 79.64 | 53.52 |
| October | 41.55 | 39.83 | October | 79.84 | 51.40 |
| November | 44.13 | 35.19 | November | 81.98 | 43.40 |
| December | 43.68 | ..... | December | 81.89 | .... |
| Year | 43.24 | ..... | Year | 77.40 | ..... |

## Wisconsin Ore Market

*Platteville, Wis., Nov.* 30—Sales of 60 per cent. zinc ore were made during the week at $35@36 per ton. Conditions have tightened up more than ever; independent buyers who formerly took on upward of 10 cars weekly are restricted in purchasing to two cars. Most of the low-grade producers have been forced to close down, while companies which continue operating have reduced wages 15 to 20 per cent. A small amount of lead ore sold during the week around $20 per thousand for 80 per cent. lead.

Following are the ore shipments for the week ended Nov. 30:

| Camps. | Zinc ore, lb. | Lead ore, lb. | Sulphur ore, lb. |
|---|---|---|---|
| Platteville | 313,680 | ..... | ..... |
| Hazel Green | 199,900 | ..... | ..... |
| Livingston | 180,000 | ..... | ..... |
| Mineral Point | 131,600 | ..... | ..... |
| Linden | 120,000 | ..... | ..... |
| Highland | 119,900 | 30,000 | ..... |
| Benton | ..... | 160,000 | ..... |
| Cuba City | ..... | 64,000 | ..... |
| Total for week | 1,065,080 | 254,000 | ..... |
| Year to Nov. 30 | 94,035,707 | 4,824,730 | 462,360 |

No shipments were made from Galena, Elmo or Rewey during the week.

## Chemicals

*New York, Dec.* 4—The general market continues quiet and dealers are not forcing business. Hence prices have not suffered to any extent, except for metallic salts and products. White arsenic is easier and prices are now quoted at 6¼@6½c. Tin products are down, but the general heavy list remains fairly strong.

*Copper Sulphate*—Business has been largely restricted to small orders and for spot delivery. The strong holders still maintain the price at $5.50 per 100 lb. for carload lots and $5.75 for smaller parcels. Outside dealers are quoting $5.25 and $5.50 respectively.

## Mining Stocks

*New York, Dec.* 4—The general market has shown some recovery during the week, and prices are better; but it is still irregular and sensitive. There are signs of a resumption of trading on margins, but only on a small scale. Money has been slightly easier, but conditions do not yet favor any extension of speculation. The cutting of dividends by Calumet & Hecla from $15 to $10, and by Calumet & Arizona from $5 to $1.50 had little effect on copper shares, the reductions having been pretty well discounted.

The curb market followed the inside lead and was more active, with some recovery in prices. The copper stocks made a good showing and were generally higher, on moderate trading. Other mining stocks improved a little, but there were not many buying orders. The tone of the market is slightly better, however, with some anticipation of further improvement.

### Boston

*Dec.* 3—The market has shown a gain this week, which seems to be real, although there was a slight recession at the close. There is an improvement in sentiment to some extent, but the large short interest appears to be doing its best to hold down prices. Banking interests are inclined to discourage speculation, and tight money does not favor

extensive dealings. The cutting of dividends by Calumet & Hecla and Calumet & Arizona and the postponement by Granby were so generally expected, that they had little present effect.

Calumet & Arizona closed at $90; Copper Range at $55; North Butte at $41; Utah Consolidated at $33. Amalgamated Copper sold at $50 today. The market quieted notably on an easier tendency in prices of the afternoon, but it has shown good rallying power, good revival in interest and increased confidence.

The Calumet & Hecla dividend is $10, a reduction of $5 from the preceding quarter. The Calumet & Arizona dropped from $5 to $1.50, making $16.50 for the year.

## STOCK QUOTATIONS

| NEW YORK | Dec. 3 |
|---|---|
| Name of Comp. | Clg |
| Alaska Mine | . .. |
| Am.Nev.M.&P.Co. | .... |
| Amalgamated | 49⅞ |
| Anaconda | 32⅝ |
| Balaklaia | .... |
| British Col. Cop | 4⅛ |
| Buffalo Cobalt | 1⅛ |
| Butte & London | .... |
| Butte Coalition | 14⅞ |
| Butte Cop. & Zinc | .... |
| Cobalt Contact | .... |
| Colonial Silver | ⅜ |
| Cum. Ely Mining | 5¼ |
| Davis Daly | 4 |
| Dominion Cop | 1⅞ |
| El Rayo | 2 |
| Foster Cobalt | .60 |
| Furnace Creek | .22 |
| Giroux Mine | 3⅛ |
| Gold Hill | ¾ |
| Granby, New | .... |
| Greene Gold | ¾ |
| Greene G. & S | ½ |
| Greenw'r & D.Val. | .75 |
| Guanajuato | 2¼ |
| Guggen. Exp. | 135 |
| Hanapah | .35 |
| McKinley Dar | 1/16 |
| Micmac | 3¼ |
| Mines Co. of Am | 1½ |
| Mitchell Mining | ⅛ |
| Mont.Sho. C.(New) | 3¾ |
| Nev. Utah M. & S. | 2⅛ |
| Newhouse M. & S. | 6½ |
| Nipissing Mines | 6⅛ |
| Old Hundred | .... |
| Silver Queen | ⅜ |
| Stewart | ⅛ |
| Tennessee Cop'r | .... |
| Union Copper | ⅞ |
| Utah Apex | 2⅛ |
| West Columbus | .11 |

| N. Y. INDUSTRIAL | |
|---|---|
| Am. Agri. Chem | .... |
| Am. Smelt. & Ref. | 76⅝ |
| Am. Sm. & Ref., pf. | 91½ |
| Bethlehem Steel | .... |
| Colo. Fuel & Iron | 18⅛ |
| Federal M.& S., pf. | 60 |
| Inter. Salt | 11 |
| National Lead | 42 |
| National Lead, pf. | .... |
| Pittsburg Coal | 9 |
| Republic I. & S | 17 |
| Republic I.& S.,pf. | 65 |
| Sloss-Sheffield | 37 |
| Standard Oil | 425 |
| Tenn. C. & I | .... |
| U. S. Red. & Ref. | 6 |
| U. S. Steel | 26⅛ |
| U. S. Steel, pf | 87⅝ |
| Va. Car. Chem | 18 |
| Va. I. Coal & Coke | 40¼ |

| ST. LOUIS | Nov. 30 | |
|---|---|---|
| N. of Com. | High. | Low. |
| Adams | .30 | .20 |
| Am. Nettie | .03 | .02 |
| Center Cr'k | 2.00 | 1.75 |
| Cent. C. & C. | 65.00 | 64.00 |
| C.C. & C. pd. | 76.00 | 75.00 |
| Cent. Oil | 100.00 | 95.00 |
| Columbia | 4.00 | 2.00 |
| Con. Coal | 25.00 | 24.00 |
| Doe Run | 125.00 | 120.00 |
| Gra. Bimet. | .25 | .20 |
| St. Joe | 14.00 | 13.00 |

| BOSTON | Dec. 3 |
|---|---|
| Name of Comp. | Clg. |
| Adventure | 1½ |
| Allouez | 26 |
| Am. Zinc | 21 |
| Arcadian | 3¾ |
| Atlantic | 10 |
| Bingham | 5 |
| Boston Con | 10½ |
| Calumet & Ariz | 96 |
| Calumet & Hecla | .... |
| Centennial | 233¾ |
| Con. Mercur | .... |
| Copper Range | 54¾ |
| Daly-West | 10¾ |
| Franklin | 8 |
| Greene—Can. | 5⅞ |
| Isle Royal | 17¾ |
| La Salle | 10¾ |
| Mass | 2¾ |
| Michigan | 8½ |
| Mohawk | 48½ |
| Mont.C.&C.(new) | .... |
| Nevada | 7¾ |
| North Butte | 41 |
| Old Colony | .50 |
| Old Dominion | 26½ |
| Osceola | 85¾ |
| Parrot | 10½ |
| Phoenix | .... |
| Quincy | 81 |
| Rhode Island | 3 |
| Santa Fe | 1⅞ |
| Shannon | 10½ |
| Tamarack | .... |
| Trinity | 10½ |
| United Cop., com. | 83⅛ |
| U. S. Oil | .... |
| U. S. Smg. & Ref. | 38 |
| U.S.Sm.& Re.,pd | 38 |
| Utah Copper | 33 |
| Victoria | 4¾ |
| Washington | .... |
| Winona | 4½ |
| Wolverine | 110 |
| Wyandotte | .75 |

*Ex. Div. †Ex. Rights.

| BOSTON CURB | |
|---|---|
| Ahmeek | 50 |
| Ariz. Com | .... |
| Black Mt | 4⅛ |
| East Butte | 4½ |
| Hancock Con | .... |
| Keweenaw | .... |
| Majestic | .75 |
| Raven | .88 |
| Shawmut | .47 |
| Superior | 15 |
| Superior & Pitts | 9¼ |
| Troy Man | .70 |

| LONDON | Dec. 4 | | |
|---|---|---|---|
| Name of Com. | Clg. | | |
| Dolores | £1 | 1s | 3d |
| Stratton'sInd. | 0 | 2 | 9 |
| Camp Bird | 0 | 14 | 9 |
| Esperanza | 1 | 9 | 3 |
| Tomboy | 1 | 11 | 0 |
| El Oro | 1 | 2 | 6 |
| Oroville | 0 | 14 | 3 |
| Somera | . | .. | . |
| Utah Apex | 0 | 11 | 6 |
| Ariz.Cop.,pfd. | . | .. | . |
| Ariz.Cop.,def. | . | .. | . |

Cabled through Wm. P. Bonbright,& Co., N.Y.

### NEVADA STOCKS. Dec. 4.

Furnished by Weir Bros. & Co., New York.

| Name of Comp. | Clg. | Name of Comp. | Clg. |
|---|---|---|---|
| TONOPAH STOCKS | | Golden Sceptre | ... |
| Belmont | 85 | Homestake King | .50 |
| Extension | 1.12½ | Montgomery Mt | .05 |
| Golden Anchor | .03 | Mont. Shoshone C. | 4.50 |
| Jim Butler | .40 | Original Bullfrog | .03 |
| MacNamara | .18 | Tramp Cons | .19 |
| Midway | .39 | MANHAT'N STOCKS | |
| Montana | 1.37½ | Manhattan Cons. | .25 |
| North Star | .08 | Manhat'n Dexter. | .09 |
| Tonopah & Cal | ... | Jumping Jack | .06 |
| Tono'h Mine of N. | 6.25 | Stray Dog | .10 |
| West End Con | .35 | Indian Camp | .05 |
| GOLDFI'D STOCKS | | GREENW'R STOCKS | |
| Adams | .05 | Furnace Creek | .18½ |
| Atlanta | .23 | Greenwater &D.V. | .05 |
| Blue Bell | .07 | Green'rCop.M.&S. | .05 |
| Blue Bull | .16 | United Greenwa'r | .04 |
| Booth | .15 | MISCELLANEOUS | |
| Columbia Mt | .14 | Golden Boulder | .07 |
| Comb. Frac | .79 | Hayseed | .30 |
| Cracker Jack | .07 | Lee Gold Grotto | .12 |
| Dia'dfield B. B. C. | .16 | Nevada Hills | 3 12½ |
| Goldfield Belmont | .12 | Nevada Smelting | 1.25 |
| Goldfield Con | 3.87½ | Pittsburgh S. Pk | 1 07 |
| Goldfield Daisy | .72 | Round Mt. Sphinx | .27 |
| Goldfield Mining | ... | | |
| Great Bend | .27 | | |
| Jumbo Extension | .57 | | |
| Jumbo Mining | ... | | |
| Katherine | .06 | | |
| Kendall | .11 | | |
| Laguna | ... | | |
| Lone Star | .09 | | |
| Lou Dillon | .03 | | |
| May Queen | .05 | | |
| Mohawk | ... | | |
| Oro | .09 | | |
| Red Hill | .24½ | | |
| Red Top | ... | | |
| Roanoko | .09 | | |
| Sandstorm | .16 | | |
| Silver Pick | .23 | | |
| St. Ives | .40 | | |
| Triangle | .07 | | |
| BULLFROG STOCKS | | | |
| Amethyst | ... | | |
| Bullfrog Daisy | ... | | |
| Bullfrog Mining | 04 | | |
| Bullfrog Nat. B | .09 | | |
| Gibraltar | 10 | | |
| Gold Bar | .34 | | |

### COLO. SPRINGS Nov. 30

| Name of Comp. | Clg. |
|---|---|
| Acacia | .... |
| Black Bell | .. |
| C. C. Con | .... |
| Dante | 5⅛ |
| Doctor Jack Pot | 6⅛ |
| Elkton | .... |
| El Paso | 25 |
| Findlay | 38 |
| Gold Dollar | 6 |
| Gold Sovereign | 4⅛ |
| Isabella | 19¾ |
| Index | .... |
| Jennie Sample | .... |
| Jerry Johnson | .... |
| Mary McKinney | .... |
| Pharmacist | .... |
| Portland | 92 |
| Un. Gold Mines | 4¾ |
| Vindicator | 77 |
| Work | 14½ |

### New Dividends

| Company. | Payable. | Rate. | Amt. |
|---|---|---|---|
| Batopilas | Dec. 31 | $0.12½ | $ 56,250 |
| Butte Coalition | Dec. 15 | 0.15 | 150,000 |
| Calumet & Arizona | Dec. | 1.50 | 300,000 |
| Calumet & Hecla | Dec. 24 | 10.00 | 1,000,000 |
| Copper Range Con | Jan. 1 | 1.00 | 383,781 |
| Federal M. & S., com | Dec. 16 | 1.50 | 90,000 |
| Federal M. & S., pfd | Dec. 16 | 1.75 | 210,000 |
| Gen. Chemical, pfd | Jan. 2 | 1.50 | 150,000 |
| Hecla | Dec. | 0.02 | 20,000 |
| Montezuma M. & S. | Jan. 10 | 0.04 | 40,000 |
| National Lead, com | Jan. 1 | 1.25 | 186,318 |
| National Lead, pfd | Dec. 16 | 1.75 | 260,820 |
| Quincy | Dec. 23 | 2.00 | 220,000 |
| Republic Iron & Steel, pfd. | Dec. 21 | 1.75 | 357,296 |
| Standard Con | Dec. 2 | 0.10 | 17,860 |
| Standard Oil | Nov. 26 | 10.00 | 9,700,000 |
| St. Joseph | Dec. 20 | 0.15 | 150,000 |
| U. S. C. I. Pipe & Fdy., com | Dec. 2 | 1.00 | 125,000 |
| U. S. C. I. Pipe & Fdy., pfd | Dec. 2 | 1.75 | 218,750 |
| U. S. Smg., Ref. & Mg., com. | Nov. 1 | 0.87½ | 304,646 |
| U. S. Smg., Ref. & Mg., pfd. | Nov. 1 | 0.87½ | 656,250 |
| U. S. Steel Corp., com | Dec. 30 | 0.50 | 2,451,513 |
| U. S. Steel Corp., pfd | Nov. 30 | 1.75 | 6,305,497 |
| Warwick I. & S | Nov. 15 | 0.30 | 43,674 |

### Assessments

| Company. | Delinq. | Sale. | Amt. |
|---|---|---|---|
| Alpha, Nev | Nov. 25 | Dec. 17 | $0.05 |
| Best & Belcher, Nev. | Nov. 18 | Dec. 10 | 0.10 |
| Crown Point, Nev | Nov. 26 | Dec. 19 | 0.10 |
| Del Monte, Cal | Nov. 20 | Dec. 11 | 10.00 |
| Emerald, Utah | Dec. 14 | Jan. 11 | 0.01 |
| Imlay | Nov. 23 | Dec. 17 | 0.01 |
| Jenny Lind, Cal | Dec. 13 | Dec. 30 | 0.02 |
| Lucky D., Nev | Dec. 17 | Jan. 11 | 0.01 |
| Mt. Dell, Utah | Nov. 19 | Dec. 7 | 0.01 |
| Pacific Tin M. Al'ka | Nov. 30 | Dec. 20 | 0.02 |
| Penn. Con., Cal | Nov. 16 | Dec. 3 | 0.10 |
| Posey Canyon, Utah | Dec. 6 | Dec. 23 | 0.01 |
| ProvidentOilMg.,Ca. | Dec. 7 | Dec. 27 | 0.01½ |
| Rescue, Nev | Dec. 10 | Jan. 3 | 0.02 |
| Silver Queen, Utah | Dec. 7 | Dec. 24 | 0.01½ |
| Stansbury, Utah | Nov. 18 | Dec. 16 | 0.01 |
| Ultimo, Cal | Dec. 2 | Dec. 23 | 0.05 |
| Union Con | Nov. 15 | Dec. 6 | 0.10 |
| Wabash, Utah | Nov. 30 | Dec. 23 | 0.03 |
| West End, Utah | Nov. 3 | Dec. 31 | 0.01½ |
| Wolverine & Ariz., A. | Nov. 18 | | 0.25 |

## 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 | 67.792 | 31.483 | 31.313 |
| October | 69.523 | 62.435 | 32.148 | 28.863 |
| November | 70.813 | 58.677 | 32.671 | 27.154 |
| 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 | 15.565 | 19.328 | 16.047 | 87.831 | 68.375 |
| October | 21.203 | 13.169 | 21.722 | 13.551 | 97.269 | 60.717 |
| November | 21.833 | 13.391 | 22.398 | 13.870 | 100.270 | 61.226 |
| 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 | 36.689 |
| April | 38.900 | 40.938 | October | 42.852 | 32.620 |
| May | 43.313 | 43.149 | November | 42.906 | 30.833 |
| 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 | 4.813 | 18.266 | 19.775 |
| October | 5.750 | 4.750 | 19.350 | 18.531 |
| November | 5.750 | 4.376 | 19.281 | 17.281 |
| 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 | 26.900 | 23.850 |
| August | 6.027 | 5.701 | 5.878 | 5.551 | 26.938 | 21.969 |
| September | 6.216 | 5.236 | 6.056 | 5.086 | 27.563 | 21.050 |
| October | 6.222 | 5.430 | 6.070 | 5.280 | 28.075 | 21.781 |
| November | 6.375 | 4.925 | 6.225 | 4.775 | 27.781 | 21.438 |
| 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 | a ton | 25.00@35.00 |
| Pumice Stone, Am. lump | 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. | .026@.03 |
| 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 | " | .08¼@.08½ |
| **ALCOHOL**—Grain | gal. | 2.46½ |
| Refined wood, 95@97% | " | .70@.75 |
| **ALUM**—Lump | 100 lb. | $1.75 |
| Ground | " | 1.85 |
| Chrome Alum | lb. | .05¾@.06 |
| **ALUMINUM**—Sulphate, com'l. | " | 1.25@1.75 |
| **AMMONIA**—24 deg. lb | | .04¾@.05½ |
| " 26 " " | | .04¾@.05¾ |
| **AMMONIUM—** | | |
| Bromide | lb. | .23 |
| Carbonate | " | .07½@.08 |
| Muriate grain | " | .05¾@.06½ |
| Lump | " | .09½@.09½ |
| Sulphate, 100 lb. | | 3.05@3.10 |
| Sulphocyanide com. | " | .30 |
| " " chem. pure | " | .40 |
| **ANTIMONY**—needle, lump lb. | | .07@.08 |
| **ARSENIC**—White | " | .06¼@.06¾ |
| 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 | " | 23.50@30.00 |
| **BARIUM—** | | |
| Carb. Lump, 80@90% | lg. ton. | 30.00@35.00 |
| Precipitated, 96@98% | | 31.50@35.00 |
| Powdered, 80@90% | lb. | .02@.02½ |
| Chloride com'l | ton. | 38.00@40.00 |
| 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. | | 5.50 |
| **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 | " | .80@.85 |
| **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. | 12.00@20.00 |
| **INFUSORIAL EARTH—** | | |
| Ground Am. best | lb. | .01¾ |
| French | lg. ton. | 56.00 |
| German | lb. | .02½@.02¾ |
| **LEAD**—Acetate (sugar of) brown | lb. | .07¾ |
| Nitrate, com'l | " | .09@.09¼ |
| **MAGNESITE**—Greece. | | |
| Crude (95%) | lg. ton. | 8.00@10.00 |
| 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@1.00 |
| Sulphate (Epsom salt) | 100 lb. | .90@1.00 |
| **MANGANESE—** | | |
| Crude powdered: | | |
| 70@75% binoxide | lb. | .01¾@.01¾ |
| 75@85% binoxide | " | .01¾@.02 |
| 85@90% binoxide | " | .01¾@.05 |
| 90@95% binoxide | " | .06¼ |
| 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, | .09@.11 |
| " double | " | .06½@.08 |
| **NITRATE OF SODA**—100 lb. 95% for '07 | | 2.45 |
| 95% for 1908 | | 2.45@2.50 |
| 95% for 1909 | | 2.40 |
| 96% is 5c 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 | " | .07¼@.07¾ |
| Foreign | " | .08¼@.08½ |
| Turpentine, spirits bbl., per gal. | | .48½@.49 |
| White lead, Am., dry | lb. | .06½@.07 |
| American, in oil | " | .07¼@.07½ |
| Foreign, in oil | " | .10¼@.10½ |
| Zinc white, Am. extra dry | " | .05½@.05½ |
| Foreign, red seal, dry | " | .07¼@.07½ |
| Green seal, dry | " | .08¼@.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 | | .... |
| **POTTASSIUM—** | | |
| Bicarbonate crystal | lb. | $.08½@.09 |
| Powdered or granulated | " | .09@.09½ |
| Bichromate, Am. | " | .08¼@.09 |
| Scotch | " | .11 |
| Bromide | " | .15@.17 |
| Carbonate (80@85%) | " | .03½@.04 |
| Caustic, ordinary | " | .04½@0.5¾ |
| Elect. (90%) | " | .05½@.06 |
| Chloride (muriate), 100 lb. | | 1.90 |
| Chlorate, powdered | " | .09½@.09¾ |
| Crystals | " | 09@09¼ |
| Cyanide (98@99%) | | |
| Carloads (30,000 lb.) | " | 18c. |
| 5-ton lots | " | 18½c. |
| Less than 5 tons | " | 19c. |
| Kainite, long ton, bulk, 8.50; bags, 9.50. | | |
| Permanganate | lb. | .09¾@.10½ |
| Prussiate, yellow | " | .15½@.16 |
| Red | " | .33@.38 |
| Sulphate | 100 lb. | 2.18½@2.21½ |
| **PYRITE—** | | |
| Domestic, non-arsenical, 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 | | .13@.14 |
| Imported, arsenical, furnace size, per unit | | .12@.13 |
| 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@1.18 |
| N. Y. agricultural | sh. ton. | 3.80@4.50 |
| **SALTPETER**—Crude | 100 lb. | 4.62½@5.00 |
| Refined, crystals | " | 5.25@5.75 |
| **SILICA—** | | |
| Ground quartz, ord'ry | lg. ton | 13.00@15.00 |
| Silex | " | 13.00@40.00 |
| Lump Quartz | " | 2.50@4.00 |
| Glass sand | " | 2.75 |
| **SILVER**—Nitrate, crystals | oz. | .40@.42 |
| **SODIUM—** | | |
| Acetate | lb. | .04¾@.05 |
| "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 | | .55@.70 |
| Soda, monohydrate, per lb | | 1.4@1.75c. |
| Bichromate | lb. | .07¼@.07½ |
| Bromide | " | .15@.17 |
| Chlorate, com'l | " | .09@.09½ |
| Cyanide ("100% KCN") | | |
| Carloads (30,000 lb.) | " | 18c. |
| 5-ton lots | " | 18½c. |
| Less than 5 tons | " | 19c. |
| Hyposulphite, Am | " | 1.35 up |
| German | " | 1.60@1.70 |
| Phosphate | 100 lb. | 2.10@2.30 |
| Prussiate | " | .09½@.10 |
| Sal soda, f.o.b. N. Y | 100 lb. | .65@.70 |
| 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. | .60@.70 |
| " " calcined | | .65@.85 |
| **STRONTIUM**—Nitrate | lb. | .08@.08½ |
| **SULPHUR—** | | |
| Louisiana (prime) to New York, Boston or Portland | lg. ton | 19.50 |
| To Philadelphia or Baltimore | " | 19.50 |
| Roll | 100 lb. | 1.85@2.15 |
| Flour | " " | 2.00@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 | " | 16.00@25.00 |
| Italian, best | " | 35.00@40.00 |
| **TIN**—Bi-chloride, 50% | lb. | .09½@ 09¾ |
| Crystals | " | .20½ up |
| Oxide, lb. | | .37@.39 |
| **URANIUM**—Oxide | " | 3.50 |
| **ZINC—** | | |
| Chloride solution, com'l 20° | " | .02½ |
| Chloride, granular | " | .04½@.05 |
| Dust | " | .05½@.06 |
| 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 | $1,716,381 | Oct. 1907 | $ .50 |
| Alaska Treadwell, g. | Al'ka | 5,000,000 | 200,000 | 25 | 9,635,000 | Oct. 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 | 55,177,425 | Nov. 1907 | 1.00 |
| Am.Sm.&Ref.,com. | U. S. | 50,000,000 | 500,000 | 100 | 11,625,000 | Oct. 1907 | 2.00 |
| Am. Sm. & Ref. pf. | U. S. | 50,000,000 | 500,000 | 100 | 25,338,053 | Oct. 1907 | 1.75 |
| Am. Smelters, pf. A | U. S. | 17,000,000 | 170,000 | 100 | 2,195,000 | Dec. 1907 | 1.50 |
| Am. Smelters. pf. B | U. S. | 30,000,000 | 300,000 | 100 | 3,750,000 | Dec. 1907 | 1.25 |
| Am.Zinc,Lead&Sm. | Kan. | 3,750,000 | 80,000 | 25 | 100,000 | Nov. 1907 | .50 |
| Anaconda, c. | Mont | 30,000,000 | 1,200,000 | 25 | 38,450,000 | Nov. 1907 | 1.25 |
| 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 |
| Bald Butte, g. s. | Mont | 250,000 | 250,000 | 1 | 1,354,648 | Oct. 1907 | .04 |
| Beck Tunnel, g.s.l. | Utah | 100,000 | 1,000,000 | 0.10 | 615,000 | Oct. 1907 | .02 |
| 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 | 48,775,000 | Nov. 1907 | 6.00 |
| 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 | 9,726,000 | Nov. 1907 | .60 |
| Butte Coalition, c. s. | Mont | 15,000,000 | 1,000,000 | 15 | 2.450.000 | Dec. 1907 | .15 |
| Calumet & Arizonac | Ariz | 2,500,000 | 200,000 | 10 | 9,300.000 | Dec. 1907 | 1.50 |
| Calumet & Hecla, c. | Mich | 2,500,000 | 100,000 | 25 | 105,900,000 | Dec. 1907 | 10.00 |
| Camp Bird, g., s. | Colo | 5,500,000 | 820,000 | 5 | 4,276,300 | Nov. 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 | 283,540 | 5 | 226,832 | Oct. 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 | 220,000 | Oct. 1907 | .50 |
| Copper Range Con. | Mich | 38,500,000 | 383,781 | 100 | 6,477,801 | Jan. 1908 | 1.00 |
| 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 | 5,823,000 | Sept. 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 | 1,464,568 | Nov. 1907 | .50 |
| Elkton Con., | 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 | 2,618,750 | Dec. 1907 | 1.50 |
| Federal Sm., pf. | Idaho | 20,000,000 | 120,000 | 100 | 3,281,250 | Dec. 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 |
| Goldfield Con., g. | Nevada | 50,000,000 | 5,000,000 | 10 | 1,000,000 | Nov. 1907 | .10 |
| Grand Central, g. | Utah | 250,000 | 250,000 | 1 | 1,333,000 | Oct. 1907 | .05 |
| 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 | 1,460,000 | Dec. 1907 | .02 |
| 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 | 5,642,000 | Sept. 1907 | .05 |
| Inter'l Nickel, pf. | N. Y. | 12.000,000 | 87,415 | 100 | 917,869 | Nov. 1907 | 1.50 |
| Iron Silver | Colo | 10,000,000 | 500,000 | 20 | 4,100,000 | Oct. 1907 | .10 |
| Jamison, g. | Cal | 3,900 000 | 390,000 | 10 | 286 270 | Oct. 1907 | .02 |
| Jerry Johnson. | Cal | 2,500,000 | 500,000 | 1 | 61,700 | Apr. 1906 | .03 |
| Kendall, g. | Mont | 2,500,000 | 500 000 | 5 | 1,130,000 | Aug. 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 | 42,750 | Aug. 1907 | .07½ |
| Mammoth, g. s. l. | Utah | 10,000 000 | 400,000 | 2.50 | 2,120,000 | Oct. 1907 | .05 |
| Mary McKinney, g. | Colo | 1.500,000 | 1,304,252 | 1 | 801.765 | Apr. 1907 | .03 |
| May Day, g. s. l. | Utah | 800,000 | 800,000 | 1 | 70,010 | Oct. 1907 | .01½ |
| 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 | 300,000 | Sept. 1907 | .10 |
| New Century, z., l. | Mo. | 300,000 | 300,000 | 1 | 230,300 | Aug. 1907 | .00½ |
| Newhouse M. & S.c. | Utah | 6,000,000 | 600,000 | 10 | 600,000 | Nov. 1907 | .50 |
| New Idria, q | Cal | 500.000 | 100,000 | 5 | 940,000 | Oct. 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 | 5,800,000 | Sept. 1907 | 2.00 |
| North Star, g. | Cal | 2,500,000 | 250,000 | 10 | 1,536,989 | Oct. 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 | 7,627,080 | Oct. 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 | 17,945 446 | Dec. 1907 | 2.00 |
| 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 | 5,558,357 | Dec. 1907 | .15 |
| Silver Hill, g. s. | Nevada | 108,000 | 108 000 | 1 | 81 0.00 | June 1907 | .05 |
| Silver King, g. s. l. | Utah | 3.000,000 | 150,000 | 20 | 11,187,500 | July 1907 | .33⅓ |
| Silver King Co't'n. | Utah | 6,250,000 | 1,250,000 | 5 | 187,500 | Oct. 1907 | .15 |
| 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 | 450,000 | Sept. 1907 | .03 |
| Standard Con., g. s. | Cal | 2,000,000 | 178,600 | 10 | 5,192,641 | Dec. 1907 | .10 |
| Stratton's Independ | 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 | 3,500,000 | Oct. 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 | 165 000 | Oct. 1907 | .03 |
| United States, com. | Utah | 37,500,000 | 467,430 | 50 | 913,938 | Nov. 1907 | .87½ |
| United States, pfd.* | Utah | 37,500,000 | 348,167 | 50 | 3,937,500 | Nov. 1907 | .87½ |
| 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., pf. | Mo.-Kan. | 500,000 | 19.556 | 25 | 303,006 | Oct. 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 | 19,260.322 | Sept. 1907 | .75 |
| U.S. Red. & Ref. Pf | Colo | 4,000 000 | 39,458 | 100 | 1,005,504 | Oct. 1907 | 1.50 |
| Utah, g.(Fish Sp'gs) | Utah | 1,000.000 | 100,000 | 10 | 282,000 | Oct. 1907 | .03 |
| Utah Con., c. | Utah | 1,500.000 | 300,000 | 5 | 7,236,000 | Oct. 1907 | 1.00 |
| Victoria, Utah | Utah | 250,000 | 250,000 | 1 | 177,500 | Mar. 1907 | .04 |
| Vindicator Con., g. | Colo | 1.500.000 | 1,500,000 | 1 | 1.710.000 | Oct. 1907 | .03 |
| Wolverine, c. | Mich | 1,500,000 | 60,000 | 25 | 4,500,000 | Oct. 1907 | 7.50 |
| Work, g. | Colo | 1,500,000 | 1,500,000 | 1 | 150.000 | Oct. 1907 | .01 |
| Yankee Con | Utah | 500,000 | 500,000 | 1 | 157,500 | Oct. 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. †Amalgamated.

## 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 | 7,920,460 | Oct. 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 | 2,075,625 | Oct. 1907 | 1.50 |
| Central C. & C., pf. | Mo | 1,875,000 | 18,750 | 100 | 1,312,502 | Oct. 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 | 279,952 | Oct. 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 | 9,262,900 | Oct. 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 | 4,990,178 | Jan. 1908 | 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 | 26,308,495 | Nov. 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 |
| 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 | 2,347,602 | Jan. 1908 | 1.25 |
| National Lead, pf. | N. Y. | 15,000,000 | 149,040 | 100 | 16,845,968 | Dec. 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 | 225,702 | Nov. 1907 | 1.50 |
| Pacific Coast Borax. | Cal | 2,000,000 | 19,000 | 100 | 2,086,500 | Aug. 1905 | 1.00 |
| Peerless Oil. | al | 1,000,000 | 92,000 | 10 | 396,320 | May 1905 | .14 |
| Penna. Salt. | Pa. | 3,000,000 | 60,000 | 50 | 14,738,000 | Oct. 1907 | 3.50 |
| Penna. Steel, pfd. | Pa. | 25,000,000 | 168,214 | 100 | 8,204,493 | Nov. 1907 | 3.50 |
| Phila. Gas, com | Pa. | 28,953,029 | 579,061 | 50 | 8,484,336 | Nov. 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 | 5,688,042 | Dec. 1907 | 1.75 |
| Sloss-Sheffield, com. | Ala | 10,000,000 | 100,000 | 100 | 1,500,000 | Dec. 1907 | 1.25 |
| Sloss-Sheffield, pf. | Ala | 10,000,000 | 67,000 | 100 | 3,283,000 | Oct. 1907 | 1.75 |
| Standard Oil. | U. S. | 100,000,000 | 970,000 | 100 | 590,722,905 | Nov. 1907 | 10.00 |
| Tenn. C. & I., com | Tenn | 22,553,600 | 225,536 | 100 | 3,583,060 | Nov. 1907 | 1.00 |
| Tenn. C. & I., pf. | Tenn | 248,000 | 2,480 | 100 | 390,040 | Nov. 1907 | 2.00 |
| Texas & Pacific Coal. | Texas | 2,000,000 | 20,000 | 100 | 1,960,000 | June 1907 | 1.50 |
| Union Oil | Cal | 10,000,000 | 100,000 | 100 | 1,118,766 | May 1905 | .50 |
| United Metals Selling. | | 5,000,000 | 50,000 | 100 | 4,500,000 | Nov. 1907 | 7.50 |
| U. S. Steel Corp., cm. | | 500,000,000 | 5,083,025 | 100 | 68,583,053 | Dec. 1907 | .50 |
| U. S. Steel Corp., pf. | U. S. | 360,281,100 | 3,603,141 | 100 | 193,760,221 | Nov. 1907 | 1.75 |
| Va. Carolina Ch., pf. | U. S. | 20,000,000 | 180,000 | 100 | 12,540,869 | Oct. 1907 | 2.00 |
| Warwick I. & S. | U. S. | 1,500,000 | 145,581 | 1 | 473,138 | Nov. 1907 | .30 |
| 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 |
| Batopilas. | Mex | 9,000,000 | 446,268 | 20 | † 55,784 | Dec. 1907 | .12½ |
| Buffalo, s. | Ont. | 1,000,000 | 900,000 | 100 | 135,000 | Oct. 1907 | .03 |
| 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 |
| 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 | 2,400,000 | Oct. 1907 | 1.00 |
| Dominion Coal, pf. | N. S. | 3,000,000 | 30,000 | 100 | ‡525,000 | Aug. 1907 | 3.00 |
| 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 | 2,968,630 | Sept. 1907 | 3.00 |
| Greene Con. Copper. | Mex | 8,640,000 | 864,000 | 10 | 6,137,800 | 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 | 3,697,500 | Oct. 1907 | 2.50 |
| Kerr Lake, s. | Ont. | 3,000,000 | 600,000 | 5 | 390,000 | Oct. 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 | 600,000 | Aug. 1907 | .50 |
| Mines Co. of Am. | Mex | 2,000,000 | 2,000,000 | 1 | 2,865,000 | Nov. 1907 | .02 |
| N. Y. & Hond. Ros. | C. A. | 1,500,000 | 150,000 | 10 | 2,352,000 | Nov. 1907 | .10 |
| Nipissing, s. | Ont | 6,000,000 | 1,200,000 | 5 | 1,320,000 | Oct. 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 | 1,013,042 | Oct. 1907 | 1.50 |
| N. S. St. & Coal, pf. | N. S. | 1,030,000 | 10,300 | 100 | 417,150 | Oct. 1907 | 2.00 |
| Penoles*. | Mex | 250,000 | 2,500 | 100 | 8,263,375 | Aug. 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 | .05 |
| St. Eugene Con. | B. C. | 3,500,000 | 3,202,120 | 1 | 402,120 | Oct. 1905 | .02 |
| Tezuitlan Copper | Mex | 1,000,000 | 10,000 | 100 | | Oct. 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. †Since reorganization. ‡Since August, 1905.

# THE MINING INDEX.

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4812—AUSTRIA—Ueber die Arsenerzlagerstätten von Reichenstein. O. Wienecke. (Zeit. f. prak. Geol., Sept., 1907; 1½ pp.) Descriptions of the ieading geoiogical features of the arsenic ore deposits of Reichenstein in the province of Bresiau, Germany. 40c.

4813—SMELTING WORKS—The Deloro Mining and Reduction Company. (Can. Min. Journ., Nov. 15, 1907; 5½ pp.) Reviews the history of the early iife of this smeiting company and its recent reorganization to smeit the compiex arsenicai silver ores of Cobalt. The equipment and capabilities of the new plant are fuily outiined. 20c.

## ASBESTOS

4814—QUEBEC—The Asbestos Industry of Quebec. Raiph Stokes. (Min. Wld., Oct. 19 and Nov. 2, 1907; 5 pp.) Comments on the extent and character of the asbestos deposits of the Thetford, Black Lake and East Broughton districts, and gives brief notes on amounts of mineral extracted and economic features of mining. 40c.

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## COAL AND COKE

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4825—COKING PLANT—A Battery of Beigian Type Coke Ovens. (Iron Tr. Rev., Nov. 14, 1907; 7 pp.) Describes the construction of the modified types of Beigian coking ovens which are to be used on a iarge scale near New Salem, Penn.; also describes the leveling, drawing and quenching devices, the general layout and equipment of the plant, the surface works of the coai mine and the methods of handling the products. 20c.

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4827—ITALY—Ueber die fossiien Brennmaterialien Italiens und die Braunkohlenwerke Ribolla und Casteani in de Provinz Grosseto. K. Stegl. (Oest. Zeit. f. B. H., Oct. 19, 26 and Nov. 2, 1907; 10½ pp.) Reviews the coal measures of Italy and describes in particular the lignite deposits of Ribolla and Casteani in the province of Grosseto. Shows by many statistics the present status of the Italian coai industry in regard to output, exports, consumption, imports, etc. Also deals with the geological features of the lignite deposits of the Grand Duchy of Toscana. 80c.

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4831—MONTANA—Montana's Great Coalfields and Its Collieries. F. W. Parsons. (Eng. and Min. Journ., Nov. 23, 1907; 3½ pp.) Mentions the present coai resources of this State and the effect of a recent severe coai famine. Describes the effect of recent legislation upon coai mining, and discusses the economics of coal mining in the Northwest. 20c.

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## COPPER

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4843—GENESIS OF ORES—Precipitation of Copper from Chloride Solutions by Means of Ferrous Chloride. G. Fernekes. (Econ. Geol., Sept.-Oct., 1907; 4 pp.) Short account of an attempt to use ferrous chloride as a precipitant of metallic copper from solutions, with a view to applying the facts thus obtained to the genesis of the copper deposits of the Lake Superior region. 60c.

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4845—MEXICO—The Mines of Cananea, Sonora. (Min. Wld., Oct. 26, 1907; 2 pp.) Short descriptions of the mines of this district, their commercial importance and present state of development, also an outline of present industrial activity. 40c.

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4851—QUEENSLAND — Cloncurry Copper Mining District. L. C. Ball. (Queens. Gov. Min. Journ., Sept., 1907; 11½ pp.) Continuation of lengthy report on the above district, which has been previously mentioned in this Index. 60c.

4852—SMELTING PRACTICE—Notes on Copper—X. A. H. Sexton. (Mechan. Engr., Nov. 9, 1907; 4 pp.) Continuation of this article of which the present instalment concerns itself with the operations carried out in bessemerizing copper matte. 20c.

4853—UTAH—Some of the Mines of Tintic District. W. C. Higgins. (S. L. Min. Rev., Nov. 15, 1907; 3 pp.) Enumerates the various producing mines in the Tintic copper district with short comments on their physical and financial condition and prospects of future activities. 20c.

## FLUORSPAR

4854—KENTUCKY—Fluorspar Deposits of Kentucky, with Notes on the Production, Mining and Technology of the Mineral in the U. S. Also Some Data Concerning Barite Deposits. F. J. Fohs. (Ky. Geol. Surv., Bull. No. 9, 1907; 51 pp.) An abstract of a bulletin on the above subject soon to be published. The abstract comprises statistics and general reviews of production, lists of mines, notes on prices, special separating processes used in preparing fluorspar, etc.

## GOLD AND SILVER

4855—ASSAYING—Experiments in Fire Assaying at the Rejang Lebong Mine, Sumatra. G. B. Hogenraad. (Journ. Chem., Met. and Min. Soc. of South Africa, Sept., 1907; 5 pp.) Discusses the experiments made in attempting to obtain consitent values in gold and silver assays by varying the amounts of the various fluxes used in the charge. 60c.

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4858—CALIFORNIA—An Important Gold District Near Redding. (Min. Wealth, Oct. 1, 1907; 3½ pp.) Gives a review of the operations now going on in this mining district of Shasta county, together with a few facts as to the characteristics of the region. 20c.

4859—COLOMBIA—Gold Mining in Colombia. Juan de la C. Posada. (Eng. and Min. Journ., Nov. 2, 1907; 1 p.) Contains some general notes on the characteristic methods of working gold ores in this country, showing how inexperience and wasteful methods have resulted in considerable losses. The difficulties of establishing a modern plant are described. 20c.

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4862—CYANIDATION—Recent Advance in Cyanidation in Mexico. J. L. Mennell. (Min. Wld., Oct. 26, 1907; 1½ pp.) Review of the advances in the art of cyanide extraction recently attained in this country, giving short notes on some of the modern installations. 20c.

4863—CYANIDATION—Steps in Cyanidation. Philip Argall. (Proc. Colo. Sci. Soc., Nov., 1907; 24½ pp.) A historical outline of the discovery of cyanogen compounds and their application to the extraction of gold, the origin and growth of this art and the improvements which have recently been made in processes and apparatus for cyanide extraction.

4864—CYANIDE PROCESS at the Portland (Colo.) Mill. R. Chauvenet. (Min. Rep., Oct. 24 and 31, 1907; 41 pp.) Notes on the development of the present method of treating old mill tailings at Cripple Creek by cyaniding and the equipment and operations of the plant. 40c.

4865—CYANIDE TESTS—Notes on Preliminary Cyanide Work. H. F. A. Riebling. (Western Chem. and Met., Oct., 1907; 4 pp.) Description of methods generally adopted in preliminary work on ores to determine their suitability for extraction by cyanide. 60c.

4866—DREDGING Beach Gravel Deposits Near Nome. J. P. Hutchins. (Eng. and Min. Journ., Nov. 23, 1907; 6 pp.) Traces the history of early and unsuccessful attempts to handle Nome beach gravel by mechanical means and describes present operating methods and appliances which have to handle unequally frozen ground from beds of three beach levels. 20c.

4867—HYDRAULIC MINING in California. Al. H. Martin. (Min. Wld., Nov. 2, 1907; ½ p.) Short mention of the principal hydraulic mines of this State, their location and scope of operations. 20c.

4868—IDAHO—The Elk City Mining District, Idaho. G. A. Collins. (N. W. Min. Journ., Nov., 1907; 1 p.) A few notes on the extent of mining activity in this gold district. 20c.

4869—MEXICO—Mining and Milling in Guanajuato. (Min. Wld., Oct. 26, 1907; 4½ pp.) Points out the revival of mining operations in this district due to the application of cyaniding and gives brief outlines of the operations performed at some of the mines and mills. 40c.

4870—MILLING PRACTICE at El Oro Mine, Mexico. E. Burt. (Min. Wld., Oct., 26, 1907; 4 pp.) Notes on the general character of the concentrating processes in use at this mine with details of the sand and slime treatment and descriptions of the machines used therein. 20c.

4871—MILLING PRACTICE—The Desert Mill. A. R. Parsons. (Min. and Sci. Press, Oct. 19, 1907; 6 pp.) Very thorough description of the equipment of this 100-stamp mill designed to work on ores from Tonopah, Nevada, and an outline of the process to be used in the concentration. 20c.

4872—NEW ZEALAND—Waihi Gold Mining Company, Limited. (Min. Journ., Oct. 26, 1907; 3 pp.) Lengthy description of the concentration and power plants of this mine which has the largest gas engine installation in New Zealand. 20c.

4873—RUSSIA—Mining in Russia. (Min. Journ., Oct. 26, 1907; ½ p.) Short note on the territory of European and Asiatic Russia in which gold mining is forbidden to foreign enterprise and extracts from the existing laws wherein the prohibition is made. 20c.

4874—SLIMES TREATMENT—The Utilization of Waste Heat in Slimes Settlement. A. Salkinson. (Journ., Chem., Met. and Min. Soc. of South Africa, Sept., 1907; 3½ pp.) Discussion by H. A. White, E. J. Laschinger and J. Lea of the above paper, dealing with those factors which are of greatest importance in causing the settlement of slimes from solutions under the influence of waste heat. 60c.

4875—TUBE MILL PRACTICE—Notes on Some Recent Improvements in Tube Mill Practice. K. L. Graham. (Journ. Chem., Met. and Min. Soc. of South Africa, Sept., 1907; 2½ pp.) Discussion by R. G. Bevington of the above paper which was previously mentioned in this Index, together with the author's reply. 40c.

## GRAPHITE

4876—PRODUCTION of Graphite in 1906. G. O. Smith. (Advance Chapter from Mineral Resources of the U. S., Calendar Year 1906; 7 pp.) Short notes on the occurrence, uses, production, consumption and imports of graphite.

## IRON AND STEEL

4877—BLAST FURNACE GASES—The Blast Furnace as a Center of Power Production. B. H. Thwaite. (Cassier's Mag., Nov., 1907; 17½ pp.) Points out the very great industrial and economic advantages which would result from a concentration of iron furnaces near manufacturing centers so that surplus energy from blast-furnace gas may be pooled and subsequently distributed in electrical form as required. 60c.

4878—BLAST FURNACE LINING— Der experimentelle Nachweis der Schachtzerstörung im Hochofen durch ausgeschiedenen Kohlenstoff. B. Osann. (Stahl u. Eisen, Nov. 6, 1907; 2 pp.) Interesting description of a set of experiments showing the pernicious effect of separated carbon upon the refractory lining of the iron blast furnace. 40c.

4879—CARBON IN CAST IRON—Influence of Carbon on Cast Iron. (Foundry, Nov., 1907; 1 p.) A summary of the report by a Carnegie scholar who made a determination of the temperatures at which carbides are decomposed and whether the recalescent point had any influence upon this decomposition. 20c.

4880—CAST IRON—The Solidification of Cast Iron. E. L. Rhead. (Foundry, Nov., 1907; 2 pp.) Considers the behavior of cast iron during cooling and the properties of crystallized bodies. The changes which occur in the structure after it has reached the solid state and the effects of contraction are discussed. 20c.

4881—CASTINGS—Converter vs. Small Open-hearth. W. M. Carr. (Foundry, Nov., 1907; 1 p.) A consideration of the relative advantages and disadvantages of these two processes for the manufacture of small steel castings. In this instalment the losses in the converter, heat of the open-hearth furnace, and the influence of the raw materials on the choice of the process are discussed. 20c.

4882—CUPOLA CHARGING MACHINE. (Iron Tr. Rev., Nov. 7, 1907; 1 p.) Illustrates and describes the leading features of this device which is adapted to tilt the entire contents of a charging car directly into the cupola furnace. 20c.

4883—CUPOLA PRACTICE — Foundry Cupola and Iron Mixtures. W. J. Keep. (Proc. A. S. M. E., Nov., 1907; 16 pp.) A large collection of practical points concerning the construction, maintenance, repairing and operation of a cupola furnace; also for calculating charges.

4884—DESULPHURIZING — Beitrag zur Entscheweflung des Eisens im Kjellinschen Induktionsofen. A. Schmid. (Stahl u. Eisen, Nov. 6, 1907; 2½ pp.) Gives several definite instances of the success of the Kjellin induction furnace in desulphurizing pig iron and steel, giving analyses of products before and after the melting and commentiug briefly on the conditions attending the tests. 40c.

4885—ELECTRIC FURNACES—Der elektrische Induktionsofen nach dem System Röchling-Rodenhauser. H. Wedding. (Stahl u. Eisen, Nov. 6, 1907; 8 pp.) Deals very thoroughly with the principles of the Röchling-Rodenhauser induction furnace, its construction, operation, instaliation, capacity, efficiency aud the quality of steel turned out by it. 40c.

4886—ELECTRIC SMELTING—Die elektrische Herstellung von Eisen nach der Methode der Aktiengesellschaft "Elektrometall." Von Bergsmann. (Glückauf, Oct. 26, 1907; 2 pp.) The process and furnace used iu the production of iron by electrical means as carried out by the "Electrometall" company are described. Figures as to coal and power consumption, analyses of product and escaping gases are given. 40c.

4887—ELECTRIC SMELTING — The Hiorth Electric Furnace. (Min. Journ., Oct. 26, 1907; ½ p.) Short note on the cost and the possibilities of smelting the low-grade titaniferous iron ores of Norway by the process of the inventor who uses a special furnace, electric power generated from waterfalls and graphite in place of coke. 20c.

4888—EXCAVATING ORE—An Excavator and Conveyer Problem with Five Solutions. W. Barnes. (Industrial Mag., Nov., 1907; 8 pp.) Quarrying hematite ore in England in some quarries is done with the restriction that the overburden must he replaced after the ore is won, and the ground left in its original condition. The various methods adopted to accompiish this end and the kinds of apparatus used are the subjects of this article. 40c.

4889—FOUNDING — Specifications for Iron and Fuel, and Method of Testing Foundry Output. R. Moldenke. (Proc. A. S. M. E., Nov., 1907; 6 pp.) Shows the necessity of purchasing fuel and raw material for founding work of specification and the economies resulting thereby. Gives a statement of the methods used in testing foundry products, but no details as to the carrying out of these procedures.

4890—FOUNDING PRACTICE—Melting Iron for Foundry Purposes. E. L. Rhead. (Mechan. Engr., Nov. 2, 1907; 2½ pp.) Points out the bad effect of tuyere obstructions and the possibilities of hot blast. The preparation of the cupola, making the hottom, charging, the effect of moisture in the blast and the use and effect of coke and fluxes are deait with. (To be continued.) 20c.

4891—FOUNDRY—Ueber Aufbereitung und Beförderung des Formsandes in den Giessereien. J. Kraus. (Stahl u. Eisen, Oct. 16 and 23, 1907; 12½ pp.) Brief consideration of some principles regarding the selection and use of sand in the foundry, followed by extended descriptions of modern machines used in the preparation of molding sand for use. Deals also with the appliances and systems for elevating, conveying, storing, mixing and handling the sand after its preliminary preparation. To be continued. 60c.

4892—FRANCE—Die französische Eisenindustrie. H. Konrad. (Eisen Zeit.; Nov. 2, 1907; 1 p.) Reviews the commercial aspects of the French iron industry with reference to the consolidations which have recently taken place and speculates upon the possibility of similar international combinations so as to maintain industrial stability. (To be continued.) 20c.

4893—FRANCE—Etude sur l'Industrie du Fer dans le Nord des Ardennes Francaises. P. Dunaime. (Ann. des Mines, T. XII, 1907; 103 pp.) A study of the industrial conditions in the iron and steel iudustry in the province of Ardenne, showing number and location of works, scope of their operations, character of output, source and distribution of raw and finished material, etc.

4894—FURNACE ACCRETIONS — Zur Frage der Entstehung von Bodensauen und Graphitansammlungen in Hochofengestellen. B. Osann. (Stahl u. Eisen, Oct. 16 and 23, 1907; 12 pp.) The author inquires into the character and cause of formation of sows and graphitic accretious iu iron blast furnaces. 60c.

4895—GERMANY—Das neue Thomasstahlwerk des Aachener Hütten-Aktien-Vereins in Rothe Erde. (Stahl u. Eisen, Oct. 23, 1907; 4½ pp.) Describes the operations and equipment of the basic open-hearth department of the Aachen smelting company, and shows the scale on which the undertaking is carried out. 40c.

4896—HIGH SPEED STEEL—Actual Results with High-speed Steel. Fred H. Colvin. (Am. Machinist, Nov. 7, 1907; 1½ pp.) A summary of the information gained from several shops using special steels, showing present practice in annealing, handling, the advantages of low carbon steel and whether high speed steels actually pay. 20c.

4897—HISTORY OF SMELTING—Das Eisenhüttenwesen im Altertum. F. Freise. (Stahl u. Eisen, Nov. 6, 1907; 6 pp.) Traces the evolution and progress of iron smeiting in ancient Roman times, giving notes on the sources of raw material, the location of the smelting works, and illustrations of anclent furnaces. (To be continued.) 40c.

4898—LAKE SUPERIOR DISTRICT—Activities of Some Old Range Mines. (Iron Tr. Rev., Oct. 24, 1907; 3 pp.) States the present condition of the mines of the Menominee and other iron ranges with a few short notes as to ground breaking and future prospects of some of the mines. 20c.

4899 — METALLOGRAPHICAL STUDIES—Zur Metallographie des Roheisens, E. Heyn and O. Bauer. (Stahl u. Eisen, Oct. 30 and Nov. 6, 1907; 11 pp.) A metallographical study of the structure of pig iron in relation to the formation of graphitic carbon, determining at what temperature graphite begins to be formed and the relative speed at which the formation goes on as the temperature of the iron decreases. 60c.

4900—MICHIGAN—The Eastern Menominee Country. (Iron Tr. Rev., Oct. 31, 1907; 1½ pp.) Describes the present situation in the eastern part of this range, showing briefly the operations of the various groups on the range. 20c.

4901—MINNESOTA—Iron Ore in Crow Wing County, Minn. D. E. Woodbridge. (Eng. and Min. Journ., Oct. 26, 1907; 1 p.) Discusses the encouraging results which have been obtained from test holes in this district and outlines proposed plan for handling the ore. Prospecting operations in neighboring districts are commented upon. 20c.

4902—MINNESOTA—The Cuyuna Iron Range. N. H. Winchell. (Econ. Geol., Sept.-Oct., 1907; 7 pp.) A consideration of some new rock formations discovered on this range and evidence from new borings which may have bearing on the conditions under which the iron deposit was formed. 60c.

4903—ORE HANDLING PLANT at South Bethlehem, Penn. (Iron Age, Nov. 14, 1907; 4 pp.) At the reconstructed works of the Bethlehem Steel Company a very well designed system of ore handling is in use and contains unusual devices. A rolling car dump which dumps two full sized freight cars simultaneously hy tipping them upside down and other features, such as storage system, switching methods, ets., are fully described. 20c.

4904—PRODUCTION of Iron Ores and Iron Products in 1906. E. C. Eckel. (Advance Chapter from Mineral Resources of the U. S., Calendar Year 1906; 40 pp.) Gives a general survey of the production of iron ore in the United States as a whole, and then by separate districts. The pig iron and steel industry is reviewed with regard to progress in technology and the usual statistics of output, consumption, export and imports of iron ores and products are given.

4905—RAIL ROLLING—Rail Mill Practice and Rail Service. F. E. Abbott. (Iron Age, Nov. 14, 1907; 4½ pp.) A discussion of rolling rails and their average life, from the viewpoint of a manufacturer. The points taken up are the different stages of rolling, the influence and mutual relations of carbon, phosphorus, sulphur, silicon and manganese, the rail section, and causes of failures of rails. 20c.

4906—ROLLING PROCESS—Mannesmann Rolling Process. T. Steltmann and H. Kestner. (Jour. Transvaal Inst. Mechan. Eng., Oct., 1907; 6 pp.) Description of the arrangement of plant and working methods of this process of rolling weldless tubular articles and a discussion of the principles on which the process is based. 60c.

4907—SMELTING—The Lash Steel Process and the Electric Furnace. (Electrochem. and Met. Ind., Nov., 1907; 1 p.) The Lash process of steel production consists in mixing finely divided iron ore with carbon, a certain quantity of finely divided carboniferous iron, sawdust and fluxes suitable to the ore. This mixture is charged into an open-hearth furnace and is converted directly into steel by heat. The possibility of replacing the open-hearth furnace by an electric furnace is considered here. 40c.

4908—SPECIAL STEELS—Beitrag zum Studium des Systems Eisen-Wolfram. H. Harkort. (Metallurgie, Oct. 22, 1907; 9 pp.) Conclusion of article previously mentioned in this Index. 40c.

4909—STEEL PLANT—New Saucon Plant of Bethlehem Steel Co. (Iron Tr. Rev., Nov. 7, 1907; 14 pp.) Describes the entire equipment of this new unit of the Bethlehem Steel Company at So. Bethlehem, Penn., comprising rail, structural and beam mills, the beam mill being constructed according to the Grey patents. 20c.

4910—STEEL PLANT CONSTRUCTION—Heavy Foundations for the New Steel Works at Gary, Ind. (Eng. Rec., Nov. 2, 1907; 3 pp.) A history of the preparation of the site for this large steel works which will be nearly a mile square. The contractor's operations in handling material and concrete are taken up in detail. 20c.

4911—STEEL TRADE—Combination and Competition in the Steel Trade. T. Good. (Eng. Magazine, Nov., 1907; 9 pp.) Analyzes present economic conditions in the iron and steel industry of Great Britain and shows how the necessity of meeting competition of foreign combinations and labor unions at home is tending to bring about more powerful combinations in the steel and iron industry of Great Britain. 40c.

4912—SWEDEN—Die Eisenerzvorkommen in den Gemeinden Jukkasjärvi und Gellivare im schwedischen Regierungsbezirk Norrbotten. (Stahl u. Eisen, Oct. 30, 1907; 7 pp.) An abstract from a long article by W. Petersson on the character, extent and quality of the iron ore deposits in the Swedish provinces of Jukkasjärvi and Gellivare. 40c.

4913—TAXATION—Iron Mine Assessments in Minnesota. D. E. Woodbridge. (Eng. and Min. Journ., Nov. 23, 1907; 1 p.) An account of the action of the tax commission of this State, formed to classify mineral and iron deposits and the rates thereon. The results of the commissioner's reports and their effects on individual mine operators are given. 20c.

4914—TEMPERING STEEL—La Trempe de l'Acier. Paul Blum. (Rev. Industrielle, Oct. 19, 1907; 1 p.) Review of the salient points in a paper on this subject by M. Demozay before the Congress at Vienna, 1907. Analyzes the importance in the tempering process of the following factors: Duration of the heating, temperature to which the piece is carried, nature of the tempering bath, and the dimensions or size of the object being tempered. 40c.

4915—TITANIUM in Steel and Iron. C. V. Slocum. (Iron Tr. Rev., Nov. 16, 1907; 1½ pp.) Shows the remarkable wearing powers and hardness of titanium-steel and makes the assertion that the smelting of titaniferous iron ores is entirely possible if given proper attention and the right fluxes are used. 20c.

4916—VANADIUM STEEL. J. Kent Smith. (Proc. Eng. Soc. W. Penn., Oct., 1907; 26 pp.) Gives some general information as to the properties of vanadium and the qualities it imparts to tool and special steels. 40c.

## LEAD

4917—ELECTRIC EQUIPMENT — An Electrically Equipped Lead Mine. H. Floy. (Eng. News, Nov. 14, 1907; 2 pp.) Details and illustrates the various uses to which electrically operated machinery has been put in the mines of the St. Louis Smelting and Refining Company at St. Francis, Mo. 20c.

## MANGANESE

4918—PRODUCTION of Manganese Ore in 1906. E. C. Eckel. (Advance Chapter from Mineral Resources of the U. S., Calendar Year 1906; 11 pp.) Notes and statistics on production, uses and prices of manganese ores, together with a few chapters dealing with manganiferous iron ores and the manufacture of ferro-manganese and spiegeleisen.

## NICKEL

4919—DETECTION OF NICKEL—Nouvelle Réaction Caractéristique du Nickel,

Applicable à la Caractérisation instantanée du Nickel en Présence d'une Quantité quelconque de Cobalt. E. Pozzi-Escot. (Ann. de Chim. Anal., Oct. 15, 1907; 1½ pp.) Note on a method of detecting with certainty the presence of a small amount of nickel in the presence of considerable cobalt. The method depends on the insolubility of molybdate of nickel in a weakly acid solution and an excess of ammonium molybdate. Molybdate of cobalt is soluble under these same conditions. 40c.

## PETROLEUM AND NATURAL GAS

4920—CALIFORNIA—Geology and Oil Resources of the Summerland District, Santa Barbara County, California. R. Arnold. (U. S. Geol. Surv., Bull. No. 321; 93 pp.) Deals with the topography and geologic formations of the Summerland district, describes the wells now in operation, and gives a few conclusions as to future prospects. The physical and chemical properties of the oil and the cost of its production are briefly considered.

4921—GALICIA — Studien über die chemische Zusammensetzung galizischer Erdöle. R. Zaloziecki and J. Hausmann. (Zeit. f. angew. Chem., Oct. 11, 1907; 6 pp.) Investigates the composition of various crude oils from Galicia; also the character of the products obtained by fractional distillation. 40c.

4922—INTERNATIONAL PETROLEUM CONGRESS. David T. Day. (Eng. and Min. Journ., Oct. 26, 1907; 4 pp.) Discusses the personnel of the delegates to this convention which resulted in a great gain in knowledge of the technical and scientific aspects of the petroleum industry, and gives abstracts of the most important papers which were read. 20c.

4923—LIQUID FUELS—Technical Aspects of Oil as Fuel—II. F. E. Junge. (Power, Nov., 1907; 3½ pp.) Investigates the character and importance of those factors which affect the combustion of oil vapor and determines the cycle of operations adapted to give the highest possible results in burning liquid fuels. 20c.

4924—NATURAL GAS—The Occurrence of Helium in Natural Gas and the Composition of Natural Gas. H. P. Cady and D. F. McFarland. (Journ. Am. Chem. Soc., Nov., 1907; 13 pp.) Mentions the occurrence of natural gas in Kansas in which appreciable amounts of helium were discovered and describes the course of an investigation to develop a method of determining this substance analytically. The apparatus used is described. 60c.

4925—PRODUCTION of Petroleum in 1906. W. T. Griswold. (Advance Chapter from Mineral Resources of the U. S., Calendar Year 1906; 7¼ pp.) Reviews production in the different fields during 1906, gives average prices obtained, enumerates progress in the different States and gives a short review of the petroleum industry in foreign countries.

4926—RUMANIA — Rumänische Petroleum-Industrie. (Montan-Zeit., Nov. 1, 1907; 1½ pp.) A survey and review of the petroleum industry of Rumania, showing the growth in production and exportation of petroleum and its derivatives and giving brief information as to the financial affairs of the industry. 20c.

4927—UTAH—Virgin Oil Fields of Washington County. C. W. Higgins. (S. L. Min. Rev., Nov. 15, 1907; 2½ pp.) Notes on the geologic formations of this new oil field of southern Utah and the amount of development already accomplished. 20c.

## PLATINUM

4298—CRUCIBLES—Ueber eine Ursache der Zerstörung von Platingefässen. W. C. Heraeus. (Zeit. f. angew. Chem., Nov. 1, 1907; 2 pp.) Statistics relating to the use of platinum crucibles and their subsequent deterioration, lead to several theories as to the most probable causes of injury to them. Some of these theories, especially the effect of diffused hydrogen in the crucible causing the reduction of compounds being heated therein bringing about injurious alloys, were tested experimentally. 40c.

4929—CRYSTALLIZED PLATINUM—Ueber krystallisiertes Platin. F. Limmer. (Chem. Zeit., Oct. 12, 1907; ½ p.) Brief report on investigations made to determine the conditions under which platinum may be obtained in a crystallized condition. 20c.

**4930—PRODUCTION of Platinum in 1906. David T. Day. (Advance Chapter from Mineral Resources of the U. S., Calendar Year 1906; 16 pp.) Gives figures of production in the U. S. and reviews market and industrial conditions in the U. S. and in foreign countries.**

## RARE METALS

4931—RADIUM MANUFACTURE — A New Mineral Industry—The Manufacture of Radium. Jacques Boyer. (Eng. Mag., Nov., 1907; 8 pp.) Interesting description of the methods and equipment used for making radium bromide and other halogen compounds of radium in the works at Nogent-sur-Marne, France. 40c.

4932—TITANIUM in Steel and Iron. C. V. Slocum. (Iron Tr. Rev., Nov. 14, 1907; 1½ pp.) See under "IRON AND STEEL."

## SILICON

4933—ELECTRICAL PROPERTIES of Silicon. F. G. Wick. (Phys. Rev., Nov., 1907; 8 pp.) Contains a considerable amount of information upon the thermo-electric behavior of metallic silicon under different conditions, tabulating the observed properties in convenient tables and diagrams.

## SALT

4934—MANUFACTURE of Salt. Chas. E. Munroe. (Bull. 83, Dept. of Commerce and Labor, Bureau of the Census, 18 pp.) A survey of the entire salt industry, its manufacture from brine, its preparation from the mineral form, production, uses, consumption, etc.

## SULPHUR

4935—PERU—El Azufre de Sechura. J. Klinge. (Boletin de Minas, Lima, Peru, Aug. 24, 1907; 9½ pp.) Gives notes on the geography and history of the sulphur deposits of the region around Sechura, the means of communication with the district and takes up the question of exploitation in detail.

## TALC

4936—ONTARIO—The Henderson Talc Mine. (Can. Min. Journ., Nov. 1, 1907; 2½ pp.) Contains brief facts concerning the growth, equipment, working methods and present condition of this Canadian talc mine. 20c.

## TIN

4937—ALASKA—Tin Mining in Alaska. A. H. Fay. (Mines and Min., Nov. 15, 1907; 1 p.) Describes the conditions under which mining the tin deposits of this country must be carried out and enumerates the companies which have been most active in explorations and what they have accomplished. 20c.

4938—INDUSTRIAL CONDITIONS—A Review of the World's Tin-Mining Industries. A. Selwyn Brown. (Eng. Mag., Nov., 1907; 9 pp.) Shows how tin deposits are now exploited only in a restricted area and analyzes the steadily growing demand for this metal. The known tin deposits of the world are then reviewed with the idea of determining where and how the increased demand for tin is to be met. 40c.

4939—MEXICO—Tin Deposits of Mexico. H. G. Bretherton. (Min. Wld., Oct. 26, 1907; ½ p.) Notes on the history and present standing of the tin deposits which are situated in and about the border region between the States of Jalisco and Aguascalientes. 20c.

4940—NEW SOUTH WALES—Tingha Tin Dredging Industry (N. S. W.) P. J. Thibault. (Aust. Min. Standard, Sept. 18, 1907; 1½ pp.) Information concerning the capitalization and present operations of the Amalgamated Tin Dredging Company which has three dredging plants in operation in the Tingha field. 40c.

## TUNGSTEN

4941—ELECTROLYTIC REDUCTION—Zur elektrolytischen Reduktion der Wolframsäure. H. Leiser. (Zeit. f. Elektrochem., Oct. 25, 1907; 3½ pp.) Recounts some of the difficulties met with in the attempt to reduce acid solutions of tungsten salts by electrolysis and the methods used in overcoming them. 40c.

## ZINC

4942—ELECTRIC ZINC SMELTING. F. T. Snyder. (Min. Rep., Oct. 24, 1907; 1 p.) In the electric smelting of zinc ores, the heat of an electric current replaces the heat due to the action of the air blast on the burning coke in the blast furnace, and consequently zinc ores may be smelted in bulk without oxidation of the metal. Details of operating methods and costs of this new process are given. 20c.

**4943—ELECTROLYSIS—The Rapid Determination of Zinc by Electrolysis. Francis C. Frary. (Journ. Am. Chem. Soc., Nov., 1907; 7 pp.) This paper describes the method used in making a quick electrolytic determination of zinc. A cylindrical cathode of nickel gauze is used and the electrolyte is caused to rotate. The results of many tests showing the accuracy of the method are included. 60c.**

4944—GENESIS OF ORE—The Origin of the Lead and Zinc Deposits of Southwestern Missouri. E. R. Buckley. (L. & Z. News, Nov. 4, 1907; 3 pp.) Reviews various theories which have been brought forward to account for the origin of the lead and zinc ore deposits of the Joplin district. 20c.

4945—HOISTING at the Yellow Dog Mine Near Webb City, Mo. Doss Brittain. (Eng. and Min. Journ., Nov. 16, 1907; 2 pp.) Describes in considerable detail the endless chain bucket hoist of this mine of which 260 ft. is underground, the distance between sprockets being 300 ft. Without needing an attendant it hoists 500 tons per 8-hour shift. 20c.

4946—MILLING—Improvements in Milling Missouri Zinc Ores. W. E. Ford. (Eng. and Min. Journ., Nov. 9, 1907; 2½ pp.) Considers those peculiar conditions which must be observed in concentrating ores from the Joplin districts and points out the way in which the problem of obtaining increased economical extraction from mill tailings should be attacked. 20c.

4947—MILLING PRACTICE in the Joplin District. Doss Brittain. (Ores and Metals, Nov. 5, 1907; 7 pp.) Traces the evolution of concentrating methods used in the Joplin district from the first attempts at hand sorting to present day jigging and tailings treatment, giving many details of construction of various types of jigs. 20c.

4948—MINING AND METALLURGY—Zinc, Its Minerals and Its Metallurgy. E. W. Buskett. (Ores and Metals, Oct. 20, 1907; 2 pp.) Brings into condensed form a lot of well-known facts relating to the occurrence of zinc ores, their identification and analysis, and the methods used in extracting zinc from them. 20c.

4949—MINING COSTS — Estimates of Costs of Mining Operations in the Joplin District. (L. & Z. News, Nov. 4, 1907; 2 pp.) Compiles many estimates as to cost of mining in the Joplin district, these estimates having been made by mine operators and managers who are actually engaged in mining exploitation. 20c.

4950—SHEET-GROUND MINE in Southwest Missouri. D. T. Boardman. (Eng. and Min. Journ., Nov. 9, 1907; 3 pp.) Contains mine and mill reports from a Webb City sheet ground mine, also details of management and operation, and shows what careful management, supervision and judicious investment in a district of this character can accomplish in the way of efficient mining and milling. 20c.

4951—SHEET GROUND MINING—The New Sheet Ground of the Joplin District. Doss Brittain. (Min. Wld., Nov. 9, 1907; 3¾ pp.) After defining a sheet ground deposit and describing the leading characteristics of this type of deposit, the article enumerates the various sheet ground mines in the Joplin territory and gives short notes on the scope of their operations. 20c.

4952—SLUDGE MILLING — Sludge-Mill Practice in the Missouri-Kansas District. (Min. Rep., Nov. 7, 1907; 2½ pp.) Some notes on present methods of treating sludge and fine tailings in the Joplin district. Describes also the construction and operation of circle tanks which have proved useful in saving values from fine material. 20c.

4953—SMELTING—History of Smelting in the Joplin District. Doss Brittain. (Eng. and Min. Journ., Nov. 2, 1907; 6½ pp.) An interesting review of the growth of the zinc and lead smelting industry of Joplin from its beginning to the present time, tracing the history of the various operators and companies and giving valuable data on primitive smelting practice and its costs. 20c.

4954—WALES—Lead and Zinc Mines of North Wales. Edward Walker. (Eng. and Min. Journ., Nov. 9, 1907; 4½ pp.) Gives geological and historical information of interest concerning the Flintshire district of North Wales which probably has passed its zenith of importance. The methods of concentration and special devices used therein are described and illustrated. 20c.

## ECONOMIC GEOLOGY—GENERAL

**4955—COLORADO AND UTAH—Stratigraphic Results of a Reconnaissance in Western Colorado and Eastern Utah. W. Cross. (Journ. of Geol., Oct.-Nov., 1907; 46 pp.) Gives many facts connected with existing sedimentary outcrops as seen on a recent reconnaissance through this district and confirms a previous correlation of the strata of this region with the sedimentary formations of the Plateau Province. 60c.**

4956—FAULTING—Possible Oblique Minor Faulting in Alaska. L. Martin. (Econ. Geol., Sept.-Oct., 1907; 4 pp.) Suggests the possibility that some of the faults caused by the Yakutat Bay earthquake of 1899 were oblique and considers the value of the evidence for this belief. 60c.

4957—FAULTS—The Fault Problem—I. T. C. Chamberlin. (Econ. Geol., Sept.-Oct., 1907; 16 pp.) Continuation of the discussion on this subject, this article being a plea to reduce the use of ill-considered and hypertechnical terms until more is known as to the forces which cause faults. (To be continued.) 60c.

4958—FINLAND—Finlands nutzbare Lagerstatten. (Zeit. f. prak. Geol., Sept., 1907; 9 pp.) Abstracts from a report by the German consul at St. Petersburg, giving information as to the natural resources of Finland, the extent of its ore deposits and some figures showing mineral and metallurgical output. 40c.

4959 — GEOLOGICAL HISTORY — The Broader Features of the Geologic History of North America in Diagram. H. W. Shimer. (Technology Quar., Sept., 1907; 4½ pp.) Indicates the main changes in land and sea-levels which have taken place in early times on the American continent and points out briefly the general effect of these changes upon climate, fauna and sedimentation. 80c.

4960—MARYLAND—Geologic Atlas of the U. S. Patuxent Folio. Maryland-District of Columbia. (U. S. Geol. Surv., 1907; 20 pp.) Descriptions of structural, historical and economic geology within the Patuxent quadrangle, accompanied by very detailed geological and topographical maps and charts. 40c.

4961—MEXICO—Geologic and Geographic Aspects of Mexico—IX. R. T. Hill. (Min. Wld., Nov. 2, 1907; ½ p.) Continuation of this article which was previously mentioned in this index, dealing in this instalment with Sinaloa. 20c.

4962—MEXICO: Its Geology and Natural Resources. Robt. T. Hill. (Min. Wld., Oct. 26, 1907; 5½ pp.) General statements as to the geology of Mexico, followed by studies of conditions in the Sierra Almoloya district, its geologic structure and history, its mineralization and outcrops. 20c.

4963—MICHIGAN—Notes on the Geological Section of Michigan. Part I. The Pre-Ordovician. A. C. Lane and A. E. Seaman. (Journ. of Geol., Oct.-Nov., 1907; 16 pp.) Contains results of studies into the geological relation of the pre-Ordovician rocks of Michigan with attempts at correlation. 60c.

4964—MINERAL PAINTS—The Production of Mineral Paints in 1906. Edwin C. Eckel. (Advance Chapter from Mineral Resources of the U. S., Calendar Year 1906; 12 pp.) Contains statistics of output, imports, etc., of ocher, umber, sienna, metallic and mineral paints, zinc white, lead pigments, lithophone and a review of the geology and technology of metallic paint deposits of the Lehigh Gap district and the producing centers in Tennessee and Georgia.

4965—PHILIPPINES—Notes on the Geology and Geography of the Baguio Mineral District. A. J. Eveland. (Philippine Journ. of Sci., Aug., 1907; 30 pp.) Treats of the geography, hydrography, physiography, topography and general geology of this district. As yet the ore deposits here are too little known to allow much to be said of them and the pamphlet is of scientific interest only. 60c.

4966—ROCKY MOUNTAIN REGION, Certain Features of the. H. F. Evans. (Min. Wld., Oct., 19 and Nov. 2, 1907; 1½ pp.) The first of a series of articles on this region, giving in the present a few general notes on its chief physical characteristics. 40c.

4967—TENNESSEE - NORTH CAROLINA—Geologic Atlas of the U. S., Roan Mountain Folio. (U. S. Geol. Surv., 1907; 22 pp.) Gives exact topographic and geologic charts and maps of the Roan Mountain district describing the rock series which are exposed and giving information as to occurrences of minerals of economic importance. 40c.

## MINING—GENERAL

4968—AUSTRALIA—Mining in Australia. W. J. Loring. (Min. and Sci. Press, Oct. 19, 1907; 2 pp.) Short summary of present activity in mining throughout the different Australian states. 20c.

4969—BRITISH COLUMBIA—Mining in British Columbia. R. W. Young. (Brit. Col. Min. Rec., Sept., 1907; 7 pp.) Reviews the character and scope of operations in the chief mining districts of this Province. 20c.

4970—BRITISH COLUMBIA—Mining in Kamloops District. (B. C. Min. Exch., Oct., 1907; 2½ pp.) Contains information as to the mineral deposits of the Kamloops district, the extent of mining activity and the chances for future development and investment. 20c.

4971—CARD SYSTEM in Colorado. W. E. Pasmore. (Eng. and Min. Journ., Nov. 9, 1907; ½ p.) The card system of identifying and designating miners in the Cripple Creek district has been replaced by a more stringent method of recording men undesirable to mine employers. This new system is here described and commented on. 20c.

4972—DRAFTING—Devices for the Draftsman. (Mechan. Wld., Oct. 18, 1907; 1 p.) Describes briefly some unique and useful devices for reducing labor in drafting. 20c.

4973—DRILLING—Multiple Arrangement of Drills on the Rand. W. P. J. Dinsmoor. (Eng. and Min. Journ., Oct. 26, 1907; ½ p.) Compares the rapid drilling of a tunnel at Cripple Creek with the progress made on the Rand when multiple drills were used, and inquires briefly into the causes of the differences in progress in the two cases. 20c.

4974—ELECTRIC SIGNAL SYSTEM for Mines. C. L. C. Fichtel. (Eng. and Min. Journ., Oct. 26, 1907; 1 p.) This system operates on any voltage from 50 to 500, on either a direct or alternating current. Two power and one signal wire are required. The methods of installation and of operating the colored lamps which do the signaling are fully outlined. 20c.

4975—ELECTRICITY IN BOREHOLES—Ueber Gewinnung elektrischer Energie aus Tiefbohrlöchern. Tecklenberg. (Oest. Zeit. f. B. u. H., Oct. 12, 1907; 4 pp.) The author proposes the plan of utilizing the magnetic effects which are often met with in deep boreholes as a source of electric energy. Some of the methods which he used in detecting and measuring these magnetic effects are described briefly. 40c.

4976 — EMPLOYERS' LIABILITY — The British Workmen's Compensation Act, 1906. (Can. Min. Journ., Nov. 1, 1907; 2½ pp.) Analyzes many of the provisions of the British Workmen's Compensation Act of 1906 which went into operation in July, 1907, and imposes severe burdens upon mining companies in the matter of liability for injuries to workmen. 20c.

4977—ENGINEERING OBSERVATIONS and Data. B. H. Reddy. (Iron Tr. Rev., Oct. 31, 1907; 3 pp.) Gives some of the methods which the author has pursued in collecting engineering data and classifying and filing them so as to be readily accessible. Many specimen cards and valuable hints to a young engineer are given. 20c.

4978—FILING NOTES AND CLIPPINGS. E. E. White. (Eng. and Min. Journ., Nov. 9, 1907; ½ p.) Describes a method of filing and classifying clippings from all sources related to mining and smelting interests. 20c.

4979—FREEZING PROCESS—Mechanical Production of Low Temperatures. (Eng. and Min. Journ., Nov. 9, 1907; 1 p.) The author corrects some erroneous statements made by S. F. Walker in an article on "Mechanical Production of Low Temperatures." Defines the functions of $CO_2$ refrigerating machines and the principle of the "closed system high pressure" type of refrigerators. 20c.

4980—HOISTING—Ueber Hauptschacht-Förderung mit Koepe-Scheibe. M. Kaufhold. (Bergbau, Nov. 7, 1907; 1½ pp.) Investigates from a theoretical and mathematical point of view, the friction coefficient between rope and sheave in the Koepe system of hoisting. (To be continued.) 20c.

4981—HOISTING ROPES—A Few Notes on Tests of Worn Ropes. W. M. Epton. (Journ. Transvaal Mechan. Engrs., Oct., 1907; 7½ pp.) Discusses and analyzes the results secured in breaking many samples of worn hoisting rope and shows that the gripping of wires after short use will raise the breaking strength of the rope above the aggregate strength of the individual wires. 60c.

4982—HOISTING ROPES for Mines. (Eng. and Min. Journ., Nov. 16 and 23, 1907; 5 pp.) Abstracts from the report of the Transvaal Commission upon the operation of mines. The portion of the report here included contains much very valuable information on the structure of hoisting rope in general, the kinds of rope used on the Rand, advantages of hemp and wire cores, parallel and tapered ropes, etc. (To be continued.) 20c.

4983—HOISTING ROPES—Transvaal Report on Rope and Safety Catches. E. M. Weston. (Eng. and Min. Journ., Nov. 2, 1907; 3½ pp.) Abstracts from the above report, showing the necessary requirements demanded in safety catches, and describing the construction of several leading types of this class of device. 20c.

4984—IGNITION TEMPERATURES of Gaseous Mixtures. K. George Falk. (Journ. Am. Chem. Soc., Nov., 1907; 25½ pp.) Describes in considerable detail the experimental work, apparatus, and results obtained from a new method of testing the ignition temperature of gases. The method consists of instantaneously compressing the gas in a vessel, measuring the temperature before and after compression. 60c.

4985—LAW—A Broad Apex. (Min. and Sci. Press, Nov. 9, 1907; 4 pp.) Contains the decision of the Supreme Court of the United States on a case arising from a dispute at Bingham, Utah, where the apex was so broad as to pass outside the side lines of a single company. 20c.

4986—LAW OF THE APEX, A Remedy for the. James Douglas. (Eng. and Min. Journ., Nov. 23, 1907; 1 p.) Paper read before the Am. Min. Congress, Nov., 1907. Points out the advantages of adjacent mining companies' agreeing mutually to waive rights under the apex law and to claim and work only that ore which lies within the vertical projection of their claim boundaries. 20c.

4987—LOCATION—Locators Who Have Not Complied with the Law. R. L. McWilliams. (Pac. Miner, Oct., 1907; 1 p.) A review of some of the legal aspects of locating mining claims and a consideration of some recent cases in which the courts have ruled on disputed points as to possession of claims. 20c.

4988—MAP FILING—System of Map Filing. G. N. Pfeiffer. (Min. and Sci. Press, Nov. 9, 1907; ½ p.) Brief descriptions of the cabinets and system used in filing mine maps at a Californian mine. 20c.

4989—MEXICO—History of Mining Developments in Mexico. T. C. Graham. (Min. Wld., Oct. 26, 1907; 2 pp.) Some interesting information about the part played in the history of Mexican mining by investments and work of foreigners. 20c.

4990—MEXICO—Mineral Resources on Kansas City, Mexico and Orient Railway. J. W. Malcolmson. (Min. Wld., Oct. 26, 1907; 1½ pp.) A summary of the natural resources, particularly those of a mining character, which are tapped by this new railroad line. 20c.

4991—MEXICO—Mining and Metallurgy in Mexico. (Min. Wld., Oct. 26, 1907; 10 pp.) Articles setting forth the progress in mining, milling, metallurgy and the nature of the deposits in the following States and mining districts: Chihuahua, Michoacan, Aguascalientes, San Luis Potosi, Mexico, Nuevo Leon, Tepic, Coahuila, Sinaloa, Hidalgo, Guerrero, Zacatecas, Hostotipaquillo, Durango, Jalisco, Oaxaca, Guanajuato, Rastras Ranch, Cananea and Sonora. 40c.

4992—MEXICO—Railroad Development in Northern Mexico. R. Coleman. (Min. Wld., Oct. 26, 1907; ½ p.) Tells of the proposed railroad extensions toward Guadalajara and south from El Paso, pointing out what an impetus these roads will give to mining interests. 20c.

4993—MEXICO—Some Notes on a Journey Through Mexico. D. E. Woodbridge. (Min. Wld., Oct. 26, 1907; 4½ pp.) An interesting record of experiences and impressions of the author during a trip through Sonora, Sinaloa, Tepic and the west coast of Mexico, describing existing conditions and customs of the people in these sections. 20c.

4994—MEXICO—The Climate and Natural Resources of Mexico. E. A. H. Tays. (Min. Wld., Oct. 26, 1907; 1½ pp.) Summarizes the most important facts relating to the climate, the natural resources, the people and the laws of Mexico. 20c.

4995—MEXICO—The Economic Progress of Mexico Since Early Times. C. C. Schnatterback. (Min. Wld., Oct. 26, 1907; 14 pp.) A statistical review, showing by official figures the growth of output, and export of mineral and metallurgical products, also the increasing area of mining ground denounced and its distribution among the various States. 20c.

4996—MEXICO—The Greene Mining Interests in Mexico. R. Coleman. (Min. Wld., Oct. 26, 1907; 2 pp.) Describes the extent of the holdings of the Greene family which is an important factor in Mexican mining development and enumerates the various properties controlled by it. 20c.

4997—MINE DAMS—Ueber einen Grubendamm aus Passstücken. Dr. Weise. (Glückauf, Oct. 19, 1907; 4½ pp.) Relates the manner in which mine dams are used to block off floods and fires by a structure easily constructed from columns and sheets either wood or metal. 40c.

4998—MINE MANAGEMENT. To Young Men About to Become Mining Engineers. C. DeKalb. (Min. and Sci. Press, Nov. 2, 1907; 3½ pp.) An address delivered to mining students of the University of California, giving an interesting and forceful exposition of the principles upon which managerial success is based, and outlining the ideal attitude of a manager to his work and principals, and the

best means of attaining efficient administration. 20c.

4999—MINE TEMPERATURES—Das Temperament der Grube. Lehrer. (Bergbau, Nov. 7, 1907; 1½ pp.) Deals with theoretical aspects of the influence of ventilating currents on mine temperatures, discussing some of the fundamental equations which are used in calculations relating to this subject. 20c.

5000—MINERAL PRODUCTION — Summary of the Mineral Production of the U. S. in 1906. Wm. Taylor Thom. (Advance Chapter from Mineral Resources of the U. S., Calendar Year 1906; 57 pp.) Gives a summary of all statistical matter relating to consumption and production of metals, fuels, abrasive aud structural materials, chemicals, pigments, and minerals in the U. S. during 1906.

5001—MINER'S INCH—Calibrations of Various Miner's Inch Openings. K. A. Hawley. (Journ. Elec., Power & Gas, Nov. 2, 1907; 2 pp.) Describes some investigations made to determine the proper coefficients to apply to various orifices in order to calculate the amount of water delivered under given heads. 20c.

5002—PROFESSIONAL ETHICS. C. DeKalb, G. E. Collins, R. C. Turner and others. (Min. and Sci. Press, Oct. 19, 1907; 3 pp.) A series of questions as to professional ethics propounded by a young engineer about to undertake his first trip to examine a mining property; also answers to the questions by several reputable engineers. 20c.

5003—PROSPECTING by Deep Well Drilling. L. C. Corneil. (Eng. and Min. Journ., Nov. 9, 1907; ½ p.) Points out the importance of an experienced operator for churn-drill prospecting and the value of a proper selection of drilling rigs and equipment. Some figures as to costs of drilling and of moving drills from one location to another are included. 20c.

5004—PUBLICITY IN MINING—The Wyoming Voluntary Publicity Law. (Compiled by H. C. Becter, Cheyenne, Wyo., 1907; 11 pp.) Gives the provisions of this Wyoming law which offers mining companies a voluntary means of placing reliable information on file and accessible to the public at large, and of distinguishing legitimate enterprises from frauds. The working of the law is apparently favored by honest mining ventures.

5005—REGULATIONS — Rules for the Guidance of Employees Underground. R. C. Turner. (Min. and Sci. Press, Oct. 19, 1907; 1 p.) A reprint of the regulations made by two mining companies and enforced by them with the idea of safeguarding both the life of the employee and the interests of the employer. 20c.

5006—ROCK DRILL ECONOMICS: Advantages of High Pressures. (South African Mines, Oct. 19, 1907; 1 p.) Rehearses the chief weaknesses in the present methods of supplying air to underground drills on the Rand and of sharpening drills. 20c.

5007—SHAFT SINKING—Care of Plant in Sinking by Refrigeration. Sydney F. Walker. (Eng. and Min. Journ., Oct. 26, 1907; 2 pp.) Deals with the causes of interruptions in sinking operations and the methods of preventing and overcoming them. 20c.

5008—SLAG-DAMS. H. W. Hixon. (Min. and Sci. Press, Nov. 2, 1907; 1 p.) A few additional short details on the method of handling the track for the slag bowls and the preparation of the foundation and spillway of slag dams. 20c.

5009—STEAM SHOVELS—Ueber Löffelhochbagger. M. Buhle. (Glückauf, Oct. 12, 1907; 6½ pp.) Reviews the present state of steam shovel practice in Germany, illustrating several types of shovels and giving information as to their accomplishments. 40c.

5010—SURVEYING—A Method of Mine Surveying. (Can. Min. Journ., Nov. 15, 1907; 2 pp.) Describes some modifications in methods of making observations, recording notes and making calculations, developed by the author to suit his needs. Specimen pages from note books and sample calculations are given. 20c.

5011—SURVEYING—Invar (Nickel-Steel) Tapes on the Measurement of Six Primary Base Lines. O. B. French. (Proc. A. S. C. E., Oct., 1907; 23 pp.) Deals with the use of a nickel-steel tape as a substitute for bars in measuring base lines. Comparisons of the economy, speed and accuracy of the tape as against bars are given, and notes on the method of using the tape at night, are given.

5012—TIMBER—Second Progress Report on the Strength of Structural Timber. W. K. Hatt. (U. S. Dept. of Agriculture, Forest Service, Circular 115, Oct. 24, 1907; 39 pp.) The tests here reported were made on longleaf pine, tamarack, Norway pine, Douglass fir and loblolly pine, and show the effects of moisture distribution, knots and seasoning on ultimate strength.

5013—TIMBER PRESERVING—The Creosoting Process. I. C. Iken. (Cal. Journ. Technology, Oct., 1907; 2 pp.) Notes on the manner of carrying out the process of timber preservation by drying the wood by steam and then injecting creosote into the open pores by pressure. 20c.

5014—TIMBERS—Prolonging the Life of Mine Timbers. J. M. Nelson. (U. S. Dept. of Agriculture, Circular 111, Oct. 10, 1907; 18 pp.) Gives the results of an investigation to determine the best methods of prolonging the life of mine timbers.

5015—TRANSYLVANIA—Ancient Mining in Transylvania. G. Slujka. (Eng. and Min. Journ., Oct. 26, 1907; ½ p.) A brief historical review of mining operations in Hungary from the beginning of the Christian era. 20c.

5016—WASTE STOWING—Spülversatzanlagen auf Zeche Deutscher Kaiser bei Hamborn. (Glückauf, Nov. 2, 1907; 7 pp.) At the shaft of the Deutsche Kaiser mine at Hamborn, a waste disposal installation makes use of sand from blast furnace slag as filling material. The working of the filling process and information as to relations between amount of material, size of sand particles, amount of carrying water, etc., are given. 40c.

5017—YAK TUNNEL. H. C. Armstrong and H. W. Stotesburg. (Am. Min. Rev., Oct. 19 and 26, 1907; 2½ pp.) Deals with the methods of sampling the ores from the various mines tapped by the tunnel; also the methods used in exploiting the mines. 40c.

## ORE DRESSING—GENERAL

5018—CONCENTRATING TABLE—Traylor Concentrating Table. R. Meeks. (Eng. and Min. Journ., Nov. 23, 1907; 1 p.) This concentrating table has a hinged deck so that part of the working surface may be level and the other section sloping. Riffles are formed by stretching a rubber sheet over a set of wooden strips instead of having the riffles tacked on the upper surface as in the ordinary table. 20c.

5019—CONCENTRATION Upside Down. W. R. Ingalls. (Eng. and Min. Journ., Oct. 26, 1907; 5½ pp.) This concentration process makes use of surface tension which, being greater than gravity in the case of finely crushed concentrates, causes them to float when placed on a water surface, while similarly crushed gangue particles sink. The apparatus used, and the limitations, advantages and accomplishments of this process are fully discussed. 20c.

5020—HARDINGE CONICAL MILL. H. W. Hardinge. (Eng. and Min. Journ., Nov. 16, 1907; 1½ pp.) A consideration of some of the principles of crushing and grinding by use of tube mills. Many experiments were carried out to attempt to settle various questions such as most effective diameter and length of mill, revolutions under different loads, size of pebbles, relation of size of feed to diameter of mill and pebbles, etc. 20c.

5021—JIGGING by Hand. Arthur C. Nahl. (Min. and Sci. Press, Nov. 2, 1907; 3 pp.) Recounts the experiments made in settling upon the design and construction of a simple and efficient hand jig adapted to use on fine, low-grade material which cannot be sorted by hand economically. The type of jig evolved is now in use and is shown by various working drawings. 20c.

5022—NEW SOUTH WALES—Method of Treating Ore at Broken Hill. Al. H. Martin. (Ores and Metals, Nov. 5, 1907; 1 p.) Gives information as to the method of handling ore at this Australian silver-lead mine, of weighing and crediting production to individual miners and general statements as to the course of ore during dressing. Not a specific article. 20c.

## METALLURGY—GENERAL

5023—BLAST FURNACE CHARGING—The Charging of Blast-Furnaces. E. H. Messiter. (Min. and Sci. Press, Oct. 26, 1907; 4½ pp.) The author describes his ore-bedding and conveying system which is adapted to the economical handling of large amounts of ore and fluxes. Full details of this scheme are given and its advantages and limitations are pointed out. 20c.

5024—CHLORINE—A New Application of Chlorine in Metallurgy. Chas. E. Baker. (Min. Rep., Oct. 24, 1907; 1¾ pp.) Description of a new process of ore treatment in which electrolytically produced chlorine is forced into a special tube mill containing the sulphides to be treated and flint pebbles. The chlorine is said to replace the sulphur in the ground ore, making the metals soluble and renewing the sulphur by excess chlorine as a marketable by-product. 20c.

5025—ELECTRIC FURNACES—Neue Elektrische Oefen im Hüttenwesen. Walter Ritter v. Molo. (Oest. Zeit. f. B. u. H., Oct. 19, 1907; 3¾ pp.) Describes special points in the construction and new devices in several types of modern electric furnaces, making them of increased importance to smelting men. 40c.

5026—ELECTRO-METALLURGY — Applied Electro-Metallurgy up to the End of 1906. John B. C. Kershaw. (Eng. Magazine, Nov., 1907; 17 pp.) Conclusion of the above review. This instalment treats of the metallurgy of ferro-alloys, iron and steel, and briefly deals with lead, nickel siloxion, silicon, sodium, tin and zinc. The Heroult, Stassano, and Kjellin types of furnaces are given especially interesting treatment. 40c.

5027 — FURNACE CHARGING. G. F. Beardsley. (Min. and Sci. Press, Nov. 9, 1907; 1 p.) Description of some changes which were made in the automatic charging apparatus of copper furnaces when the latter were remodeled in order to secure increased capacity. 20c.

5028—HARDNESS OF METALS—An Instrument for Testing Hardness. A. F. Shore. (Am. Machinist, Nov. 14, 1907; 4½ pp.) This new instrument measures hardness by the amount of indentation in the metal tested when struck by a given weight having a fixed area of contact. The importance of this machine, its operation and the variety of uses to which it can be put in testing metals and alloys are discussed at length. 20c.

5029—HEAT TREATMENT—Apparatus for Heat Treating Metals. E. F. Lake, I. W. Chubb, and Adolph Machlet. (Am. Machinist, Nov. 7, 1907; 10¼ pp.) Description of new furnaces for hardening metals, lined with quartz and provided with a recording pyrometer. 20c.

5030—MELTING—Economy in Melting. J. H. Hart. (Metal Industry, Nov., 1907; 1½ pp.) Considers the various means whereby economies in handling and melting metals may be practiced, taking up such points as fuel consumption, heat utilization, design of furnace, and ordinary efficiencies attained in heat utilization. 20c.

5031—MELTING POINTS—Die Schmelzdiagramme der binären Systeme Schwefelsilber-Kupfersulfür und Bleiglanz-Kupfersulfür. K. Friedrich. (Metallurgie, Oct. 22, 1907; 4 pp.) This article deals with the experimental work in determining the melting curves of mixtures of silver and copper sulphides; also of lead and copper sulphides. 40c.

5032—METAL REFINING—Copper, Lead and Zinc Smelting and Refining. S. B. Ladd. (Dept. of Com. and Labor, Bureau of the Census, Bulletin 86; 32 pp.) Commercial and industrial review of the business of refining these metals, giving information as to number and distribution of the various plants, capital invested, extent of operations, and processes employed. But trifling attention is given to the technical aspects of refining.

5033—OXYGEN DISSOCIATION—Ueber Dissoziationsspannungen resp. Sauerstoffdrücke einiger Oxyde in den Röst- und Schmelzhitzen der Flammöfen. W. Stahl. (Metallurgie, Oct. 22, 1907; 9½ pp.) A long mathematical and electro-chemical discussion of the principles and conditions underlying the dissociation of various oxides in roasting and smelting operations in reverberatory furnaces. 40c.

5034—PRODUCTION OF LIME and Sand-lime Brick in 1906. E. C. Eckel. (Advance Chapter from Mineral Resources of the U. S., Calendar Year 1906; 7 pp.) Information as to the output, the uses and the distribution of these substances in the United States.

5035—PYRITIC SMELTING—Negative Results in Pyritic Smelting. L. T. Wright. (Eng. and Min. Journ., Nov. 2, 1907; 2 pp.) Applies the principles of heat formation of various slags and matte compounds to the discussion of the failure of pyritic smelting of nickel ores from Sudbury, Ontario, and reaches the conclusion that there was not sufficient fuel present to supply enough heat to keep the smelting process going. 20c.

5036—PYROMETRY — Optical Pyrometry. C. Fery. (Engineering, Oct. 18, 1907; 1 p.) A consideration of the theory of pyrometers which depend on radiations from the body whose temperature is being measured, and a discussion of the special features of some improved types of apparatus of this character. 40c.

5037—PYROMETRY—Progress with the Pyrometer. E. R. Markham. (Am. Machinist, Nov. 7, 1907; 1½ pp.) Shows some of the limitations of pyrometers, enumerates the classes of work on which they yield best results, and points out the necessity of intelligent use of these machines. 20c.

5038—SMELTER ANALYSIS — "Silica" and "Insoluble" in Smelter Analysis. E. Kneeland. (Eng. and Min. Journ., Nov. 2, 1907; ½ p.) An instance where a poor conception of the real character of the insoluble silicious residue of an ore and its proper treatment during analysis resulted in loss to the smelter company which purchased the ore. 20c.

5039—SULPHIDE FORMATION — Ueber die Affinität des Schwefels zu einer Reihe von Metallen. E. Schütz. (Metallurgie, Oct. 22, 1907; 6 pp.) Conclusion of article which has previously been mentioned in this Index. The present instalment outlines experiments upon the affinity of sulphur for zinc, lead, copper, nickel, iron, etc., and shows that it is impossible to arrange the metals investigated in a definite series according to their chemical affinity for sulphur. 40c.

5040—WASTE GASES—The Utilization of the Waste Gases of Blast Furnaces and of Coke Ovens in Metallurgical Works. L. Greiner. (Cassier's Mag., Nov., 1907; 15 pp.) Gives a general survey of the art of using waste gases from industrial and metallurgical works as sources of power and indicates the tremendous development which this science has undergone. 60c.

## MINING AND METALLURGICAL MACHINERY

5041—AIR COMPRESSORS—Electrically Driven Air Compressors. A. F. Bushnell. (Eng. and Min. Journ., Nov. 2, 1907; 1½ pp.) Enumerates briefly some of the universally recognized advantages of electric drive for air compressors and gives descriptions of several installations of this character in the Butte district. 20c.

5042—BOILER FEED WATER, The Purification of. L. Waefelaer. (Journ. South African Assn. Engrs., Sept., 1907; 18 pp.) Reviews the characters of various waters fed to boilers and the causes and results of scale formation. Describes also the construction, operation, and maintenance of several types of apparatus for softening water and methods of testing. 80c.

5043—BRAZING and Reinforced Brazing of Metals. (Am. Machinist, Nov. 7, 1907; 7 pp.) Describes the methods used and the results secured by the Reinforced Brazing and Machine Company of Pittsburg, Penn., which has developed a system of brazing to make permanent repairs on large and intricate machine castings, thus effecting large savings by making new casting unnecessary. 20c.

5044—BUCKET DUMPING—Arrangement for Dumping Buckets. H. N. Herrick. (Min. and Sci. Press, Oct. 26, 1907; 1¼ pp.) A device used by the Standard mine at Mace, Idaho, for dumping buckets mechanically during the progress of shaft sinking. Drawings showing arrangement of all details are given, making the building of a similar device. 20c.

5045—CENTRIFUGAL PUMPS. E. F. Doty. (Engineer, Nov. 1 and 15, 1907; 3½ pp.) Deals with the development of various mechanical features which have improved the efficiency of centrifugal pumps, such as guide vanes, shaft bearings, packing boxes and internal water packing. The second instalment contains notes on the more ordinary causes of loss of energy and lifts in pumps of this class, and discusses ways and means of meeting these defects. 40c.

5046—CENTRIFUGAL PUMPS—Notes on Centrifugal Pumps—II. (Mechan. Wld., Nov. 8, 1907; 1 p.) Continuation of this article, giving in this instalment methods of applying diagrams representing mean paths of water flow, to the designing of vanes. 20c.

5047—DRILLS—Air-hammer Drills. J. T. Glidden. (Eng. and Min. Journ., Nov. 2, 1907; ½ p.) A few facts concerning uses of air-hammer drills, their working weights, capacities and power requirements. 20c.

5048—ELECTRIC HOISTS—Étude sur les Machines d'Extraction électriques. A. Baijot and A. Monet. (L'Association des Ingénieurs de l'École des Mines de Mons, T. I, 1907; 67 pp.) A long analytical investigation as to the importance of the factors of which account must be taken when selecting a hoisting system, and applying the information thus derived to a system of electric extraction applicable especially to deep mines over 3000 ft. (To be continued.)

5049—GAS ENGINES—Chief Points of Difference between the Gas Engine and the Steam Engine. William H. Booth. (Power, Nov., 1907; 1¾ pp.) Considers the fundamental differences between steam and gas engines in the matter of cylinder construction, action of the impelling vapor, indicator diagrams, etc. 20c.

5050—GAS ENGINES—The Development of the Large Gas Engine in America. E. T. Adams. (Cassier's Mag., Nov., 1907; 14 pp.) Interesting descriptions of the general features of large gas engine installations in the United States. 60c.

5051—GAS POWER as a Factor in Mine Economics. Archibald Burnett. (Eng. and Min. Journ., Nov. 16, 1907; 3½ pp.) Suggests means whereby gas engines could be used directly or by the intervention of only one intermediary, to operate pumps, primary and auxiliary hoists, etc. and compares operating maintenance and depreciation costs of steam, electricity and gas primary power generators. 20c.

5052—GAS POWER PUMPING PLANT. (Iron Age, Oct. 24, 1907; 2½ pp.) Describes the equipment and working of this pumping plant which is operated by suction gas producers and which is in duplicate throughout. 20c.

5053—HOISTING ENGINE—Long Range vs. Short Range Trip Gears for Winding Engines. R. H. Collingham. (Engineer, Lond., Nov. 8, 1907; 1½ pp.) A long discussion of the economies and relative efficiencies in steam consumption, torque and power output of winding engines equipped with valve gears which have a long range of trip, varying from 0 to 85 per cent. of the stroke as compared with those whose range of trip is not more than 37 per cent. of the stroke. 40c.

5054—HOISTING SKIPS—Die Gewichtänderung eines Förderkorbes beim Anfahren. (Glückauf, Nov. 2, 1907; 2 pp.) A few notes on the influence of positive and negative acceleration on the vertical weight of skips. 40c.

5055—HYDRAULIC MEASUREMENTS—Hydraulic Measuring Instruments. R. C. Beardsley. (Industrial Mag., Nov., 1907; 7 pp.) Deals with the principles on which weirs are built and considers their accuracy as a means of gaging stream flow, then describes Venturi and revolving meters, comparing their accuracy with that of weirs and considering the relative advantages of these different types as regards cost of installation and maintenance. 40c.

5056—HYDRO-ELECTRIC PLANT of the Black Hills Traction Co. S. H. Lea. (Eng. Rec., Nov. 16, 1907; 1½ pp.) Describes the methods employed in utilizing water power in the Black Hills of South Dakota for the generation of electric power. 20c.

5057—LOCOMOTIVES—Steam Locomotives vs. Electric Locomotives. Max Toltz. (Tech. Literature, Nov., 1907; 4 pp.) Shows that a steam locomotive, properly improved, is more economical as a motive agent than an electrically driven engine, and discusses the modifications necessary in steam locomotives to attain this end. 40c.

5058—LUBRICATING OILS. J. H. Coste and E. T. Shelbourn. (Tech. Literature, Nov., 1907; 5½ pp.) Deals with theoretical aspects and principles of friction and then discusses the qualities and essentials of good lubricants, the relative merits of fatty and mineral oils and the art of choosing a suitable lubricant. 40c.

5059—PIPE—Reinforced Concrete Pipe for Carrying Water under Pressure. (Proc. A. S. C. E., Oct., 1907; 3 pp.) Brief discussion by F. Teichman and J. R. Worcester of the above paper, which was previously mentioned in this Index.

5060—PIPE—Small Cement Pipe for Irrigation. Albert Eugene Wright. (Cal. Journ. of Technology, Oct., 1907; 5 pp.) Gives costs of building 6-, 8- and 10-in. cement pipe and the result of tests made on these sizes to determine strength and amount of leakage. 20c.

5061—POWER TRANSMISSION—The Calculation of Copper Conductors for Alternating Current Three-phase Transmission Lines. F. B. Brown. (Can. Soc. Civ. Eng., Nov. 7, 1907, advance proof, 12 pp.) Explains the use of some special diagrams, the employment of which makes it easy to calculate the size of any transmission system, the proper spacing of wires, drop in voltage, proper impressed voltage and similar factors.

5062—PRODUCER GAS PLANT, Test of a. J. H. Alexander. (Engineer, Nov. 1, 1907; 1½ pp.) Gives the results of a very detailed test on two power plants working on producer gas, and shows the relative cost and operating expenses of steam and producer gas plants. 20c.

5063—PUMPING MACHINERY Employed in Mining. J. H. Hart. (Min. Wld., Nov. 2, 1907; 1 p.) Reviews the systems of lifting water which have been used in mining operations and mentions the advantages of air-lift pumps for this purpose. 20c.

5064—PUMPING PLANT—Tests of a Large Pumping Plant. J. Macaulay. (Journ., Transvaal Inst. Mechan. Eng., Oct., 1907; 3½ pp.) A general account of the procedure in conducting a test of a large central station pumping plant, recording the results obtained and discussing their significance. 60c.

5065—PUMPS—Electrical Pumping Installation of the Lindal Moor Mines, England. (Elec. Wld., Nov. 16, 1907; 3½ pp.) Very complete account of the largest electric pump installation in Great Britain. This plant has to unwater a mine and check inflows of water and the pumps are so designed as to be lowered down the inclined shaft as the water level recedes. 20c.

5066—RESCUE APPARATUS—Los Aparatos respiratorios y los Servicios de Salvamento en las minas de carbon. E. Hauser and R. Ariza. (Ministerio de Fomento Comisión del Grisú, Madrid, 1907; 66 pp.) Report of a Spanish imperial commission which investigated the performances of various types of rescue apparatus throughout the coal districts of Europe. The construction of the apparatus, its behavior and value as shown by its use in Westphalia and Austria, are the chief subjects discussed.

5067 — RESCUE APPARATUS — Sauerstoffbehandlung. (Chem. Ind., Oct. 15, 1907; 1½ pp.) Gives hints on the management of oxygen apparatus and the best methods of administering this gas to victims of gas poisoning and other accidents. 40c.

5068—STEAM SHOVELS—Die Entwicklung und Bedeutung der Dampfschaufeln. R. Richter. (Zeit. des Vereines deutscher Ingenieure, Oct. 26, 1907; 10 pp.) Traces the evolution of steam shovels as applied to dredging and mining operations and points out the extensive field opened to them. The leading types of shovels are fully described.

5069—STEAM TURBINES—Practical Experience With Exhaust-steam Turbines. Alfred Gradenwitz. (Eng. Magazine, Nov., 1907; 16 pp.) In minor fields this type of turbine has an admitted value as a prime mover. Several applications of these turbines to various uses in European steel mills and mines are described. 40c.

5070—TUNNELING—New Boring Machines for Tunneling. (Eng. and Min. Journ., Nov. 23, 1907; 1 p.) Analyzes the conditions under which tunnel boring machines must operate and considers the problem of muck disposal in relation to their capabilities. 20c.

5071—VENTILATION SYSTEM—An Improved System for Ventilating Mines. G. M. Capell. (Min. Wld., Nov. 16, 1907; 1 p.) Describes the claims of an improved method of applying fans to mine ventilation; also the construction and arrangement of the machines used in this system. 20c.

5072—WATER WHEELS—The Governing of Pelton Water Wheels. H. Aughtie. (Mechan. Engr., Nov. 9, 1907; 1½ pp.) Gives a few facts connected with the governing of Pelton water wheels, discussing them from the point of view of theoretical changes in efficiency. 20c.

## ANALYTICAL CHEMISTRY

5073—DIMETHYLGLYOXINE—Ueber die Anwendung des Dimethylglyoxims zur Bestimmung des Nickels und zu seiner Trennung von den Metallen der Schwefelammoniumgruppe. O. Brunck. (Zeit. f. Angew. Chemie, Oct. 25, 1907; 6½ pp.) Notes on the use of this organic reagent as a means of separating nickel from solutions which contain cobalt, zinc, manganese, iron and chromium. It appears that this reagent gives quantitative separations and that the precipitates are easily dried and weighed and that accurate results are easy to obtain. 40c.

5074—ELECTROLYTIC ANALYSIS—Rapid Analysis by Electrolysis Without Rotating Electrodes. Francis C. Frary. (Journ. Am. Chem. Soc., Nov., 1907; 4 pp.) Describes various improvements in the apparatus used in quick determinations by electrolysis, making use of solenoids and gauze cathodes. This arrangement makes the use of motors and rotating electrodes unnecessary. 60c.

5075—FLUORINE — Determination of Fluorine. C. A. Heberlein. (Min. and Sci. Press, Nov. 9, 1907; ½ p.) Notes on a volumetric method of determining fluorine in the presence of carbonic acid, chlorine and organic substances. The apparatus required and equations involved are described. 20c.

5076—MINERAL EXAMINATION—Sammlungs-mikroskope für Mineralensammlungen. M. Schwarzmann. (Centralblatt f. Mineralogie, Oct. 15, 1907; 9 pp.) Description of several improved types of microscopes adapted to the use of ordinary and polarized light in the examination of mineral sections, and notes on systems of making observations. 40c.

5079—USE OF LITHARGE—The Effect of High Litharge in the Crucible-Assay for Silver. R. W. Lodge. (Paper read before A. I. M. E., July, 1907; 5½ pp.) Shows by examples how high litharge in the crucible will lead to low silver results when assaying certain classes of ore. Shows also the superiority of the scorification method for assaying ores from the Cobalt district when they are rich in nickel and cobalt. The fluxes and results of all assays leading to these conclusions are included. 40c.

## INDUSTRIAL CHEMISTRY

5081—CYANIDE and Its Manufacture. (Brass Wld., Oct., 1907; 1½ pp.) Describes briefly the old method of making cyanide from yellow prussiate of potash, also the modern method which calls for the fusion of the prussiate with metallic sodium. 20c.