The Engineering and Mining Journal

VOL. LXXXIII. NEW YORK, FEBRUARY 2, 1907. NO. 5.

# MINING CONDITIONS IN THE MOUNTAINS OF CHIHUAHUA*

## The Difficulties of Operation in the Sierra Madre—The Dolores Mine and Mill

BY JOHN B. FARISH†

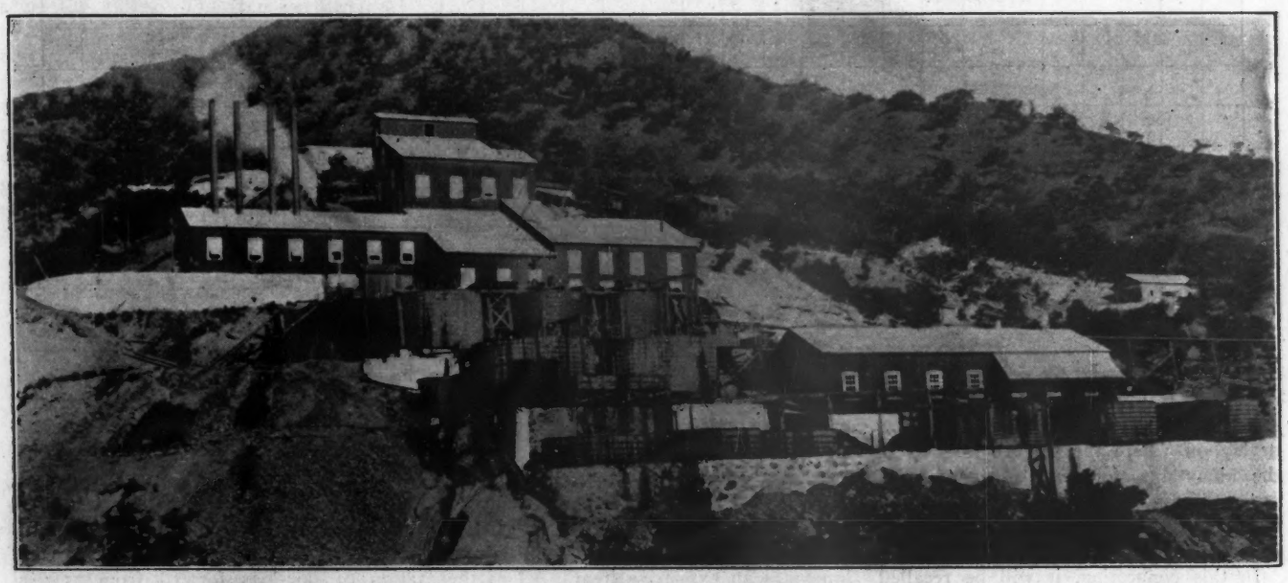
The properties owned by the Dolores Mines Company are situated in an isolated section of the Sierra Madre, in the western part of Chihuahua, Mexico. The nearest mining camps, which are from one to two days' mule-back travel from the mine, are Soyopa, Ocampo, and Pinos Altos. The property is reached by the Mexican Central Railroad from El Paso to Chihuahua, thence via the Chihuahua al Pacifico Railroad to La Junta, thence over the branch to San Isidro. From San Isidro a mule trail leads over the mountains in a general direction a little south of west, an estimated distance of about 100 miles to the Dolores mine. This trail is exceedingly rough in places; good riding time from San Isidro being 33 hours in the saddle. Owing to the roughness of the trail this requires, under ordinary conditions, from three and one-half to four days.

Careful observations were made on my trip of the riding time between points and barometric readings of elevations. From these I prepared a profile based horizontally on riding time and vertically on altitude. This, of course, gives only an approximate idea of the character of the country, for it is readily understood that the riding time on steep hillsides is not nearly so fast as on level mesas. Still the observations are of sufficient interest, as indicating the character of the country. The elevations vary from 3510 ft. at the pumping station on the Tutuacá river to 8500 ft. on the summit of the Cebadilla mesa. The variations in altitude present a range of vegetable growth from the palm trees of the upper tropicals to the pine trees of the temperate zones. At the pumping station at the Tutuaca river can be seen some few scattering palms, sycamores, aloes, willows, maguey, and a scant growth of small scrub oaks. At an altitude of 4500 ft. junipers appear with a scant growth of scrub cedars. Here the oaks have materially increased in size. At something over 5000 feet manzanitas and scrub madrones appear. At an altitude of 5250 ft. the madrones have increased in size, and the first scrub pines appear in the sheltered ravines. At 6000 ft. the oaks reach their maximum growth and development. At an altitude 500 ft. higher the pines produce good mine poles with some fair saw-logs. The best saw-logs, and in fact the only ones that can be considered good, were seen at altitudes above 7000 ft.

### TRANSPORTATION

Over the trail described, all freight, supplies, laborers, and in fact everything going to Dolores, must be transported on mule back. Supplies and machinery must be broken in packages of from 150 to 300 lb. each, as an average load for a mule is about 250 lb., while that for a burro is about 200 lb. Packages weighing in excess of 300 lb., or those of unhandy bulk or shape call for extra freight rates, which are greatly in excess of the regular rates for packing more convenient parcels. During the construction of the mill $25 was paid for packing a cam-shaft weighing 485 lb., while $37.50 was paid on a piece of a Cameron pump weighing 630 lb.

At the time of the organization of the company there seemed to be an abundance of freight animals, both mules and burros, to handle all material and supplies for the mine. The advent of the Greene interests in the Sierra Madre, the building of railroads and the opening of other new



THE DOLORES MILL FROM THE EAST

*This article is drawn from a report made to the Dolores Mines Company, as the result of a visit to the property in June and July, 1906. Some photographs that accompanied but were not published in the original report have been added.

†Consulting mining engineer, Denver and New York.

enterprises completely changed the situation. Animals are very scarce, and transportation has advanced in consequence from $3.50 and $4 per carga (300 lb. avoirdupois) at which rate most of our machinery was transported from the railroad, to the present ruling rate of $6 per cargo from San Isidro. The probabilities are that the rate will be further increased, owing to the general activity and sharp competition that now exists throughout the State of Chihuahua.

The average time for a freight train from San Isidro to the mine is, in favorable weather, from 10 to 12 days. The average return trip from the mine to the railroad—the animals being without loads—is from five to six days. Both mules and burros then require a considerable rest on pasture. Two round trips for animals under Mexican control in three months is a good average under present freighting conditions. During rainy or stormy weather the regular trip to the mine takes never less than 15 days, and from that up to several weeks, depending upon the severity of the rains or the snow storms, and the condition of the rivers and trail. Often the freighters will stop with cargas at ranches in the valley, or lay off where the pasture is good in the mountains, for a week or more in order to rest their mules before proceeding. When the rivers are up the freight is often delayed for weeks.

In this connection, it will be recalled that the rainy seasons of the summers of 1904 and 1905, and the following winters, were two of the most severe that have ever been known in northern Mexico. During the past winter snow fell to a depth of 4 ft. on the Cebradilla mesa, and lay for a period of three months—a thing unheard of before. During the first summer of our operations the rainy season was so mild that the springs and arroyos surrounding the mine dried up, and water for domestic purposes had to be packed on burros from the Tutuaca river. The following winter was equally mild and only two slight flurries of snow fell upon the trail, neither of which exceeded an inch or two nor remained on the ground more than a week.

### WATER SUPPLY

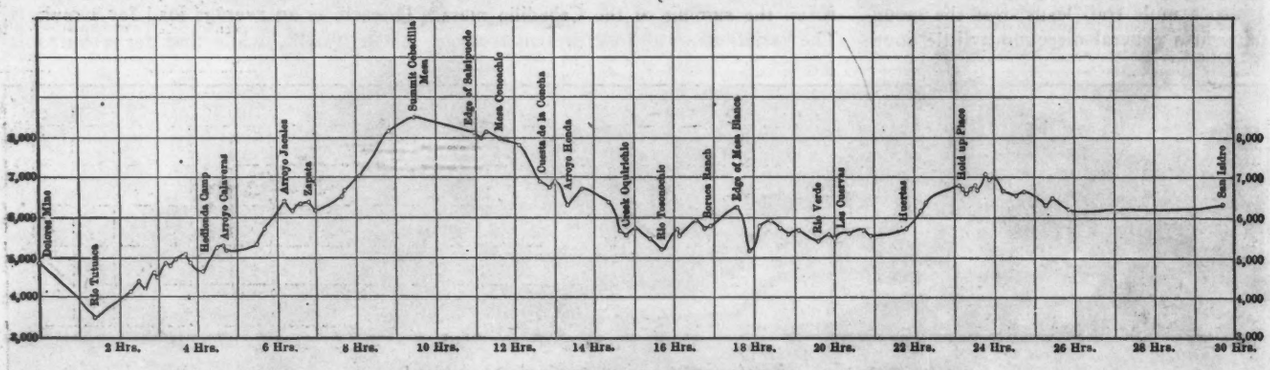
Unless the season is very dry, sufficient water flows in the San Francisco and Dolores arroyos to supply domestic wants. During the past two rainy seasons and parts of the winters following the streams have been large enough to even furnish water for milling. During the remainder of the year it is necessary to resort to the Tutuaca river, 16,000 ft. distant, where a pump has been installed. This pump is the finest piece of sectionalized machinery of the sort that I have ever seen. It has a capacity of 100,000 gal. daily, pumping through 6000 ft. of pipe against a head of 1450 ft. Such conditions impose a severe test on the pumping plant, but this has been met by a Riedler pumping engine. The plunger of this pump is differential, being 2 3/16 and 3 1/16 in. in bore by 28 in. stroke, actuated by a Corliss condensing engine. The ease with which it works and the fact that it is a sectionalized machine surprise all who see it. The tank into which the water is thrown by the pump through 3000 ft. of 3-in. and 3000 ft. of 3½-in. pipe, is of solid masonry. From this intermediate tank it flows by gravity through 10,000 ft. of 4-in. pipe to a second tank, also of solid masonry, located on a hill above the mill, and having a capacity of 200,000 gal. The building of these tanks in a country where there is practically no lime was an expensive item. All of the lime for this and other construction was gathered at scattered points, where mineral springs had made small deposits of carbonate of lime. The difficulty of obtaining a large supply, and the expense attending it, as compared with a similar supply in a limestone country, where it occurs in abundance, can be readily understood.

### TIMBER, LUMBER AND FUEL

These form a very important item in both the construction and operation of a property. At the time operations were started a careful investigation of the available fuel on the company's tract resulted in an estimate of 50,000 cords of both pine and oak. There have been cut up to date approximately 7000 cords, nearly all of which is oak. There remains approximately 6¼ cords per acre, of which 2¾ cords are oak and 3½ cords are pine, consisting of small trees, and tops of saw-log trees. The larger part of this is in the higher and more rugged mountains. The fuel now being delivered is costing about $3 per cord delivered at the mill.

Two relatively small portions of the company's acreage carried pines of sufficient size for saw-logs. Nearly all the saw-logs were snaked from the places at which they were cut, along rough roads for distances up to as much as two miles, to a point where a rough hoist was improvised from the machinery left in the old mill erected at Dolores some 20 years ago. The logs were drawn up a slide 1200 ft. to the top of the ridge, from which point they were again snaked for a distance of nearly a mile to the top of a log chute, down which they were slid 1500 ft., and again snaked a further distance of nearly a mile and a half to a log chute, down which they were slid 250 ft. to a point near the mill.

The saw-logs cut on a small section to the east of the Arroyo Amplio did not have to be hoisted and were consequently the cheapest of all logs to obtain, though they were snaked for distances of as much as two miles to the first log chute. The roads necessary for the transportation of the saw-logs cost from 50c. to as much as $1 jer meter to build. The transportation of saw-logs formed from 75 per cent. to as much as 80 per cent. of the total cost of the sawed lumber. The cost of lumber averaged about $37.50 per M.




PROFILE OF DOLORES TRAIL, CHIHUAHUA, MEXICO

Another important item in connection with the cost of lumber has been the expense of maintaining mules in a country where there is absolutely no arable land of any kind. In these logging operations an equipment of some six logging trucks is employed, complete with chains and harness, as well as some 50 odd mules for hauling purposes.

### MULES AND PASTURE

When working the animals are fed corn and hay, but when idle they are turned out to graze. Corn is purchased by the hectoliter; straw, hay, etc., by the arroba of 25 lb. A hectoliter contains approx-

imately 2.83 bushels. The average cost of corn delivered at Dolores is as follows:

| | Hectoliter. | Bushel. |
|---|---|---|
| Limited local supply..... | $4.00 | $1.42 |
| Supply from railroad..... | 4.25 | 1.50 |
| Lowest price..... | 3.25 | 1.15 |
| Average price..... | 3.625 | 1.28 |

The so called "hay" consists of dried grass collected in the arroyos and on the mesas and sells for 18½c. per arroba. Wild reeds, very much liked by the mules and very nutritious, are collected in the arroyos near the Tutuaca river, and sell for 25c. per arroba. Corn fodder comes from the small ranches on or near the Aros river, 15 miles distant, over a rugged trail, and varies greatly in price. These ranches are small and cannot be depended upon for supplies.

Owing to the increased activity in Mexico a great demand for mules has arisen within the last three years in all parts of the republic, and prices have advanced accordingly. At the present time the ordinary small Mexican pack mule, selected, costs on the ranches about $30 per head. Pack saddles of good quality cost about $12.50 each. To these costs should be added the expenses of buying and delivering the mules. This can be conservatively fixed at $2.50 per head. It is difficult to estimate the cost of operating a pack train, as so many unforeseen conditions enter into it, such as high water, snowstorms, drought, loss of animals, etc., but experience shows that the cost per ton for a foreign company is always more than the contract price with Mexican freighters.

### LABOR CONDITIONS

At the time the company began operations at Dolores the labor conditions in Chihuahua were not bad, though the scarcity was beginning to be felt. As time passed, and other large enterprises began to take shape, the scarcity of labor became more and more pronounced, and wages were correspondingly advanced in all sections in a wild but futile scramble to get an adequate supply. Labor conditions in the isolated districts of the Sierra Madre were seriously affected by the advent of the Greene interests, which raised wages abnormally and drew heavily from the old sections. At Dolores the rates of wages, already high, were raised an average of about 25 per cent., and the prices of merchandise in the store greatly reduced in an effort to hold the labor and compete with the new conditions. To show the effect on other sections of the Sierra Madre, I quote from a recent letter from the superintendent of a mine that has long operated at Ocampo:

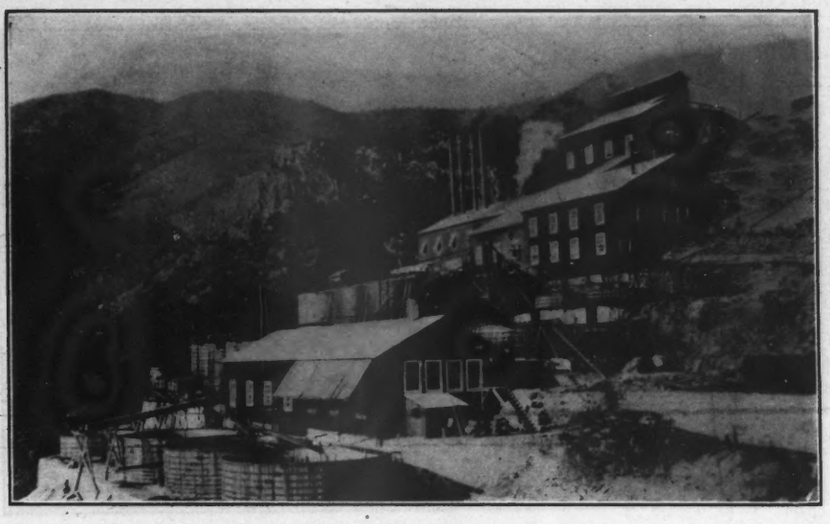
"The wages have been raised by the entry of Colonel Greene to such an extent that the company I represent cannot hope to pay; in fact, the miners, timbermen, carmen, watchmen, and so on, simply dictate as to what they shall be paid, or they will not work."

Many of the large enterprises in other parts of Mexico, such as the American Smelting and Refining Company, the Stillwell Railroad and others, are looking to a solution of the trouble by the introduction of Chinese. However, one of the chief officers of the American Smelting and Refining Company told me that it had imported 200 at a cost of approximately $80 per head. They were not adapted to the labor required of them, and soon decamped.

The Greene interests are said to have imported laborers from the United States —Scandinavians, etc.—who proved unsuitable and speedily left.

How long the present labor situation will continue in the Sierre Madre it is difficult to tell, but there seems to be no relief in sight.

The Dolores camp has a good reputation as one of the cheapest in the Sierra Madre to live in, but its isolated position and absolute lack of amusement has operated seriously against it. The Mexican is a good deal like a child and must be amused in order to be contented. The lack of proper quarters for housing the native workmen operated seriously against the company. It was supposed that laborers coming in with their families would build their own little cabins, but experience shows that they will not do this. The company was therefore forced to build barracks for them. Also it has been determined to erect a casino for the Mexican population, where they can secure liquors to a limited extent, and where they can gamble up to certain hours in the evening. This casino will be under the control of the company, and the drinking and gambling will be regulated and supervised by the police. In addition to this, it is advisable to furnish musical instruments and organize a home band. The Mexicans are very fond of music, and nothing tends more to make them contented.



THE DOLORES MILL FROM THE SOUTH

PUMPING STATION ON THE TUTUACA RIVER

### MILL

The Dolores mill is exceptionally well constructed and well appointed, location and the necessity for sectionalizing the machinery being considered. I have never seen a better sectionalized mill, and when

we consider the difficulties with labor, freighting, lime, lumber, and in fact in every direction, Mr. Hardy, the manager, is entitled to great credit for the success attained.

The mill is equipped with four 54 in. x 16 ft. boilers rated at 65 h.p. each. The engine is a 16x42-in. Corliss. The engine room also contains a 7x10-in. Chandler & Taylor engine, used to drive the dynamo for electric lighting, the dynamo being a 10-kw. Bullock, direct-current generator; also a 9x12-in. Sullivan belt-driven air compressor, taking power from the main engine shaft and furnishing air at a pressure of about 25 lb. for general use in the cyanide plant.

LOG CHUTE AND BARRACKS

### ROCK BREAKERS

At the top of the mill there are two rock breakers, 10x7 in. It was originally intended that these rock breakers should deliver the broken ore into a small auxiliary bin which was planned to deliver it to a picking table where the richer parts could be hand-picked for special treatment in the pans, the remainder being carried over to the main battery bin for general mill and cyanide purposes. This arrangement excluded the grizzlies called for in the original plan, so that all ore had to go through the breakers. The picking table intended to receive the ore from these rock breakers was found to be impractical to operate, due to the scarcity of labor and the impossibility of obtaining any sufficiently steady and expert to carry on the picking. With the introduction of concentration such hand-picking as was contemplated is rendered unnecessary.

### BATTERY

There are three batteries of five stamps each. The stamps weigh 900 lb. each when newly shod, and make about 102 drops per minute from a hight of 6 in. to 7½ in. For ordinary crushing purposes a 4-mesh screen is used on the batteries when feeding to the Bryan mills. With this screen the battery duty will probably be found to average about 4.25 tons per stamp per 24 hours. When crushing for the amalgamation pans through five stamps, without the aid of the Bryans, and through a 30-mesh screen, the duty drops to about three tons per stamp per 24 hours. To effect this crushing the discharge is kept approximately 2½ in. above the top of the dies, though with wear the discharge sometimes rises to 4 in. Back and end liners are used in the mortars to protect the mortar boxes. All the batteries are fitted to crush either in water or in stock cyanide solution, and have a combined capacity, when crushing for Bryan mills, of upward of 60 tons per day.

A CLOSE VIEW OF THE LOG CHUTE

### BRYAN MILLS

The secondary crushing is effected by three Bryan mills of the 4-ft. drum-driven, sectional pattern, manufactured by the Risdon Iron Works of San Francisco. In adapting these machines to the requirements of Dolores a considerable amount of experimenting was required, leading gradually to increased efficiency. At the best this machine is an expensive crusher, though at the same time a good one when in proper repair. Of the three mills one is constantly hung up in the hands of the repair gang, but the remaining two have an average capacity of at least 25 tons per day each, when fed with material crushed in the battery, through a quarter-inch screen and crushing to 60 mesh. Were the Dolores mine located at a point easily accessible by rail or wagon road, Bryan mills would not have been installed, but for secondary crushers of sectional design, I have yet to hear of any machine that is better.

### AMALGAMATION

The installation in this connection consists of four standard 5-ft. pans with two 8-ft. settlers, and a clean-up pan. Installed originally as a side issue and as a temporary expedient, this little plant has put through over 9700 tons, yielding a bullion of over $480,000 from ore valued at over $780,000. While the ore is not an ideal one for pan amalgamation, the recovery has been good and the tailings are lying ready, as was intended, for future cyanide treatment. When concentrators are installed the pans will still play an important part in the operations, as it is intended to use them for fine grinding for sliming the pulp for the cyanide plant, and also as a means for continuing a satisfactory output during such time as the tube mill may be out of commission.

### TUBE MILL

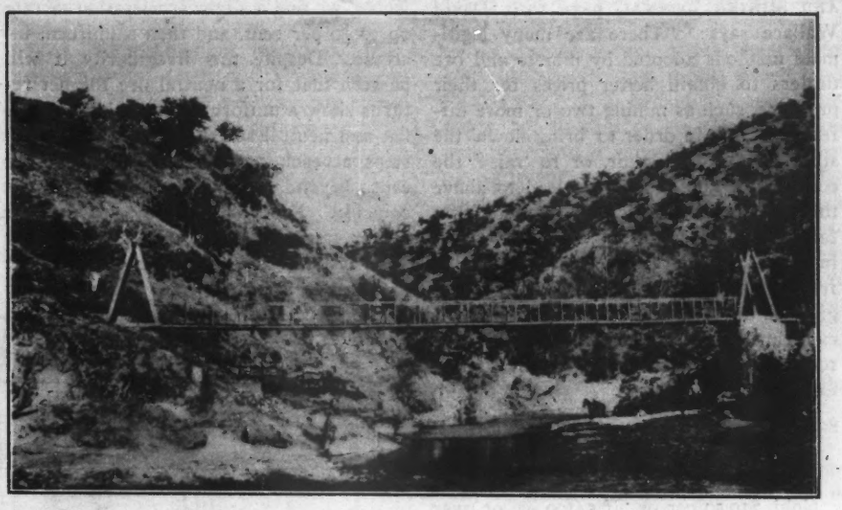
This mill was an experiment, and is probably the first and only tube mill ever sectionalized and taken into a mountain country. To this end various improvements and additions were made to the original standard pattern and the efficiency of these changes have shown themselves in practice. The machine is of the Gates pattern, 16 ft. long and 42 in. in diameter. Thus far it has run satisfactorily, with the exception of the feed, and completely slimes the material after due returning of sands to a 200-mesh screen

with the exception of a relatively small percentage that remains between the 150 to 200 mesh. At the time of my visit no great wear had been shown by the white iron liners, and the consumption of pebbles (imported from Norway) appeared to be very low. The capacity of this mill has been its disappointing feature, as even under the best conditions it has not been able to slime more than 35 tons per 24 hours. Under unfavorable conditions and during repairs and hang-ups in the mill, this capacity falls off materially. The main condition on which tube-mill capacity hinges is that of feeding it with an exceedingly thick pulp. To effect this the stream of pulp from the Bryans is led into a spitzkasten which also receives the air-lift discharge of sandy material thrown out by the classifying cones from the pulp, after it passes through the tube mill. The maintenance of a thick product from the spitzkasten has given a great deal of trouble and arrangements are now being made to remedy this defect.

It is altogether probable that a second tube mill will have to be installed to obtain a satisfactory capacity. In this event the pans will be used as reserve grinding machinery in case of a breakdown to either of the tube mills.

### CYANIDE PLANT

The installation of this plant was a heart-breaking affair, through the difficulty of obtaining saw-logs in such a rugged country, the insufficiency of the ordinary labor, and the lack of skilled labor. The native timber is at best poor for such purposes, and many logs were cut before a selected



COMPANY'S BRIDGE OVER THE TOSANOCHIC RIVER

quality even approximately good enough to be put into tanks was obtained.

The slime plant consists of an installation of four agitating tanks, 22 ft. in diameter by 15 ft. in depth, followed by three decanting tanks of the same dimensions, which deliver their washed contents to the two final settling tanks, 30 ft. in diameter by 15 ft. in depth. These latter tanks discharge the tailings directly to the dams. All the tanks are fitted with decanting arrangements whereby solutions are drawn off to be passed through the classifiers and thence to the zinc house. In addition the agitators and decanters are fitted with agitating arms on a vertical spindle connected by bevel gears from line shafts running over the top of the tanks. These line shafts are connected up to the main engine shaft by rope transmission, and also furnish the power for the pumps. Of these there are two Morris 6-in. manganese steel-lined slime-circulating pumps, two Deane 8x8-in. triplex plunger solution pumps, and one 2-in. Morris centrifugal, which returns the battery solution to the mill supply. The arrangement, as installed, is giving satisfaction, but the material composing it has in several instances brought on shut-downs through breakages. The greatest trouble has been with the bevel gears actuating the agitating spindles, and as these spindles are in two sections, connected by a compression coupling, these couplings have also given trouble through weakness or poor material. Spare parts have been ordered and patchwork repairs have kept the plant running. Much of the trouble in connection with agitation is due to improper classification owing to the sands that come over, packing in the bottom of the agitating tanks. It is proposed to remedy this by a mechanical Dorr classifier and new separating boxes. In order to bring the capacity of the slimes plant up to the full crushing capacity of the mill, it will be necessary to erect another agitating tank and to make some other slight improvements.

CAMPING ON THE TRAIL AT ZAPATO

In addition to the slimes plant there is a sand plant with a capacity of from 8 to 10 tons per day ready for use. Experience at Dolores on a working scale, however, has shown that an all-slimes treatment is to be preferred.

### MILL IMPROVEMENTS

In order to perfect the mill and bring up its capacity to a total of 1500 to 1600 tons per month, the following changes and additions are being considered. The rearrangement of the rock breakers and ore bins and the throwing out of the picking table. The installation of the grizzly, so that the fine ore from the mine will drop into the main ore bin without passing through the crushers. It has been decided to install three No. 5 Wilfley standard concentrators. The installation of an additional tube mill is also under consideration. Probably another Bryan mill will be necessary to insure ample crushing capacity during repairs. In the cyanide plant, classification will be modified by the introduction of a Dorr mechanical classifier and additional separators. An additional tank will be erected, and the zinc-precipitating space will be extended.

---

According to *Reuter*, several big nuggets of gold have recently been discovered at Poseidon Rush, near Taraguella, Australia. Two were unearthed weighing respectively 373 and 967 ounces.

# THE ADJUSTING OF ORES

## Mixing and Selecting Material to Secure the Maximum Selling Price

BY L. S. AUSTIN*

In a recent article in the ENGINEERING AND MINING JOURNAL, page 1079, David Wallace says: "There are many legitimate methods adopted by miners and ore dealers to obtain better prices for their products, such as mining two or more different classes in order to 'bring down' the silica, zinc and sulphur, or to 'raise' the contents of gold, copper or lead to above the point unpaid for by the smelters." So far as lead is concerned, this is well illustrated by a graphic diagram deduced from the schedule of prices of lead ores given in the table and issued by the American Smelting and Refining Company in 1906 for Clear Creek and Gilpin county, Colo., ores.

SCHEDULE OF PRICES AND SMELTING CHARGE FOR CALCULATING THE VALUE OF LEAD ORES

Gold, $19.50 per oz., if 5/100 oz. or over per ton.

Silver, 95 per cent. of New York quotation date of assay.

Lead, prices flat.

Copper, $1 per unit dry (1.5 per cent. off wet) when ore assays 2 per cent. wet.

Zinc, limit 10 per cent., 50c. up.

NEUTRAL SCHEDULE

Five to 10 per cent. Pb. incl., 25c. per unit, $8.00 W.C.
Over 10 to 15 per cent. Pb. incl., 25c. per unit, $7.00 W.C.
Over 15 to 20 per cent. Pb. incl., 25c. per unit, $5.00 W.C.
Over 20 to 25 per cent. Pb. incl., 25c. per unit, $4.00 W.C.
Over 25 to 30 per cent. Pb. incl., 30c. per unit, $4.00 W.C.
Over 30 to 35 per cent. Pb. incl., 30c. per unit, $3.00 W.C.
Over 35 to 40 per cent. Pb. incl., 30c. per unit, $2.50 W.C.
Over 40 to 45 per cent. Pb. incl., 32c. per unit, $2.00 W.C.
Over 45 to 50 per cent. Pb. incl., 35c. per unit, $2.00 W.C.
Over 50 per cent. Pb. incl., 40c. per unit, $2.00 W.C.
Neutral basis, 10c. up or down.

FLAT SCHEDULE

Five to 10 per cent. Pb. incl., 25c. per unit, $12.00 W.C.
Over 10 to 15 per cent. Pb. incl., 25c. per unit, $10.50 W.C.
Over 15 to 20 per cent. Pb. incl., 25c. per unit, $8.50 W.C.
Over 20 to 25 per cent. Pb. incl., 25c. per unit, $6.50 W.C.
Over 25 to 30 per cent. Pb. incl., 30c. per unit, $6.00 W.C.
Over 30 to 35 per cent. Pb. incl., 30c. per unit, $4.50 W.C.
Over 35 to 40 per cent. Pb. incl., 30c. per unit, $3.00 W.C.
Over 40 to 45 per cent. Pb. incl., 32c. per unit, $2.00 W.C.
Over 45 to 50 per cent. Pb. incl., 35c. per unit, $2.00 W.C.
Over 50 per cent. Pb. incl., 40c. per unit, $2.00 W.C.

In the diagram the lower line, marked "lead values" for both schedules, shows a sudden increase in the value of the lead per unit at 25 per cent. For example, while an ore of 25 per cent. is worth 25c. per unit, one of 25.1 per cent. brings 30c. per unit. Taking the line or curve as a whole, we find a slight acceleration of rate up to 50 per cent. and then a uniform increase. Despite this irregularity it will be seen that for a neutral ore the net returns show a uniform increase both on the flat and neutral schedules (aside from the steps at each 5 per cent.) up to 45 per cent., beyond which point both schedules coincide. Nevertheless, these steps are rather irregular, as though unguided by an exact rule. The negative values at the first indicate that for an ore containing lead only, the expense of treatment would be paid for only at from 20 to 25 per cent. of contained metal, and that accordingly in low-grade ore gold and silver would have to be present to meet this expense.

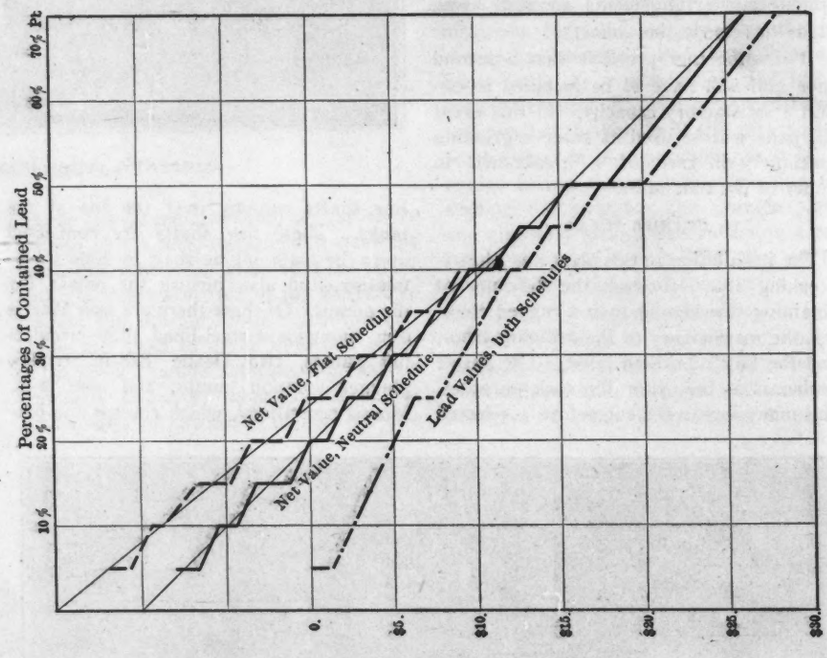



CHART SHOWING INCREASE OF VALUE PER TON

A FEW ANOMALIES

It appears from these lines that at first the silica excess on the neutral schedule must be as much as 40 per cent. to bring it in comparison with the flat schedule. At the point of 20 per cent. in the ore the difference is equivalent to 45 per cent. silica excess, and at 20.1 per cent. it would be but 25 per cent. silica excess. At 25 per cent. lead the anomalies are still more striking, so that an ore seller, whose ore carrying 25 per cent. silica excess on lead alone would leave him a few cents in debt, can by a little sorting bring it up to 25.1 per cent. lead and to $2.50 in value. On the other hand, a neutral ore of 25 per cent. lead would have but 75c. more value than one of 15 per cent. silica excess and with 25.1 per cent. lead figured on the flat basis.

The present system of preparing a schedule is defective from the fact that for the purpose of making it plain to the ore seller, it has been necessary to lay down rules which would be within the comprehension of the ordinary miner. The method of proceeding by a series of jumps certainly introduces anomalies.

On the other hand there is a pecuniary reward to the ore seller, who by means of these graphic curves can sketch out a plan and take advantage of the knowledge thus obtained to increase the returns by a judicious manipulation of his ore. At the present high rate on lead in ores the figures given are not applicable without modification, but by plotting new curves to suit altered prices, new and valuable conclusions can be drawn for any given set of conditions.

---

The dredging returns in New Zealand exhibit a falling off as compared with the terms of the three previous years. The yield to the end of September this year was 41,480 oz., against 59,514 oz. in 1905, 68,812 oz. in 1904, and 68,620 oz. in 1903. The west coast dredges for the present year obtained 9659 oz., contrasted with 16,128 oz. in 1905, and 3644 oz. in 1904.

---

Metallic carbides may be divided into two classes; the first is decomposed by water and the second is not affected. Zirconium carbide belongs to the second class.

*Professor of metallurgy, Michigan College of Mines, Houghton, Mich.

## An Electrical Indicator for Water Tanks

BY C. H. GLASSER

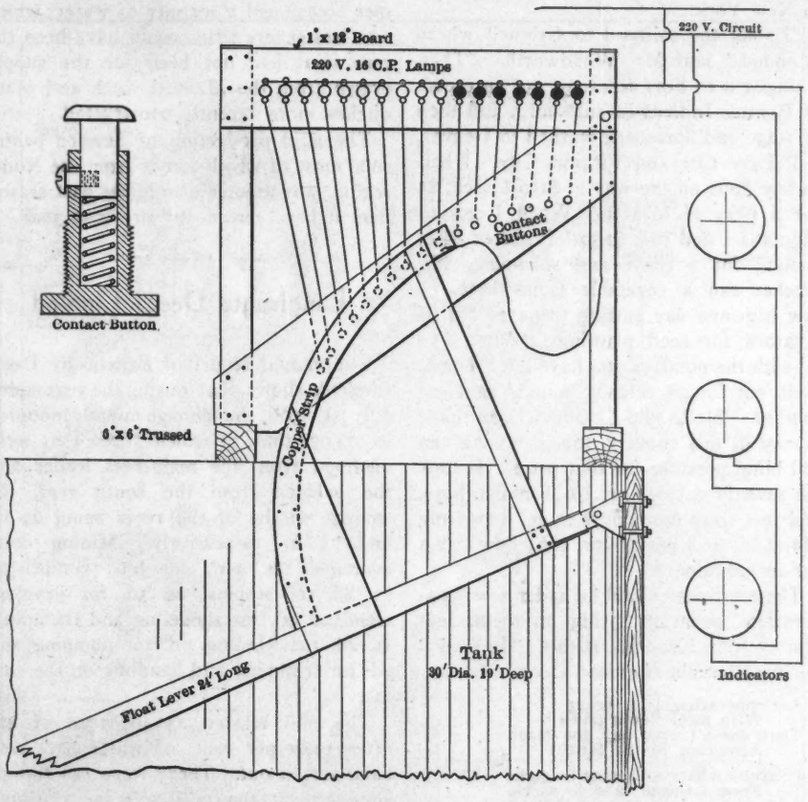
The water supply of the Tennessee Copper Company's smelting plant is delivered to the smelter-service tanks by a belt-driven centrifugal pump operating under a head of 120 ft., and located about 2000 ft. from the smelting plant. It was not feasible to regulate the speed of the pump to the variable requirements of the smelter consumption, and it is important that the pump operator, chief engineer and furnace foreman is at all times correctly informed as to the depth of water in the service tanks. This is now accomplished by means of indicators placed at different points in the works, which give by direct readings the depth of water to the nearest even foot.

When such indicators were first contemplated considerable correspondence was conducted with different parties claiming to supply electrical equipment which would accurately give the required indications, but it was found that the apparatus proposed was of such complexity or required such multiplicity of wiring that they were not deemed feasible for the purpose. The depth of the tanks is 19 ft., and we required the apparatus to indicate the approximate hight of water in the tanks at any desired number of stations throughout the works.

One correspondent stated positively that such indications could not be obtained without the use of 19 separate wires to each station. Another offered a complicated and delicate clock-work mechanism which he claimed would give the necessary indications with the use of two wires. After these proposals had been abandoned the following apparatus was devised and installed by D. J. Kerr, the smelter electrician. It is simple, gives accurate readings at any desired point or number of points, and requires but two wires. It can be installed at small cost by any electrician, and thereafter requires no attendance to insure continual service.

### DETAILS OF THE INDICATOR

A float lever the length of which is nearly equal to the diameter of the tank, is attached to the inside of the tank, near the top. Close to the fulcrum end of the float lever is attached an arm carrying a segmental copper strip which makes and breaks contact with nineteen stationary copper-contact buttons as the float rises or falls. These buttons are attached to a board opposite the moving segmental strip and are spaced the proper distance apart to make successive connections with the copper strip at each foot rise of the float. The contact buttons are connected in parallel through a lamp resistance to one wire of a 220-volt circuit, and the movable copper strip to the opposite wire. These two wires are run to the different points where indications are desired, and ammeters are connected in the line to give the desired readings. The ammeters are calibrated to give full scale deflection with a current of 5 amp. and scale markings are from 1 to 20 consuming 0.25 amp. to each division. At the power-house a recording ammeter is used, thus giving a chart record of the depth of water at all times.




PLAN OF ELECTRICAL INDICATOR AND METHOD OF WIRING

When the indicator at the pumping station registers a depth of 18 ft., the pump is stopped and remains shut down until the indicator shows 12 ft. of water in the tanks, which depth is assumed as a minimum supply.

The greater portion of the water is for blast-furnace use, and it was deemed advisable to erect an indicator near the furnaces, for in case of an accident at the pumping plant it sometimes becomes necessary to cut down the water consumption to the lowest possible point, and at such times the indicator is of especial value to the furnace foreman. The recording indicator at the power-house gives a check on the efficiency of the operator at the pumping station.

## A Concentrating Plant at the Jamestown Exposition

A feature of the Jamestown Exposition will be the concentrating plant that is to be operated by the United States Geological Survey. While this plant is primarily to test gravels from placer deposits and especially those containing what is known as the black sands, it will also be used to test pulp obtained from deep mines and all kinds of gravel and sand deposits. Its object is really twofold, that of testing the gravels and ores and also of comparing the different concentrators.

The plant will consist of various concentrating tables, magnetic separators, crushers, classifiers, etc. A complete assay laboratory will be operated in connection with the concentrating plant. Many gravel deposits and sands contain, besides the precious metals, such minerals as magnetite, chromite, ilmenite, monazite, garnet, chrysolite, zircon, quartzite, etc., and one of the objects will be to determine the commercial value of these minerals.

## British Coinage in 1906

The coinage of the British mint for the year 1906 is reported as follows, the number of pieces being given:

| | British. | Colonial. | Total. |
|---|---|---|---|
| Gold | 14,712,418 | ..... | 14,712,418 |
| Silver | 31,442,452 | 7,032,843 | 38,475,295 |
| Nickel | ..... | 1,116,000 | 1,116,000 |
| Bronze | 54,431,104 | 4,150,000 | 58,581,104 |
| Total | 100,585,974 | 12,298,843 | 112,884,817 |
| Total, 1905 | 50,600,360 | 45,187,370 | 95,787,730 |

The increase in the number of pieces coined was 17,097,087. The face value of the British coins made was: Gold, £12,165,000; silver, £1,705,070; total, £13,870,070. The face value of coins withdrawn from circulation in 1906 as light weight, defaced, etc., was: Gold, £2,700,000; silver, £666,340; total, £3,366,340. No nickel coins are used in Great Britain, though the mint strikes some for colonial circulation.

## The Montana Society

The following account of the recent dinner of the Montana Society is condensed from the New York *Sun* of Jan. 20:

The peaceful braves of the Montana Society, who scalp the tenderfoot in Wall street six days in the week with a copper tomahawk and celebrate it on the seventh, held their big powwow last night in the tepee of old Chief Delmonico, at Fifth avenue and Forty-fourth street, just east of the Broadway bad lands.

They sang the praises of Montana from Virginia City to the Yellowstone, and every third word of their strenuous table talk dealt with copper. There were Montanans present who went there before the Northern Pacific was built, and other Montanans who have never been west of Rahway, N. J., but knew the language and the warwhoops just the same.

More than 200 of them met in Delmonico's at 7 o'clock and put on their war paint and feathers. As each brave laid aside his top hat he received from attendants a drop of red paint and his own special war bonnet of red, yellow and green turkey feathers. President W. B. Thompson rigged himself out in the full regalia of a sachem, while Secretary Jim McEvilly, to lend variety to the celebration, got himself up as a Snake river cowpuncher, wide-brimmed Stetson, red flannel shirt, chaps and a leather quirt. They assembled in the hall with wild whoops of joy and gave Big Chief Bill Thompson a full salute in their own tongue, a salute which ran something like this:

"Wollygaloop, galoop, galoop, wallygaloop, galoop, galoop. Yee-yip-yee-ow!"

As the braves danced into the dining room, every man with a red paint spot on his forehead and a savage war bonnet on his head, they gave the peace dance of the society, cavorting, hopping, skipping around and around Chief Thompson until to placate them the chief grunted an order for a round of Cheyenne cocktails, a new cocktail of wonderful potency.

Edwin O. Holter was toastmaster. After a few introductory remarks he called for the "Montana Anthem," and they sang it with great joy to the tune of "The Girl with the Dreamy Eyes." Part of the anthem runs this way:

Take me where the sage is plenty;
Where there's rattlesnakes an' ticks;
Where a stack of "whites" costs twenty;
Where they don't sell gilded bricks;
Where the old Missouri river
An' the muddy Yellowstone
Make green patches in the Bad Lands
Where old Sittin' Bull was known.

Take me where there ain't no subways
Nor no forty-story shacks;
Where they shy at automobiles
Dudes, plug hats an' three rail tracks;
Where the old sun tanned prospector
Dreams of wealth an' pans his dirt;
Where the sleepy night herd puncher
Sings to steers an' plys his quirt.

A. J. Seligman announced the organization of the Rocky Mountain club.

"We settled the details today," said Mr. Seligman. "We elected for our first president John Hays Hammond. We will start with a membership of about 300 and to insure the success of the club some of us have clubbed together and put up $50,000 to make it a certain go. We will soon have a board of governors to represent the eligible States—California, Oregon, Washington, Montana, Idaho, Wyoming, Utah, Nevada, Colorado, Arizona, New Mexico, North Dakota, South Dakota, and Alaska. We intend to make it the biggest club in this country, and we are now looking for suitable headquarters."

Mr. Seligman was followed by George Woodworth, the oldest Montanan present, and an old-time miner. Mr. Woodworth went to Montana in 1865 from Ohio, and he told the banqueters some of his experiences. He came all the way from Montana to attend the dinner, his first visit to New York.

"I took the railroad to Grinnell where it ended," said Mr. Woodworth. "Then I staged it to Fort Kearney, got an escort of Pawnee Indians to Julesburg, and then by stage and horseback worked to Denver, Salt Lake City and Virginia City. I had to buy flour on the way at $150 a sack, $5 for a plug of tobacco. When I got to Montana I had just $2.50 left out of $500, enough for a shave and shampoo. My brother ran a vegetable farm there. I saw him one day cutting the eyes out of potatoes for seed planting. 'What d'ye do with the potatoes you have left?' I said. 'Sell 'em for 25 cents a pound,' said my brother. 'Hell,' said I, 'Guess I can make money in this country, too, if a man can sell blind potatoes for that price.' It took me seventy days to get to Montana, boys, and just sixty-four hours to get here from Montana, in a parlor car, too; how's that for an old miner?"

The toastmaster said he had a new "copperation" poem to spring on them, sent him by John Kendrick Bangs. He read it during intervals of quiet:

A Copperation is a beast
With forty 'leven paws
That doesn't ever pay the least
Attention to the laws.

It grabs whatever comes in sight
From hansom cabs to socks,
And with a grin of mad delight
It turns 'em into stocks.

And then it takes a rubber hose
Connected with the sea
And pumps 'em full of $H_2O$'s
Of various degree.

And when they're swollen up so stout
You'd think they'd surely bust,
They souse 'em once again, and out
They come at last a trust.

## Nome, Alaska, in 1906

The detailed study of the geology of that portion of the Nome region represented on the Nome and Grand Central special maps, which was begun by Frank L. Hess and Fred H. Moffit, of the United States Geological Survey, in 1905, was continued during the season of 1906 by Mr. Moffit and Philip S. Smith.

The remarkable discoveries made on Little creek during the winter of 1904-5 led to very active prospecting on the tundra last winter. The result was an extension of the workings along this old beach line, in which the Little Creek diggings are found, as far east as MacDonald creek, a distance of about 5 miles. Prospecting on the tundra was continued through the summer and was carried on chiefly by means of drills. With the exception of operations on Glacier and Anvil creeks, and at the head of Dexter creek, mining in the Nome region during 1906 was almost restricted to the exploitation of tundra gravels. This condition can hardly exist for any considerable length of time, however, and when the excitement over beach deposits is past there will be a return to the earlier found stream deposits.

The absence of rain during the summer occasioned a scarcity of water, which was less severe than would have been the case if it had not been for the supply drawn from the Miocene ditch and other ditches more recently constructed.

The gold production of Seward peninsula, most of which comes from the Nome region, was greater during the past season than it has been in any previous year.

## Langlaagte Deep, Limited

The annual report of Langlaagte Deep, Limited, shows that during the year ended July 31, 1906, the tonnage mined amounted to 274,974 tons, of which 71,262 tons were obtained from the main-reef leader and the balance from the south reef, the stoping widths of the reefs being 64 in. and 75 in. respectively. Mining costs averaged 14s. 10d. per ton; comprising 6s. 8d. for stoping, 2s. 5d. for development, 2s. 6d. for shoveling and trimming, 1s. 2d. for winding, 7d. for pumping and 2d. for trimming and handling on the surface.

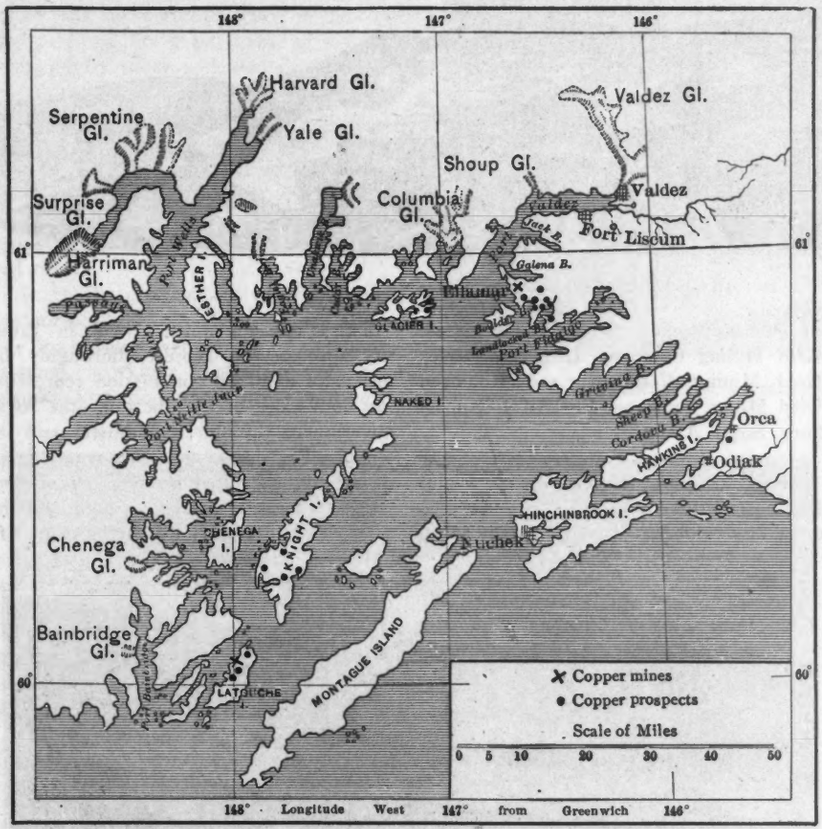
The mill treated 240,406 tons of ore after 12.57 per cent. of waste had been hand-sorted out. There were 120 stamps employed in the mill and the crushing duty per stamp averaged 5.7 tons per 24 hours. The value of the ore was 7.6 fine dwts. per ton and the yield per ton averaged 4.5 dwt. The cyanide plant handled 237,010 tons for an average return of 2.4 dwt.; the theoretical extraction being 78.97 per cent., as against 80 per cent. actual extraction. The reduction expenses averaged 4s. 2d. per ton; of which milling cost 3s. and cyaniding 1s. 2d. per ton. The extraction was improved during the year, the total being 92.016 per cent., as compared with 90.75 per cent. in 1905, there being a gain in the mill and decrease in the cyanide work due to the operation of the tube mills.

A discovery of gold is reported two miles from Mullumbimby, N. S. W., on the road to Brunswick Heads. Many claims have been pegged.

## Copper Prospects of Prince William Sound *

BY U. S. GRANT†

A considerable number of prospectors were at work in Prince William Sound, Alaska, during the summer of 1905, and previous to that time other prospects had been explored which were not being worked last summer. In none of the places is machinery used, with the one exception of the workings of the Reynolds-Alaska Development Company, at Boulder bay. The chief center of interest for prospectors is the vicinity of Copper mountain. This is a ragged-crested mountain, rising nearly 4000 ft. above sea level and




COPPER PROSPECTS NEAR PRINCE WILLIAM SOUND

situated about 4 miles southeast of Ellamar. Boulder bay is at the west base of this mountain and Landlocked bay at its south base. The rock of Copper mountain is greenstone, with a small amount of sediments (slate, graywacke, and quartzite).

Two mines on Prince William sound have demonstrated that copper ore of good grade occurs in this district and that it can be produced at a profit, notwithstanding the fact that the ore is shipped, at an expense of $2.50 to $3 per ton, to Tacoma, Wash., before it is smelted. Up to the present time nearly the entire output has been from the Gladhaugh mine. At the Bonanza mine existing developments warrant the prediction that there will be an early increase in production and that a large body of ore will be found available. None of the prospects, as developed in the summer of 1905, showed indications of as large an orebody as is known at either of the two mines.

Erosion in very recent time has been general throughout the Prince William sound region, so that no considerable secondary concentration of ores exists. The ores of possible commercial importance have all the characteristics of primary deposits and are a phase of a general sulphide deposition along certain channels or zones. In general there is no reason to expect that stringers of ore on the surface will develop in depth to payable veins or that veins of considerable width at the surface will continue with unvaried dimensions and richness to great depths. On the contrary, it is known that orebodies pinch out in individual cases, and, on the whole, irregularity of form is to be expected. Developments of prospects should be confined to the following of ore. Running long crosscuts to catch stringers or veins in depth is bad practice, since experience has shown that the continuation of the deposits is by no means assured.

Throughout the district much of the development work has been misdirected and nowhere except on Latouche island and at Virgin bay have excavations gone far enough to definitely prove the presence of workable orebodies. However, at a number of prospects the copper and gold contents of the ore are sufficiently high for profitable mining and these places are worthy of further prospecting. These facts, coupled with the location of many of the veins at or very close to tide water and the present demand for ores of this character for furnace mixtures, give reason to expect an increase of copper mining outside of the two mines already in operation. Should the future see the establishment on Prince William sound of plants for smelting the copper ores of the Copper river district, for which purpose the coal of the Bering river or Matanuska field could be utilized, the prospect for mining on the sound would be still brighter.

*From Bulletin No. 284, U. S. Geological Survey, 1906. "Copper and other Mineral Resources of Prince William Sound, Alaska."

†Professor of Geology, Northwestern University, Evanston, Ill.

## Minerals in Hunan, China

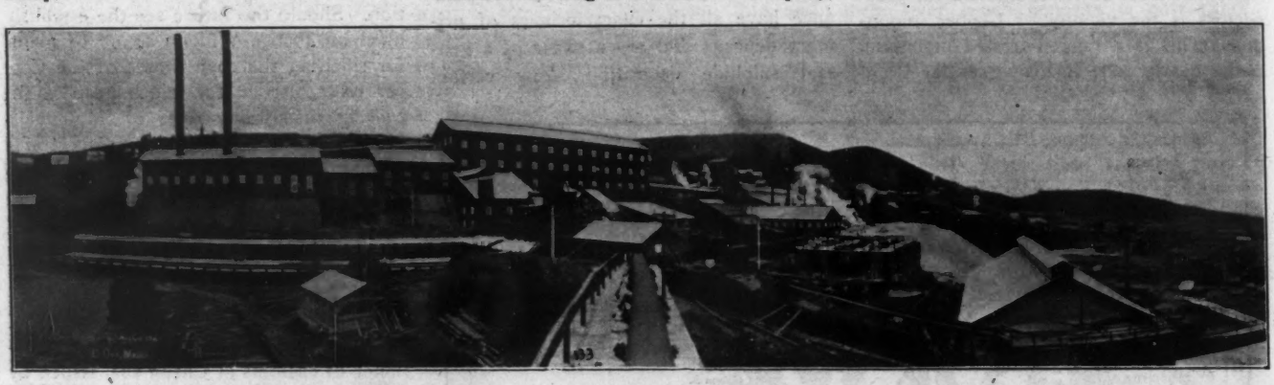
The following remarks with reference to the mineral wealth of Hunan are from the report for 1905 of the acting commissioner of customs at Chang-sha, issued by the imperial Chinese maritime customs: "The mineral wealth of Hunan is believed to be very great, and although but few serious attempts have been made to extract these natural riches by modern methods, owing mostly to the opposition of the Hunanese to foreign exploitation in their province, enough has been learned from the results of native mining enterprises to warrant a conviction that, given up-to-date appliances and expert direction, the supply of coal as well as of several kinds of metals would prove to be well-nigh inexhaustible. There are known to be hundreds of coal mines scattered throughout the province, but all are worked in the same primitive manner; and as soon as a certain depth has been reached, the shafts, or rather, manholes, have to be abandoned for want of ventilation or because of the presence of water. There are also known to be deposits of gold, lead, antimony, zinc; but these, like the coal, are still practically untouched.

At the present time the Chinese authorities are, of their own accord, taking steps for the throwing open to foreign trade of the two largest marts in the province—Hsiang-t'an, 30 miles above Changsha, and Changteh, on the Yuan river, which, like the Hsiang, flows into the Tungting lake. Sites for custom houses have already been selected or purchased, and suitable port regulations drawn up for submission to the central government.

Japan, until recently, held sixth rank among the copper-producing countries of the world, but she has risen to fourth place, with an output of copper equal to 5 per cent. of the total production of the world.

## Blaisdell Apparatus at El Oro Cyanide Plant

At the mill of the El Oro Mining and Railway Company, Ltd., at El Oro, Mexico, shown in the accompanying engraving, Blaisdell vat excavators and sand distributors are used to remove the sand from the collecting and leaching vats, and to charge the latter, and Robins belt conveyors are used throughout to transfer the sand from the collecting to the leaching vats, and from the latter to the waste dump.



100-STAMP MILL AND CYANIDE PLANT AT EL ORO

The tailing from the mill launder flows to a wet-pulp distributor, which discharges it into nine 22x10-ft. steel collecting vats, arranged in three rows. The slime overflows and passes to the slime-treatment vats. The sand, after being drained, is discharged from the collecting vats by a 22-ft. vat excavator, and is carried by one of the three 18-in. belt conveyors (Nos. 1, 2 and 3) to the inclined cross-conveyors (Nos. 4 and 5). The latter deliver to another 18-in. belt conveyor (No. 6), located above and between the two rows of leaching vats, each row containing six steel vats 40 ft. in diameter and 6 ft. deep. Belt conveyor No. 6 delivers to a belt conveyor on the sand distributor, which spreads the sand lightly and evenly in the leaching vats in an ideal condition for rapid and uniform leaching and percolation.

After treatment the sand is removed from the leaching vats by a 40-ft. excavator and carried by 18-in. belt conveyors (Nos. 6A and 6B), located beneath the leaching vats, to the stacking conveyors. These latter are 18-in. belt conveyors arranged so that, by moving the second one radially, with the far end of the first as a center, a very large tailing pile may be built up before it will be necessary to extend the conveyors. This plant was designed to treat the output of No. 2 mill (100 stamps), which was placed in commission in the spring of 1905, but the efficiency of the system has made it possible to treat the entire product of mills Nos. 1 and 2, each of 100 stamps.

The Blaisdell system, together with Robins belt conveyors, is in use, or is being installed, in many cyanide plants in the United States, Mexico and South Africa, including those of the Tonopah Mining Company, and the Tonopah-Belmont Development Company, both of Tonopah, Nev.; Montgomery-Shoshone Consolidated Mining Company, of Rhyolite, Nev.; Peregrina Mining and Milling Company, San Prospero Mines Company, and the Guanajuato Amalgamated Gold Mining Company, of Guanajuato, Mexico; Cia. Minera Las Dos Estrellas, S. A., of El Oro, Mexico; Black Mountain Mining Company, of Magdalena, Mexico; Veta Colorado Mining and Smelter Company, of Parral, Mexico; New Modderfontein Gold Mining Company, Langlaagte Deep Gold Mining Company, and Robinson Gold Mines Company, Ltd., of Johannesburg, South Africa.

---

The gold output of New South Wales for the month of November amounted to 9,833 oz., valued at £36,629, as compared with 33,913 oz., valued at £122,622, for November, 1905, says *Reuter*. The yield for the eleven months of 1906 amounted to 285,554 oz., valued at £1,012,726, as compared with 300,979 oz., valued at £1,057,006, for the corresponding period of 1905.

## The Two-shaft System for Prussian Potash Works

BY ROBERT GRIMSHAW*

There has been for some months considerable agitation in Prussia about the proposed law requiring the sinking of a second shaft in all potash workings in the kingdom, the result of popular excitement immediately following the occurrence of accidents endangering, and even causing loss of, life and limb. The proposed law is very rigid and public feeling is very acute on the subject.

The Prussian ministry will in January discuss the subject thoroughly by means of a mixed commission representing both sides of the question—the royal government through its ministry and its technical advisers and the potash-mine owners through their accredited representatives. The latter are represented by eight delegates, the government by as many officials, who are members of the "Berghauptmannschafts" of Halle and Clausthal, and consequently experts in matters relative to mining.

ROBINS BELT CONVEYER DISCHARGING CYANIDE SAND TO TANKS

The introduction of the two-shaft sys-

*Mining engineer, Hannover, Germany.

tem in the potash-mining industry is of special interest in the present Prussian province, formerly the kingdom, of Hannover, where are situated all the potash workings of Germany, and where in fact there is a practical monopoly of the potash-producing industry of the world. The Prussian Ministry of Commerce and Industry demands the change; the officials from the Halle and Clausthal districts, all of them mining experts in government employ, are called upon to discuss the matter with the representatives of the potash-producing industry, with the view of proving to the latter that the ministry is not unreasonable in its demands. The potash magnates have on general principles expressed themselves as opposed to the measure, giving as their reasons the great outlay which would be necessary to carry out the reforms, when made compulsory, and the greater risk of loss and damages by water with two shafts.

On the other hand, the Prussian government claims, and expects to prove by its experts, that the two-shaft system would entail no pecuniary loss and cause no increased risk; and that, even supposing it did, the question of safety of the underground employees is paramount to all others.

In the first place, say the government authorities, the two-shaft system affords so much better ventilation of the underground workings, especially at great depths, that the temperature would be reduced 10 to 12 deg. F., making possible an increased output, which alone would pay for the improvement. In the second place, the government authorities claim the advantage of having two shafts instead of one would appear in case of trouble with the hoisting and pumping in one shaft. The second shaft would enable the operations of the mine to be carried on without interruption, thus increasing the average annual output, and by preventing suits for damages for non-delivery at the contracted time cause a still further saving.

As proof of the sincerity of the ministerial statements, and the sound common sense of the matter from the business point of view, all government workings with but one exception have had the second shaft put in, both for politico-social and for financial reasons. The result has justified the expenditure, say the officials, from both the monetary and the humanitarian standpoints. In the case of the solitary government working in which there is but one shaft, the reason for making this an exception to the rule was that the working is so small that the second shaft would add no additional security to life and propetry.

BLAISDELL VAT EXCAVATOR

London silver shipments to the East in 1906, at the average quotation for the year, amounted in quantity to about 116,808,000 oz.; or, estimating the December exports, to about 126,400,000 oz., or nearly two-thirds of the world's production.

## A Machine Mucker

A Park automatic loader and conveyer has recently been installed in the Gold Lion tunnel in Ouray county, and is described in the Ouray *Herald*. The loader consists of the main housing mounted on a heavy cast-steel truck frame, with an endless chain carrying steel scoops or shovels every two feet. These shovels reach out over the shoe plate and scoop the muck up the carrying channel, which is 24 in. wide, and dump the load upon a heavy rubber belt, 30 in. wide. This belt conveyer is independently driven and mounted on a ball-bearing turntable which can be swung through an arc of 180 deg. The discharge of the belt is swung over the mine car, which is loaded in less than half a minute, and the next car is switched up to the machine. There are a number of methods of handling the cars and the manufacturers have arrangements for handling six, eight or ten cars at a time without stopping the machine.

EXCAVATOR, DISTRIBUTOR AND BELT CONVEYER

In the Gunnison tunnel, where one of the old machines was in operation for some time, the machine cleaned up a 5-ft. round of holes in the No. 12 or No. 14 tunnel in about 1¼ hours, and the longest time required was one hour and 50 min. The loader is the invention of Thomas M. Park, who is now at the Gold Lion with the machine.

In a rock-salt mine at Oakwood, Detroit, immense streams of water defeated every effort to proceed after the 200-ft. level had been reached. The flow was so great that a pump made but little impression on the flood. When a stream was encountered, an iron pipe was driven in and cement was forced into the crevice with compressed air, until the water was driven back and the flow stopped. Before the water stratum was passed, several thousand barrels of cement had been used.

## A Device for Reducing the Size of Assay Samples

BY WALTER S. BROWN, S. B.*

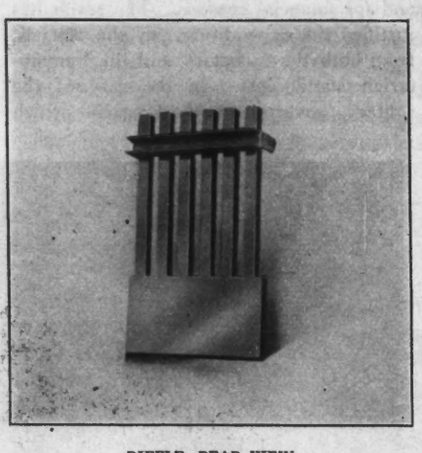
The device herein described is, with slight modifications, one which was used by the writer at a mill in northern Idaho. The original idea was furnished by H. E. T. Haultain. When I was connected with the plant I used the cabinet continuously in cutting down both mine and mill samples and found it a rapid and accurate labor saver. It is, therefore, with this to recommend it, that I venture to submit it to those readers of this paper to whom it may be of value.

### CONSTRUCTION AND OPERATION

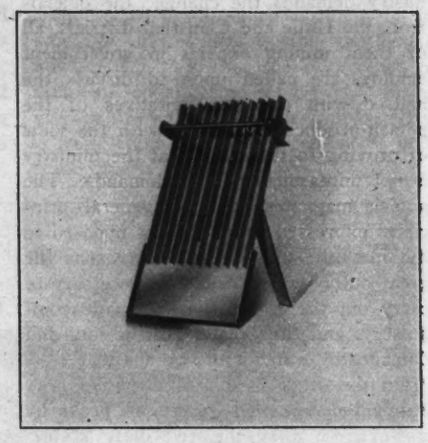
The cabinet itself is made of 2x4-in. sticks and 1-in. boards and its construction is sufficiently clear from the drawing and photographs. There are three compartments, one for concentrates, one for mine samples, other than first class, and one for tailings, thus reducing the danger of salting to a minimum. Each compartment has two riffles, one for coarse and one for fine ore. The shelf on top is for small sample pans and the lower shelf is where the pan rests which catches the ore retained by the riffles. The hight of the bottoms of the hoppers above the floor is sufficient to allow an ordinary galvanized iron pail to be placed there for removing the discarded ore.

The riffles should be made of 15-gage sheet brass. The channels should be riveted to the top of their frame and soldered to the bottom. They may be made of a width to suit the size of the ore particles, always bearing in mind, however, that this width should never be less than three and one-half times the diameter of the largest ore particle to be passed through them. It is hardly necessary to say that the spaces between the channels should be exactly the same as the width of the channels themselves.

The operation is very simple. The ore to be cut down is placed in one pan and an empty pan is put on the shelf under the riffles. The ore is then thrown in a flat stream against the riffles when the pan in the hand, now empty, is substituted for the full one on the shelf and the operation is repeated until the sample is of the size desired for bucking.



RIFFLE, REAR VIEW



RIFFLE, SHOWING CHANNELS

THE SAMPLING CABINET COMPLETE

*Mining engineer, Denver, Colo.

## Idaho Lead Mines in 1906

BY ROBERT N. BELL*

The most notable development in lead mining in Idaho during 1906 has been the remarkable performance of the Bunker Hill and Sullivan lead-silver mine, at Wardner, which, in spite of a nasty fire in one of the principal stopes, paid enormous dividends. The deposit is operated through a single entry and from a single orebody, yet the dividends paid during the year amounted to $2,340,000. There has been developed in the mine within the past eighteen months an entirely new and independent ore channel that has already been blocked with three intermediate levels, exposing the longest and largest ore-shoot ever discovered in the property. This lies below the 2000-ft. horizon between the Read and Kellogg levels, and is estimated to contain ore to the gross value of something like $15,000,000, with the definite prospect that this estimate will be trebled before the shoot is completely developed down to the main Kellogg adit level.

The Tiger Poorman mine is sinking below the 2000-ft. station of its vertical shaft. The Standard mine, at Mace, is also sinking another lift from its 1000-ft. vertical shaft, which is 2500 ft. below the apex of the vein.

The Frisco mine was freed from water in the early part of the year, and has since been sinking for new levels on a magnificent ore-shoot 900 ft. long. The Morning mine has been connected between the No. 6 tunnel, two miles long, and the No. 5 tunnel, with several extensive intermediate levels, which show much larger and better orebodies than the levels above 5.

The Hecla mine continues to improve as development progresses, and seems to be destined to make one of the biggest producers in the district, while the Hercules is simply being played with. It has paid over $1,000,000 in profits during the year, and could have doubled that great record by crude-ore shipments without crowding its resources very seriously.

The Relief mine, in Blaine county, owned by the Idaho Consolidated Mines Development Company, has disclosed some large bodies of good concentrating ore at considerable depth, which may prove a continuation of the Minnie Moore ore channel. This property is being equipped with a new electric hoist and its extensive development will be undertaken to great depth at once under the management of Irwin E. Rockwell.

A large amount of low-grade ore was shipped from the Minnie Moore dump during the year.

*State inspector of mines, Idaho.

# Engineering Periodicals*

BY H. WADE HIBBARD†

Among the most valuable members of the engineering profession today are the moving spirits of the engineering press. Books, monographs upon particular subjects, necessary as they are by their gathering within one cover all the required material of years and many places, and by their orderly classification, logical discussion, and evolving of principles, are, by the very necessity of their production, always and inevitably behind the times. The reason for existence of the engineering press is to collect all recent valuable information—news, if you please—and present it weekly or monthly, less or more digested, to as large a circle of readers as possible. Unthinkingly or deliberately to neglect forming acquaintance with so great a source of engineering knowledge is not fitting for the student who has his own future to make in a country where ruts and old fashions are only for the failures.

Should one read, and preserve what he reads? To take knowledge into one's hand temporarily, and then not afterward have that knowledge available for desired use, is as foolish as once to have seen a life preserver and not be able to find it at midnight collision.

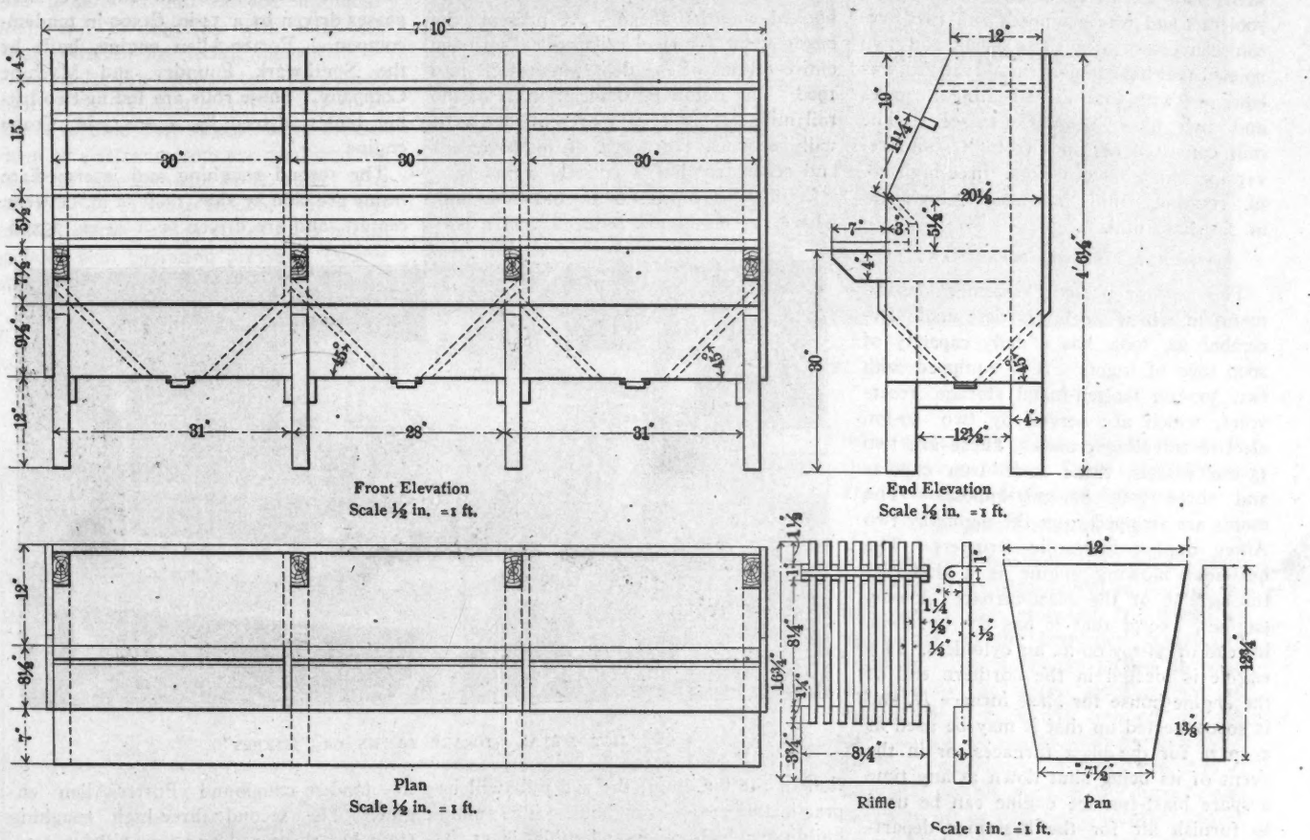
Habits are excellent balance wheels, generally. Brilliancy being given to but few men, the great majority must hammer out lesson or problem or engineering feat. In fact, genius has been defined as an infinite capacity to take trouble. Regularity of mind, a habit of most intense, undivided application, may place the worker far beyond the one who thinks to accomplish by fits and starts. It is well to form the habit of regular perusal of the weekly technical paper.

Scepticism is the normal state of the scientific mind. It is ever looking for something better, not satisfied that the present is perfect. The reading of articles over the names of famous engineers, afterward to find them severely criticized, is good for the confiding student who perhaps has supposed that all engineers and professors are agreed. It is just as well for him to learn not to believe all that is in print, unless there are good reasons presented. Independent investigation is promoted by reading the papers. A printed controversy stimulates anyone who loves a fight. Blessed be the man whose engineering eye is fired and mettle aroused by the prospect of a battle royal between men of fame.

Commercial methods are often not fully practicable in college shop, drafting room, and laboratory, because of the necessary limitations for instruction purposes. The papers, if read with discrimination, will throw light upon these departments. The reading student will learn of the difference between "exactly right," and "good enough;" between no payment of wages, and production under competition; between instruction designing, and the spur of a contract date for completion.

A *good* engineering paper should be one of the life partners, ready at hand when moments of leisure permit its instruction and enjoyment, better understood and liked as the years roll on, acquaintance or perhaps friendship formed with editor, contributions made, suggestions given and taken, some share had in its mighty influence in the engineering world.

A superintendent's office will take regularly several papers or several copies of one most useful paper. He marks in these papers articles appropriate for the instruction or spurring of particular subordinates and sends them out. Later he will call for meetings of these heads of divisions or departments in his office, and the resulting interchange of opinions on the papers, tempered with experience, will prove of decided advantage to the business, promoting unanimity of feeling between the departments and the introduction of the best methods suited for each or perhaps all. I recall with much pleasure such meetings on the Lehigh Valley Railroad, and have been told only recently by President Vreeland of the Metropolitan Street Railway of New York City, of the success attending his marking of such articles and sending them out, not merely to subordinates, but to thousands of motormen and gripmen.




DRAWINGS OF SAMPLING DEVICE

*Excerpts from an address delivered before the students of the Society of Mechanical Engineers, Sibley College of Mechanical Engineering, Cornell University.

†Professor of mechanical engineering of railways, Cornell University.

# STEEL MAKING AT PUEBLO

## The Reconstructed Plant of the Colorado Fuel and Iron Company—Bessemer Department and Rail Mill—Equipment and Capacity

BY LAWRENCE LEWIS*

The first bessemer steel was made at the Minnequa Works on April 7, 1882, and the first rails were rolled on the same date. The bessemer and rail departments were gradually increased until at the time when additions and improvements were begun on a large scale about five years ago, the old bessemer converting department had an average daily capacity of 700 tons and was equipped with two five-ton converters and three iron- and two spiegel-melting cupolas; the old rail mill was equipped with four ingot-heating furnaces and two bloom-heating furnaces. The mill consisted of one two-high 36-in. reversing blooming mill; one three-high 28-in. roughing mill; and one 3-high 26-in. finishing mill.

### THE NEW BESSEMER DEPARTMENT

The new or present bessemer department, in which steel was first made December 22, 1902, has a daily capacity of 2000 tons of ingots. It is equipped with two 300-ton molten-metal storage reservoirs, which are served by two 50-ton electric traveling cranes. There are two 15-ton vessels, three 10-ft. iron cupolas and three 7-ft. spiegel cupolas. The molds are stripped from the ingots by two Aiken duplex hydraulic strippers. The bessemer blowing engine is a duplicate throughout of the blast-furnace blowing engines, except that it has 80- by 60-in. instead of 90- by 60-in. air cylinders. This engine is located in the northern end of the engine house for blast furnace *D*, and is so connected up that it may be used as a spare for the blast furnaces, or in the event of its being shut down at any time a spare blast-furnace engine can be used to furnish air for the bessemer department. The boilers are located in the boiler house of furnace *D*, and are so arranged that they can be fired with blast-furnace waste-gas or with coal. The cupola stock-hoists are operated by electric power and were furnished by the Otis Elevator Company. The blast for the cupolas is supplied by Sturtevant pressure blowers, driven by direct-connected electric motors.

### THE RAIL MILL

Owing to the difficulties incident to construction while operations are going on, some of the improvements and enlargements planned at the rail mill at the Minnequa works are yet to be made. Reconstruction has been going on for five years, a little at a time, and throughout this period the rail mill has been in continuous operation night and day; except on Sundays when the bessemer department is closed down to reline the vessels. It has been run continuously, even during break-downs and during the coal strike of 1903-4.

Throughout this period orders were booked months ahead. At present the engagement for steel rails will absorb the entire output of the department well into 1908. The following description, is of the rail mill, not as it is at present, but as it will be when the work of improvement and reconstruction is entirely complete.

With the exception of the blooming mill, where the ingots are reduced, and a portion of the buildings, the rail mill will be practically new throughout. The main building, which covers all mills, is 55 ft. 6 in. wide by 581 ft. 4 in. long, and is provided with crane runways throughout its full length and two 15-ton and one 25-ton electric traveling cranes, which cover all tables and mills. The building covering the engines for all mills, except the finishing train, is 45 ft. 5 in. wide and 367 ft. long, and is equipped with a 40-ton electric traveling crane. The house for the engine which drives the finishing train is located on the opposite side of the building and is 27 ft. 8 in. wide by 76 ft. 7 in. long. It is covered by a 25-ton hand crane. The hot-bed building is 121 ft. 6 in. wide by 174 ft. long, and that covering the finishing department 60 ft. wide by 774 ft. long.

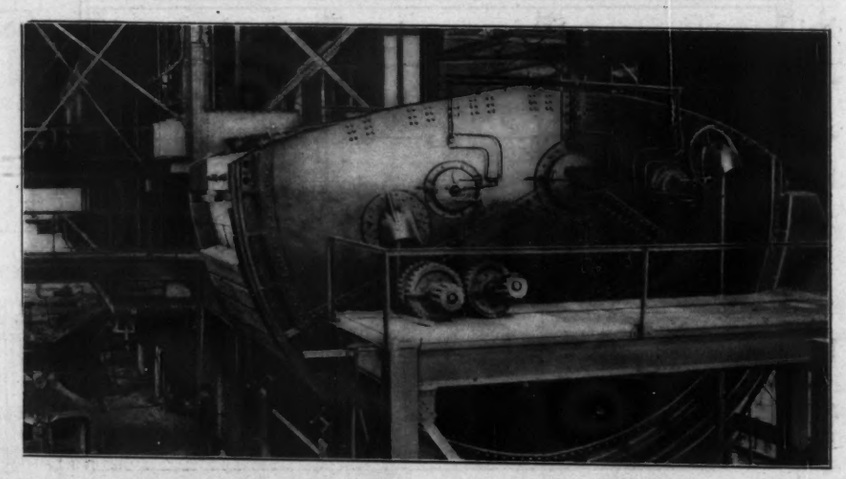
### HEATING FURNACES AND ROLLING MILLS

The pit heating furnaces are six in number, each containing four holes, holding six ingots each, and are housed in a steel building 89 ft. 4 in. wide by 256 ft. long, equipped with two electric automatic charging and drawing cranes. The ingots when taken from the pits are deposited in an automatic tilting car, which conveys them to the blooming mill table. Producer gas is used and is supplied by twelve Duff gas producers.

The ingots, 18 by 20 in., are reduced in thirteen passes to 8x8 in. in a 36-in. mill, driven by a 40x54-in. reversing engine built by the William Tod Company, and are sheared by a direct-acting hydraulic shear, the resulting blooms being conveyed by roller tables to the first roughing train of the rail mill. This is a three-high 28-in. train having five rail and five billet passes driven by a 34-in. 62x60-in tandem-compound Porter-Allen engine, built by the Southwark Foundry and Machine Company. These rolls are fed by two lifting tables, driven by a 10x12-in. Crane engine.

The second roughing and intermediate trains are side by side, 13 ft. 4 in. between centers, and are driven by a 40-in., 75x60-in. tandem-compound Porter-Allen engine. The second three-high roughing train has three rail and two billet passes, and is equipped on the north side with tilting table, and on the south side with tilting table and stationary table, which receive the rails from cross transfer and convey them to the intermediate train; 4x4-in. billets will be finished in this train and will be carried by roller tables to the shear, from which they will be conveyed to a loader.

The intermediate three-high train has four rail passes and is equipped on the north side with a tilting trough working between rollers of a stationary table, and on the south side with tilting table and stationary extension. From the last pass of the intermediate train the rail is run through the finishing pass of the 26-in. two-high finishing train, which has one chilled pass only. This train is driven by a 32-in., 56x48-in. horizontal-vertical com-



HOT METAL STORAGE TANKS OR "MIXERS"

*The writer is indebted for assistance in preparing this article to J. M. McKennan, manager of the Minnequa works, and to J. A. Durfee, assistant manager.

pound engine, built by the William Tod Company.

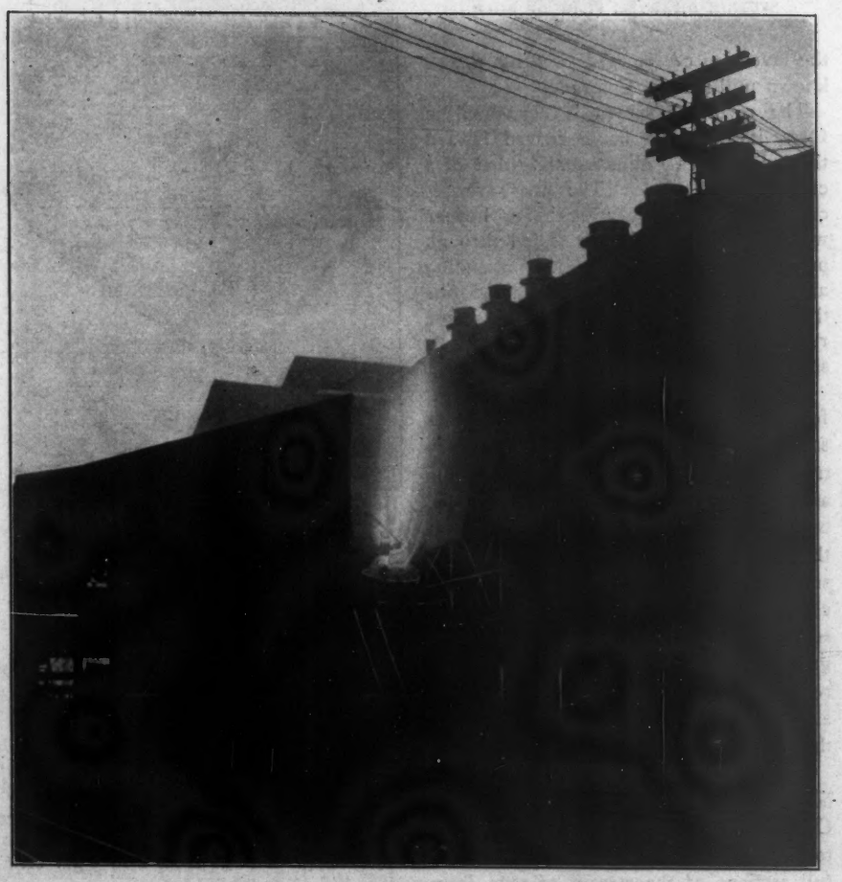
HOT SAWS AND FINISHING DEPARTMENTS

Five hot saws are installed at proper centers to cut rails, either to 30 or to 60-ft. lengths, or by sliding each alternate saw on shoes, 33-ft. lengths can be cut. These saws are driven by a 15x27-in. Buckeye engine and manipulated through a 12-in. hollow shaft operated by an 8-in. hydraulic cylinder working at 500 lb. pressure. These saws are fed by roller tables driven by 10x12-in. reversing Crane engines.

The cambering machine is driven by a 25-h.p. electric motor. The hot bed is so arranged that either 60-, 33- or 30-ft. lengths of rail can be accommodated, and is supplied with wire-rope transfer, driven by electric motors.

The rails are distributed the whole length of the building by rollers driven by electric motors. Ten straightening presses driven by electric motors are used, and are spaced to accommodate 60-ft. rails. The rails are fed to these machines by a hydraulic transfer, which places them within reach of men operating presses. Twelve pairs of drill presses are to be installed, to be spaced to suit 30- and 60-ft. lengths of rails. Shoes are provided under these presses, so that when 33-ft. lengths are to be drilled, the presses can be moved to the proper centers. These drill presses are driven by independent motors.

CASTING STEEL INGOTS



BESSEMER CONVERTER AT MINNEQUA WORKS

MAKING BESSEMER STEEL

The molten iron from the blast furnaces is conveyed in pots or ladles holding 20 tons each, and mounted by trunnions upon cars, to the bessemer department building. The ladles are picked up from the cars by the 50-ton electric traveling cranes, lifted 30 ft. and emptied into the two 300-ton hot-metal storage reservoirs. In these reservoirs or tanks the iron is kept in a molten state by oil burners and is drawn off as required into other ladles, from which it is poured into the converters. These converters or vessels, with a capacity of 15 tons of iron each, are shaped like great claret bottles, with the neck somewhat shortened and slightly bent to one side. They are constructed of steel plate lined with refractory material, chiefly ganister.

After the molten iron has been poured in, a current of air is blown through the contents from tuyeres below. By this process the manganese, silicon and carbon are removed from the iron by oxidation, the oxygen in the air combining with the carbon to form carbon monoxide and carbon dioxide, and with the silicon to form ferrous silicate slag. After the manganese and carbon have been entirely "blown out" or removed, a certain fixed quantity of carbon and manganese, in the form of melted spiegel or spiegeleisen, iron com-

bined with relatively large amounts of carbon and manganese, is added. The carbon is for hardening and the manganese to remove gases from the steel and to diminish the injurious effect of sulphur.

The contents of the vessel are then emptied into a large ladle, in the bottom of which is a hole which is closed with an iron stopper protected by fire clay. The ladle is swung around by means of a crane to a point immediately above a series of cast-iron ingot molds, 6 ft. long and 18x20 in. in section, mounted on cars. The stopper is lifted from the hole in the bottom of the ladle, whereupon the steel runs out, the slag floating on the top being retained and pure steel only being poured.

ROLLING RAILS

The ingot cars are then run to the stripper building, where the molds are withdrawn from the ingots. After being weighed on track scales the ingots are taken to the rail-mill department, where a great electric traveling crane lifts the ingots from the cars and places them in the ingot-heating furnaces, where they are kept hot by means of burning gas. In due time the ingots are again lifted by the crane and placed upon an automatic titling car, which carries them to the blooming table at the rail mill. The ingots are then passed through the reversing blooming mill, which reduces the ingots in sectional area to 8x8 in. and increases them proportionately in length. These are then sheared into two or three pieces —depending on the size of rails to be rolled—which go to other roll trains by successive passes, through which they are fashioned into the section of a rail. They are then sawed into 30-, 33- or 60-ft. lengths and are automatically conveyed to the hot beds, where they cool. The rails then go to a man known as the rail straightener, who manipulates them under his straightening press. They then go to drill presses, where the bolt holes are drilled through the web near the ends. Finally, after being inspected, they are loaded upon railroad cars and carried to the construction camps.

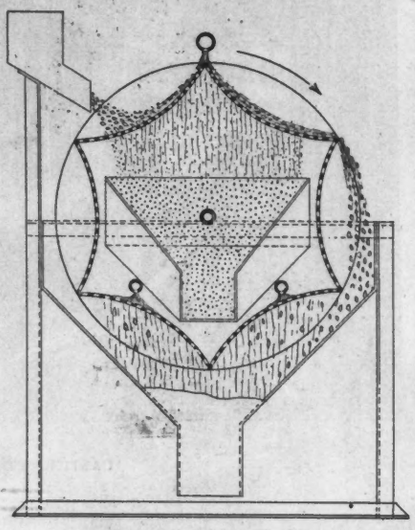
A large proportion of the rails turned out at the Minnequa works are rolled from open-hearth steel, the method of handling being the same as in the case of bessemer rails. The average daily capacity of the rail mill, when all improvements and enlargements are completed, will be 1500 tons.

---

Fan blowers are classified as "volume" and "pressure." A volume blower is primarily designed to discharge air in large quantity under low pressure with the minimum expenditure of power. This requires a wide and comparatively slow-running wheel. A pressure blower, on the other hand is designed for the purpose of creating a high pressure, which may be as great as 20 oz. per sq.in., while delivering a relatively small volume of air.

## A Revolving Screen with Outside Feed

The King revolving ore screen recently placed upon the market by the Hendrie & Bolthoff Manufacturing and Supply Company, Denver, Colo., receives the ore upon the outside of the rotating screen cloth, a reversal of the ordinary method of feed. The machine, the general appearance and principle of operation of which are clearly shown in the accompanying illustration, is



SECTION SHOWING FLOW OF PULP

the invention of Howard G. King, a well known mill-man of Colorado.

The revolving screen is hexagonal in form, its six sides being curved toward the axis upon a radius equal to that of a circumscribed circle. The fines are received in a stationary discharge hopper within the screen. Water is fed through perforated pipes, one branch extending above the machine, while another forms the stationary shaft upon which the screen revolves. The spray inside the cloth is said to prevent blinding effectually.

Several advantages are claimed for this form of screen. The wear of the cloth is said to be much less than in the ordinary trommel, owing to the gentle motion and the uniform feed. The ore is fed over practically the entire surface, and in the direction of travel, permitting the smaller particles to fall directly upon a clean surface, thus securing superior results and maximum capacity. There is no grinding of ore particles, and the power required is very small, the machine being almost self-operated on the principle of the overshot water wheel.

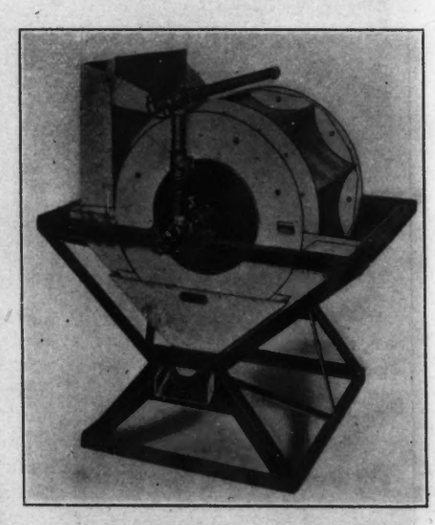
The machine weighs only 300 lb., and occupies approximately 4x4x4 ft. of space. One of its secondary features is an automatic sampling device, which delivers full sections of the stream of pulp from the undersize.

## The Nitrate Industry of Iquique, Chile

Consul C. S. Winans reports that the foreign commerce of the consular district of Iquique, Chile, both imports and exports, showed a remarkable increase during 1905.

The principal exports consisted of borax, valued at $953,142; copper ores, $693,404, and nitrate of soda, $67,314,977. The exports to the United States amounted to $17,776,517, an increase of $4,716,399 over 1904. The leading articles were: Nitrate of soda, valued at $15,112,909; iodine, $1,893,583, and silver ore, $592,069. The total amount of nitrate of soda produced in the Iquique district in 1905 was 1,902,578 tons, an increase of 202,909 tons over 1904. The exports amounted to 1,793,707 tons.

At the beginning of 1905 there were in operation 113 nitrate plants, with an estimated producing capacity of 2,896,450 tons annually, and there were in process of construction 19 new plants, with a producing capacity of 950,000 tons a year. Practically the world's production of this mineral is manufactured in and exported from this district. It is controlled by a combine in which all the manufacturers agree to limit their production to a certain amount, according to the capacity of their plants. During the present fiscal



KING SCREEN, OUTSIDE VIEW

year ending March 31, 1907, the production and exportation is to be limited to 2,175,000 tons. The combine not only controls the output and exportation, but sends experts in the use of nitrate to different parts of the world to study conditions and to extend the sales.

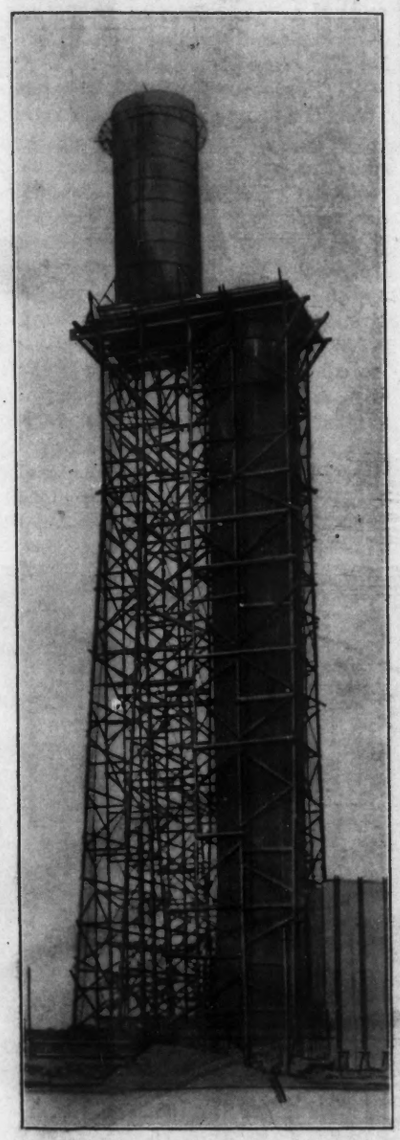
---

Pure copper cannot be cast in sand without considerable difficulty; in fact, some deoxidizer is always used. For common copper castings from 2 to 5 per cent. zinc is generally added to get sound castings.

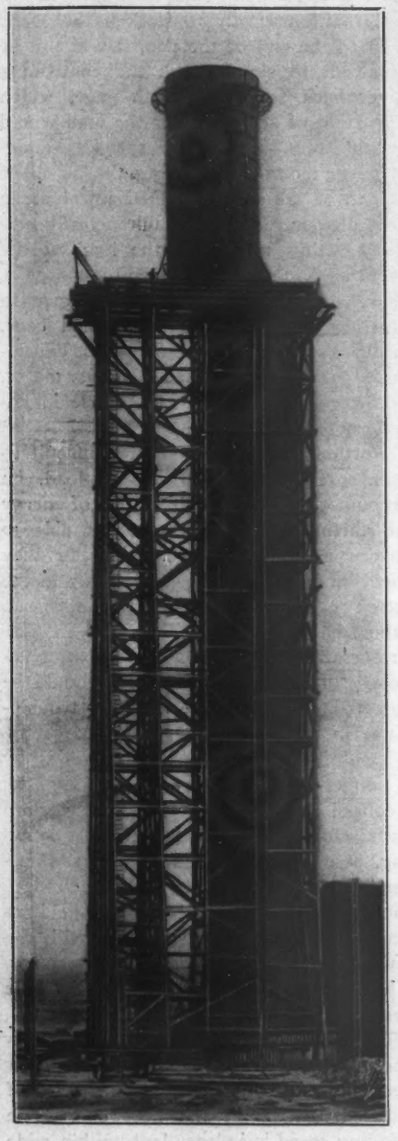
## Increasing the Hight of a Smelter Stack without Shutting Down

BY J. F. JACKSON*

A 60-ft. extension has been placed upon the 200-ft. steel stack of the Copper Queen smelting works at Douglas, Ariz., without interfering with the operation of the plant. The extension was erected upon false work built to the level of the stack and later moved into place and secured.



NEW SECTION UPON FALSE WORK



MOVING EXTENSION INTO PLACE

The plan was devised by the writer and the contract was taken for the Wisconsin Bridge and Iron Co. several months ago. The moving over was successfully accomplished on Dec. 26, the work being in charge of Herman Eastland, foreman. As shown in the accompanying illustration, the high false work was built to the level of the top and surrounding the stack. A track consisting of 15-in. I-beams was laid across the false work just outside of the old stack. Runners of I-beams of the same dimensions were attached to the new section, and nests of rollers were placed between the runners and the I-beam track.

On completion of the new section, which weighed about 40 tons, the shift into place, although a somewhat nerve-trying process to the men employed, was not particularly difficult. The old and new sections were connected by outstanding angles, and ample provisions for wind loads were made.

Some additional weight was also added to the original foundation to provide for the wind pressure on the 60-ft. extension. The original stack was built by Peter & Connelly about four years ago, and was said to be the largest plate stack in the country. Geo. B. Lee, superintendent of the smelting works, approved the plans for doing the work.

The actual time of moving the new stack upon the old one was about three hours. The foreman explained that it could have been done in less time by using a wire rope and engine, but he preferred the slow method, using a Barrett and a track jack and stopping frequently to reduce the vibration in the false work. The volume of smoke from the 25-ft. flue interfered more or less during erection, but when the new section had been moved so far that it covered one-half the area of the old stack the gases promptly adopted the new channel.

*Contracting engineer, Houghton, Mich.

## Mining in the Yukon

SPECIAL CORRESPONDENCE

A report by W. B. McInnes, late commissioner of the Yukon, on the mining operations and general conditions of the Yukon Territory, was presented to the Canadian Parliament Jan. 10. The commissioner reports that the cruder methods of working which prevailed exclusively during the earlier days of the camp, are being rapidly discontinued. Large hydraulic plants have been in operation during the summer, and others of great magnitude have been started. The old method of prospecting by shaft-sinking has been largely superseded by the use of steam drills. The operations of dredges last season confirmed the conclusion drawn from the work of the pioneer dredges of 1905; that the auriferous gravels of the Klondike district are admirably adapted to this manner of working. The advantage of operating claims by dredges and efficient hydraulic apparatus has become so apparent that the owners of many claims on the older creeks and hills preferred not to work their properties by the more primitive methods, but to await the installation of dredges, or a plentiful supply of water. For this reason the number of gold-yielding claims was temporarily reduced. The output up to Oct. 31, 1906, amounted to $5,179,948, as against $7,160,032 for the whole of 1905. In view of the transition going on, however, this output was quite satisfactory.

On the creeks lying north and west of the Indian river divide, comprising Bonanza, Hunker and Eldorado creeks, with their tributaries, primitive placer mining has almost entirely given way to modern methods. On the Indian river side, owing to the expense of transportation and the virgin state of many claims, placer methods, aided by a few mechanical contrivances, are still employed. This section includes Dominion, Gold Run, Eureka, Sulphur and Quartz creeks, and their tributaries. The report notes that there is more attention being given to agriculture, with a probability that in future more people will engage in that pursuit, though mining will continue to be the great industry of the territory.

# ELECTRICAL WINDING PLANTS

## Details of Arrangements, with Descriptions of Several German Plants

BY ALFRED GRADENWITZ*

Electricity affords a number of advantages in the operation of main-pit-winding plants, the most important of which are safety in working, ease of control and simplicity of superintendence.

A necessary condition is that the number of turns should be susceptible of alteration within wide limits, irrespective of the actual magnitude of the useful load and capable of adjustment, especially for a maximum speed of 0.5 m. per second, as in the case of a change in depth of shaft, while any fluctuations in load should be compensated, in certain cases, so as to render the amount of energy derived from the central station practically constant, to correspond with the mean output of the winding plant. The efficiency of the whole plant should finally be as high as possible, even in the event of the number of runs decreasing considerably below the normal.

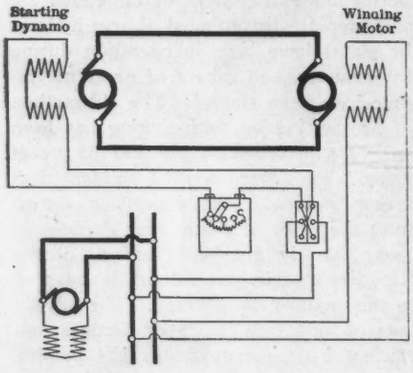



FIG. 1. LEONARD CONNECTION

### CHOICE OF SYSTEMS

The following alternatives may be resorted to in choosing the system most suitable for each given case: 1, operating the winding machine directly by means of rotary-current motors; 2, operating the winding machine by direct-current motors through a Leonard connection in conjunction, if necessary, with motor generators, and with or without devices for compensating for fluctuations in load.

### OPERATION AND CONTROL

With respect to the direct operation by means of rotary-current motors, the safety of working, ease of control and simplicity of superintendence will be warranted only in part, so long as it is possible to alter the number of revolutions with the aid of resistance inserted in the motor circuit, when this factor, as well as the speed of winding, will be dependent upon the magnitude of the useful load. On lowering the load, there is no possibility of altering the speed, in the above manner, without actuating the brake, when the speed of winding will be dependent upon not only the position of the controlling lever, but on the magnitude of the load as well. In order automatically to slacken the speed toward the end of the run, it will not be sufficient to slowly push the controlling lever back from the depth gage, which operation of adjusting for the load would result in an increase of speed. Whenever, for the sake of changes, the low speed has to be adjusted, the mechanical brake will also have to be simultaneously employed, thus adding to the load of the motor. A considerable loss of energy is moreover produced in the resistance to starting and in lifting the loaded cage, while a heavy current shock is experienced on starting the winding motor, which corresponds to the increase in energy noted on starting the load.

Further, it is usually found difficult to compensate for fluctuations in load, on account of the sudden absorption of energy in starting. Fly-wheels are not able to insure a perfect compensation, as they yield large amounts of energy only in the case of a considerable drop in speed, which should be strictly avoided in generators. When using a buffer battery, a rotary direct-current converter should be inserted, which practice is rather troublesome in large plants.

One other alternative, viz., operating by a direct-current motor and using the Leonard connection (Fig. 1), is far more satisfactory, as regards its safety of working, ease of control and simplicity of attendance. The speed of the winding motor is changed by altering the field intensity of the steering dynamo, with the aid of a simple shunt-regulated resistance. The speed will vary proportionately to the armature tension of the steering dynamo, the tension curve of the latter corresponding with the traveling speed. The direction of travel is reversed by the aid of a small switch in the field coil. The winding speed is independent, within wide limits, of the magnitude of the useful load, being the same in lifting and lowering the load. In fact, the speed is almost exclusively dependent upon the position of the controlling lever that actuates the resistance. It is thus possible to connect with the depth gage a simple and reliable safety apparatus, which by acting on the controlling lever will prevent both too rapid starting and too slow stopping. Any speed, down to practically nothing, may be provided for, with all loads, without actuating the mechanical brake, while during the slackening stage any surplus energy, deducting the generator losses, can be recovered.

The power diagram of the direct-current motor which supplies the current for operating the winding motor is very favorable for the driving engines at the central station, the load rising slowly from about zero.

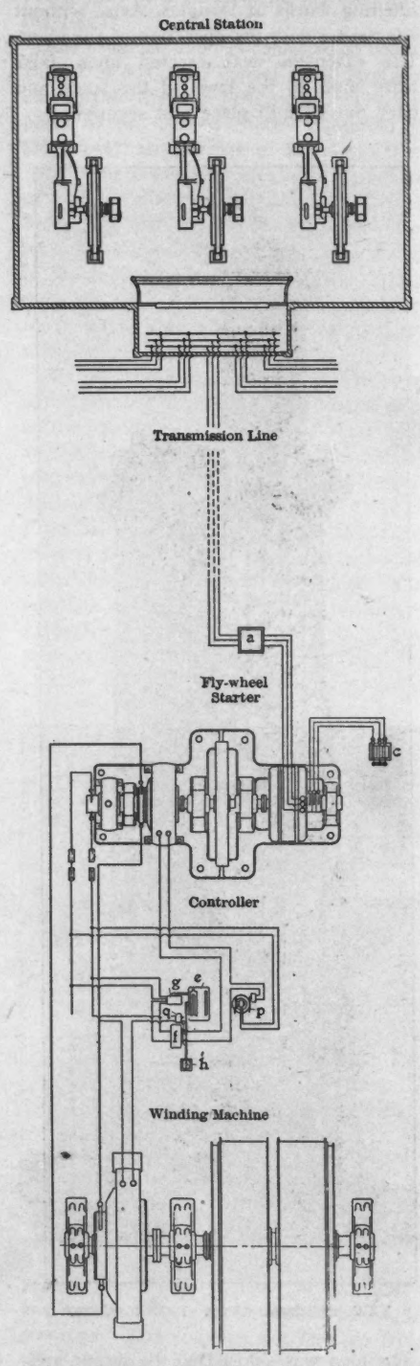



FIG. 2. ILGNER SYSTEM

Whenever means are required to compensate for fluctuations in the load, with a view to the relative dimensions of the winding machine and central station respectively, both fly-wheel and battery arrangements will prove equally acceptable, when the following alternatives may be

*Berlin W 35, Korner-Strasse 25.

chosen from: 1. Actuating the steering dynamo directly from an engine in the central station and compensating for any fluctuations in the load by means of a heavy fly-wheel, with a considerable drop in the number of turns (15-20 per cent.). The steam consumption per effective mine horse-power will in this case be found very low. This arrangement cannot be chosen when rotary-current generators are to be driven for other purposes from the same prime movers as the steering dynamos, on account of the heavy drop in the number of revolutions. 2. Actuating the steering dynamos directly from a prime mover in the central station in connection with a buffer dynamo and buffer battery. In this case, a perfect compensation of the fluctuations in load will be attainable with practically a constant number of revolutions. The steam consumption is very low. This arrangement will be preferred especially in potash and ore mines, as the battery affords a means of performing operations in the mine, during the frequent closing down of the central station, as on Sundays and holidays, as well as at night. 3. Actuating the steering dynamo and a buffer dynamo connected in parallel with a buffer battery by a special motor. The advantages of this arrangement are similar to those afforded by the second plan, especially when considering the possibility of connecting the plant with central stations containing any desired number of generators and prime movers of different sizes. 4. Operating the steering dynamo by a special motor in connection with a fly-wheel, the Ilgner-Siemens-Schuckert system.

This scheme also enables the plant to be connected to any central station, both rotary and direct-current.

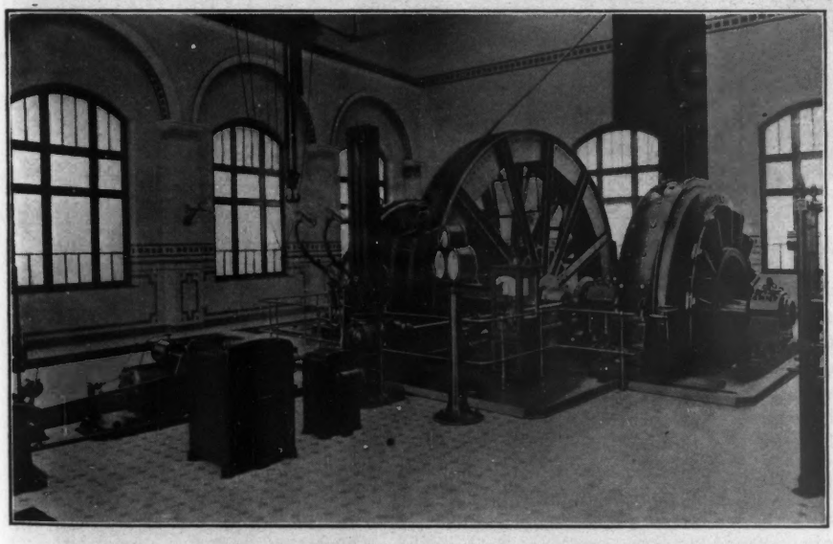


FIG. 3. HOIST AT MATHIAS STINNES MINE, CARNAP, WESTPHALIA

USE AND ADVANTAGE OF A FLY-WHEEL

Electrically operated winding plants designed on the Ilgner system, of which a sketch is given in Fig. 2, are, owing to the effect of the fly-wheels, remarkable for the uniform load on the converter motor, and the extensive alteration in the current intensity of the winding motor.

The consumption of energy for each run, even when the number of runs per hour is decreased considerably, is relatively low. In order further to decrease the consumption of energy in the case of small outputs, the fly-wheel has been in some recent plants connected to the motor generator by a clutch. The uniform load on the driving engine at the central station and the boiler plant will result in a considerable decrease in the consumption of fuel.

In case of two or more winding plants installed side by side, there is used either a common fly-wheel or separated fly-wheel converters coupled together electrically or mechanically, thus compensating for any difference in load in the converter plant without requiring any increase in the weight of the fly-wheels.

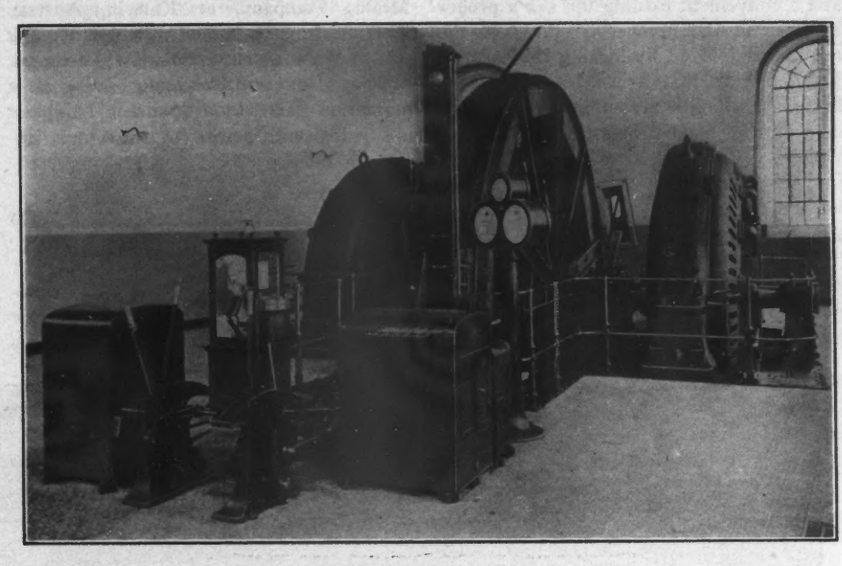


FIG. 5. HOIST AT MAIN PIT, DE WENDLE MINE

Though the first cost of this type of winding plant is higher than that of a steam-operated hoist, the increase is by no means considerable when considering the cost of installing the boiler plant, conduits, etc., and especially when decreasing the converter expenses for each machine by combining the converters of several winding plants. The additional expense will nearly always be compensated for in the fuel saving, as central stations are usually equipped with economical driving engines.

The special feature is the possibility of constructing a plant for a new mine, in stages as follows: 1, a converter without a fly-wheel, the winding speed being so low as to not exceed the maximum output of the converter motor; 2, adding a fly-wheel and raising the winding speed to its full amount; 3, adding another converter and another winding motor and doubling the useful load.

DESCRIPTION OF INSTALLATIONS

A few typical plants designed on the above system are briefly described in the following:

One of the two main-pit winding machines installed at the Mathias Stinnes mine, near Carnap, Westphalia, for an output of 100 tons per hour from a depth of 500 m., is shown in Fig. 3. The shaft is to be increased, eventually, to 800 m. The useful load for each run is 4800 kg., and the maximum speed of winding 14 m. per sec. Fly-wheel converters fed from the Rhenanian-Westphalian electrical works, situated at a distance of 9 km., serve to operate all of the four machines. (Fig. 4.) The fly-wheel converter plant provisionally comprises two converters coupled together, each of which consists of a fly-wheel, a rotary-current motor and two steering dynamos.

Owing to the impracticability of concentrating the fly-wheel mass, required for compensating the load of one machine in a single fly-wheel, two fly-wheels, each of

43 tons weight, have been provided. Together, these compensate for any fluctuations in the load of a winding machine, while being coupled not only to the motor generator of one winding machine, but to that of the other as well. The mass of the fly-wheels calculated for one winding machine thus serves simultaneously for two machines. Should the two winding machines happen to start simultaneously under full load, the fly-wheels will not suffice, and a convenient loading up, i.e., a proper increase in the number of turns to the normal, is insured by locking the controlling lever, so that it can be moved only half way, which is accomplished by means of a locking magnet arranged in the controller of the winding plant. The winding speed will thus reach only one-half its normal value, the fly-wheels being allowed sufficient time to reach their proper speed.

In addition to the two winding machines above mentioned, there have been installed two other machines, which may, in case of necessity, be connected momentarily to a double fly-wheel converter. As soon as this machine has been regularly installed, another fly-wheel converter of exactly similar design will have to be provided. In order then to provide for a further interchange of energy derived for the third and fourth winding machines with those used in operating the first installation, two steering dynamos have been provided for each winding machine; and in the event of all four winding machines being operated, their connections are such as to enable either steering dynamo of one double fly-wheel converter to be connected up in series one with the other and the two to the other converter. The four large fly-wheels will then be coupled together both electrically and mechanically.

The main-pit winding machine of the De Wendel mine, near Hamm, Westphalia, is shown in Fig. 5. The output of this machine is 175 tons per hour, the depth of pit being at present 750 m. (to be increased to 900 m.), the useful load with each run is 5200 kg., and the maximum speed of winding 18 m. per sec.

The design of this plant is similar to the one above described, with the exception that there is only one winding machine and accordingly only one motor generator installed at the present time. However, two fly-wheels, of 43 tons weight each, had to be installed from the very beginning in order to compensate for the oscillations in load of this winding machine.

Finally may be mentioned the main-pit winding machine of the Larisch-Mönnich Mining Company, at Karwin, Austria. This machine is worked at a depth of pit of 530 m., with an output of 125 tons per hour, and a useful load of 3050 kg. at a maximum speed of 12 m. per sec. This plant is supplied with power from a central station operated by coke-oven gas engines.

## Hydraulic Power Plant with 12,000-h.p. Impulse Units

The Stanislaus Electric Power Company, through its working company, the Union Construction Company, has just closed a contract for an electric power transmission system involving the largest impulse wheels ever built. The site of the proposed plant is at Vallecito, on the Stanislaus river, near Angles Camp, Cal., and the scheme contemplates the utilization of the waters of the Stanislaus river, transmitting the power electrically to San Francisco, and incidentally tapping the southern mines and the upper San Joaquin valley. The operating head is 1400 ft., equivalent to a pressure of 608 lb. per sq.in. The present equipment calls for three 6700-kw., 400 r.p.m., General Electric generators, each of which will be driven by a Pelton water-wheel unit of 12,000 h.p. capacity. Not only are the individual units larger than heretofore attempted, but the capacity of the station in excess of 36,000 h.p. is greater than any existing at the present time.

The only instance approaching this in impulse water-wheel practice is the plant of the Puget Sound Power Company at Electron, Wash., in which are installed 4 Pelton wheel units, each driving a 3250-kw. generator, with a combined maximum capacity for the station of 30,000 h.p.

The units for the Stanislaus plant will be of the "double overhung" construction. Each unit will consist of two Pelton wheels overhanging the ends of a heavy shaft which carries the rotor of the generator in the center. Each wheel will consist of a cast-steel annealed disk center to which are to be attached the Pelton buckets, also of cast steel. The shaft will be of fluid-compressed hollow-forged nickel steel, 28 ft. in length, 20 in. in diameter at the center where the rotor is located, and 16½ in. at the water-wheel journals. The wheels and rotor will be designed for a press fit on the shaft at 100 tons pressure. The journals, one on each side of the generator, will be larger than any heretofore designed for this class of work, being 16½ in. diameter by 60 in. long. They are of the ring-oiling, ball and socket type, water jacketed and provided with an oil-pressure and gravity-feed lubricating system. There will also be electric thermostats and indicators to give warning in case of excessive rise in temperature.

The nozzles will be of the needle-deflecting type, admitting of close regulation and water economy, and are to be of cast steel, as will be also the gate valves. The latter will be of the single-disk Pelton type with phosphor-bronze seats ground in place. They will be provided with roller bearings to relieve the thrust on the stems and will be actuated through gearing by means of small Pelton motors.

At the switchboard will be located the main pilot control, by means of which the operation of gates, nozzles and needles may be under the immediate control of the station attendant, small Pelton motors and direct-acting plungers being employed for this purpose.

This contract is under the direct supervision of the engineering firm of Sanderson & Porter, New York, the complete hydraulic equipment being furnished by the Pelton Water Wheel Company of San Francisco, and the electrical apparatus by the General Electric Company.

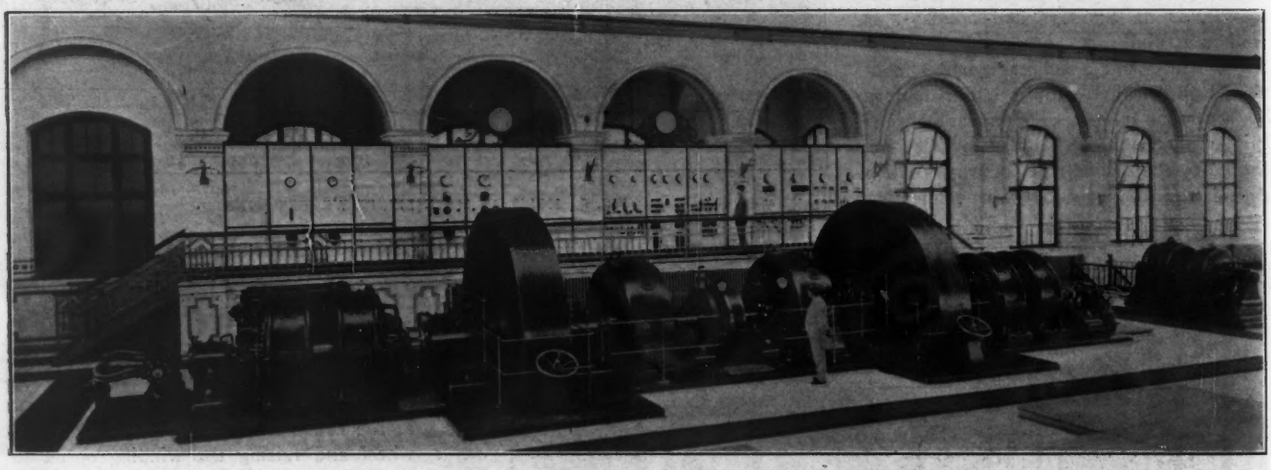


FIG. 4. DOUBLE TRANSFORMER FOR SHAFTS NOS. 3 AND 4. MATHIAS STINNES MINE, CARNAP, WESTPHALIA

# THE USE OF ELECTRICITY IN ANTHRACITE MINING

## Advantages of Modern Equipment Compared with Obsolete Methods

BY H. M. WARREN*

One of the most notable features in the development of the mining and preparation of anthracite coal during the last few years has been the marked improvement in the generation, transmission and economical use of power. While the improvements have taken place to a greater or less degree in all of the anthracite coal companies, this article will refer particularly to those made in the coal-mining department of the Lackawanna Railroad, with which I am familiar. Although not pertaining strictly to the subject of the article, a few words about the generation of steam will not be out of place.

### GENERATION OF STEAM

The old and inefficent "cylinder" boiler plants have been replaced by modern water or fire-tube boilers designed to burn the smaller sizes of anthracite and erected in well ventilated, properly lighted buildings, with economical means for handling the coal and ash.

Fig. 1 shows a typical "cylinder" boiler plant and Fig. 2 the modern boiler plant replacing it. In a few instances, where conditions were favorable, one large plant has been erected to supply a number of collieries, thereby producing a still greater saving in operating expenses. The Hampton central boiler plant, is an illustration of this type. It has a rated capacity of practically 5000 h.p., contains 15 Babcock & Wilcox water-tube boilers, two Green fuel economizers with their induced fans, duplicate air-blast fans, boiler-feed pumps and feed-water heater. Thoroughly covered steam lines convey the steam to five collieries, one washery, one coal-storage plant and one central electric station, containing five 500-kw. turbo-alternators. This boiler plant has at times developed over 9000 h.p. when burning a mixture of about 50 per cent. rice and 50 per cent. barley coal.

FIG. 1. DISCARDED CYLINDER BOILERS

The above remarks give in a very general way an idea of the trend of development in steam generation and boiler-plant economy. The utilization of this power in the form of electricity is increasing rapidly for reasons of safety, convenience, comfort and a decreased cost.

### ADVANTAGES OF ELECTRIC POWER

Economies due to the use of electricity may be produced in a number of ways; such as the elimination of steam-line losses, due to condensation and leaks which often account for large percentages of the total steam generated, particularly when steam is carried in the mines to a large number of small pumps and hoists. These pumps and hoists are also inefficient, usually being of the simple slide-valve type with the drains often left open on account of the high percentage of moisture in the steam. The exhaust steam is also detrimental to the mines, as the heat and moisture is disagreeable and one cause for the rotting of mine timber.

FIG. 2. NEW BOILER PLANT AT BELLEVUE BREAKER

The judicious use of electric locomotives in the mines in place of mules reduces haulage cost due to decreased track maintenance, saving in labor and mules and increased output over a given track, the output over a single road in some instances being doubled. Generally speaking, the more severe the haulage conditions the greater the saving by the introduction of electric locomotives. The use of electric lights properly installed in the mines at the foot of shafts, mule barns, track switches, pump rooms, etc., is a source of safety to life and limb, is productive of a greater output and decreases the fire risk over the ordinary methods of lighting. This also applies to the lighting of breakers electrically.

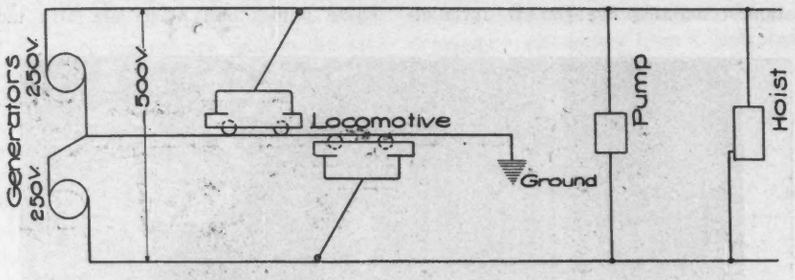
Individual induction-motor drives for breaker machinery should decrease the fire risk and increase the safety to employees by the elimination of a great many belts or ropes and bearings which are always a source of danger from fire, be-

*Electrical engineer, Delaware, Lackawanna & Western Railroad Company, Scranton, Penn.

sides leaving more space for the convenient placing of coal chutes, due to the elimination of countershafting and belts.

The above are some of the reasons why electricity is being so extensively introduced. I will not attempt to give a history of the rapid development which has taken place along these lines, but rather outline what the conditions are at present.

The Lackawanna company has a number of isolated direct-current stations containing direct-connected and belted units varying in size from 150 to 300 kw. The station usually started with one unit of about 150 kw. and other units of various capacities were added as the load required.




THREE-WIRE SYSTEM USED WITH WOODWARD GENERATORS

### INSTALLATION AT WOODWARD MINES

A typical station of this kind is located at the Woodward mines, Kingston, Penn., which now contains one 165-kw. direct-connected unit driven by a simple engine, one 330-kw. direct-connected generator driven by a simple engine, and one 330-kw. direct-connected generator driven by a cross-compound engine, Fig. 3. All of these generators compound from 250 volts at no load to 275 volts at full load and are controlled from a marble switchboard fitted with proper switches and instruments so that any or all of the machines may be run in multiple or any two in series on a three-wire system. This three-wire system is used with the neutral wire grounded so that there is not over 250 volts between any wire and the ground and 500 volts across the two outside leads as shown in Fig. 4. This arrangement allows the use of 250-volt locomotives and 500-volt hoist and pump motors, so that we have the saving in copper due to the use of 500 volts, but no more danger from shock than as though 250 volts were used, so that the trolley lines cannot be considered dangerous. The total generating capacity of this station is about 1000 h.p. and often carries 50 per cent. overload, or 1500 h.p., and as it is about 1200 ft. from the power house to the foot of shaft the saving in copper due to the use of this system is a very important item.

When it is desirable to run only one engine, as during part of the night when the load is light, the two outside wires can be connected together at the power house by suitable switch and this arrangement run as a straight 250-volt system. In this case, however, it would be necessary to have a ground connection at the hoist and pump motors if it was desired to run them on 250 volts.

## Formula for Mining Thin Seams of Coal

BY M. S. HACHITA*

The mining of anthracite coal has heretofore been confined to the thicker seams, and veins less than 3 ft. have been left untouched on account of the large expense in cutting the roof or bottom so that a proper hight may be maintained in order to load the cars in the working faces and haul them away by means of mules.

The mining of the minimum thickness of a vein depends largely upon local conditions and a general formula to determine the least workable thickness of a seam is not applicable to all cases; for breast or chamber workings I would suggest the following formula:

Let $a$ = required hight of chamber, in feet.

$b$ = width of chamber, in feet.

$c$ = cost of mining and preparing (including royalty, etc.) per ton of coal, in dollars.

$d$ = specific gravity of coal times 62.5.

$m$ = market value of one ton of coal at mine, in dollars.

$t$ = number of pounds in one ton (long or short).

$s$ = price paid for roof or bottom rock cut, one foot thick per linear yard, in dollars.

$x$ = thickness of rock cut, in feet.

Then, $\frac{3b(a-x)md}{t}$ = market value of coal per linear yard of working.

$\frac{3b(a-x)cd}{t}$ = cost of mining and preparing coal per linear yard under normal conditions.

$sx$ = price paid at mines on account of increase in rock cut; therefore, mining a vein without profit may be expressed as follows:

$$\frac{3b(a-x)md}{t} - \frac{3b(a-x)cd}{t} = sx.$$

Solving the equation for $x$, we have:

$$x = \frac{3abd(c-m)}{3bd(c-m)-st}.$$

If $a=6$, $b=24$, $c=2.10$, $d=93$, $s=0.60$ $m=2.40$ and $t=2240$, then

$$x = \frac{12{,}052.8}{3{,}352.8} = 3.595 \text{ ft.}$$

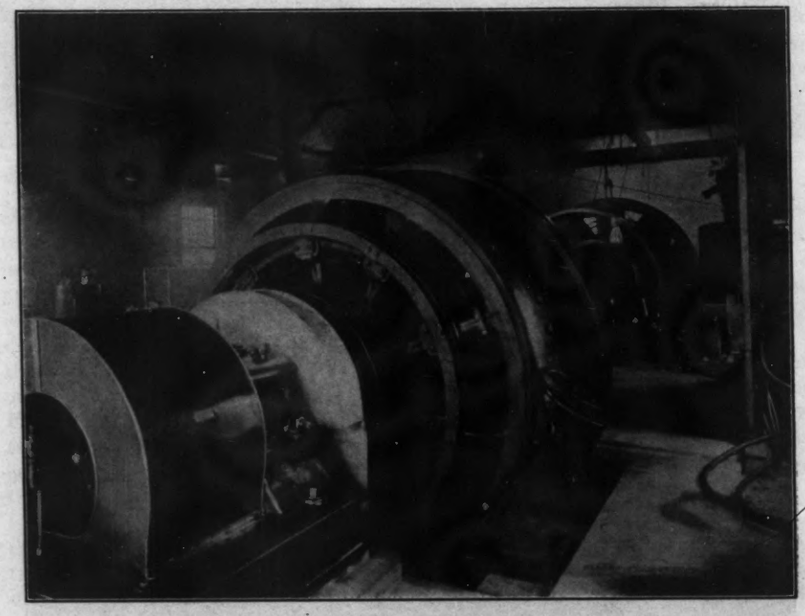


FIG. 3. GENERATORS AT THE WOODWARD MINES

$a - x = 6 - 3.595 = 2.405$ = thickness of vein.

Assuming the mine waste to be 10 per cent., then $\frac{2.405}{0.90} = 2.67$, or 2 ft. 8 in., which is the minimum thickness of a vein workable under the conditions above stated.

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

# COLLIERY NOTES

## Details in the Operation and Development of Anthracite and Bituminous Mines

One laborer can load from 13 to 22 cu.yd. of dirt into a cart in nine hours.

In any gaseous mine, sufficient air should be sent in so that the return air current will not contain more than 0.5 per cent. of fire-damp.

Common brick masonry, such as is found in or about a mine, will generally cost from $7.50 to $8.50 per cu.yd., which includes both material and labor.

Economy requires that in excavation work as many shovelers as can labor without mutual interference be employed in loading a cart. Seven laborers are sometimes used, while five is the minimum number that should be employed.

Ordinary belting of good quality and fairly well adapted for driving will safely carry, on an average, 50 lb. per in. of width. Although no "hard and fast" rule can be adopted, it is generally found safe to consider "600 ft. velocity per minute per in. of width for each horse-power."

The existence of an underground fire may often be discovered by analyzing the return air. It is fairly certain that if more than 0.02 per cent. of carbonic oxide is present in the air in which a light will burn, there is a mine fire, or a considerable heating of the coal somewhere in the workings.

As a general rule where belts are used and a greater driving capacity is desired, it should be remembered that double belts are not doubly strong, if the affected driving contact is not increased proportionately. As a maximum addition per in. of width for double belt driving a 75 per cent. increase is advised.

The cost of concrete work varies considerably, according to the locality and prevalent conditions. In average work where the concrete consists of one part cement, two to three parts sand, four to six parts gravel or broken stone, the cost for material, mixing and laying in place, will vary from $3.50 to $4.50 per cu.yd.

In a coal washery or other similar operation, two shafts connected by a belt should not be placed one directly above the other, for in such a case, the belt must be kept very tight to work successfully. In this same connection, it is generally found advisable to see that the angle of the belt with the floor is not more than 45 degrees.

Nearly 60 per cent. of the entire coal output of Ohio is machine mined. The output of Kentucky shows the second highest percentage of machine-mined coal; while North Dakota, Pennsylvania, Montana, Indiana and West Virginia follow in the order named. Illinois, Colorado and Tennessee produce the lowest percentages of machine-mined coal.

The advantages derived from compressing coal before putting it into an oven to manufacture coke are: A 10 per cent. net increase in the coke output; a firmer, denser, stronger coke, with a higher specific gravity; elimination of the spongy appearance of the top coke; less breeze and a more even size of product. The disadvantages of this method are due to an increase of about 20 per cent. in the coking time of the coal, because of the water present in the compressed coal, and the additional labor cost and repairs to the machinery.

A mine air may often contain one volume of fire-damp to four or five parts of black-damp, and still be mixed with sufficient diluted air to enable a miner's lamp to burn. If the oxygen in the air is diminished by about 3 or 4 per cent., the lamp will go out. In a case of this kind, a miner, after having his light extinguished by such a mixture, may cause a serious explosion by going farther along the entry, and again striking a light, thinking that the air contains only black-lamp. The gaseous mixture in a mine air is so uncertain that under no circumstances should an attempt be made to relight a lamp that has been extinguished by the presence of black-damp or any other gas.

A satisfactory method for securing a sample of mine air for the purpose of analysis is to use a bottle holding about ½ gal., and in addition to the narrow-necked top having another narrow opening in the bottom, or in the side near the bottom. This bottle is filled with water and taken into the mine, the lower cork is withdrawn and the water permitted to flow out when the bottle fills with mine air; it is then again corked. In case it is desired to secure a sample of supposedly dangerous mine air in a cavity in the roof, the stopper in the upper neck has a small glass tube inserted through it, and to this is attached a piece of india-rubber tube. The end of this latter tube is put into the cavity, the water is then allowed to run out and the bottle fills with the gas from the fissure.

In handling coal, whether underground or on the surface, it is most economical to install and operate a self-acting plane, if the necessary inclination is available. In such cases, gravity supplies the motive power, the principle being to have the loaded cars, descending, pull the empties up. The gradient necessary to operate a self-acting plane varies with the length of the slope, the size and conditions of the wheels and axles of the cars, and the condition of lubrication of the rolling stock. On a short incline where the weight of the rope is not so great, a gradient of 1 in 25 will often suffice. The friction and weight to be overcome is greatest at the start, which necessitates having the gradient at the top of the incline greater than at the bottom. If the incline has a dip of more than 30 deg., the cars should be placed on special carriages to keep the coal in a horizontal position.

One important consideration often overlooked by mine operators in developing a property is to carefully study the different strata passed through in sinking a shaft. An accurate record of this sort supplemented by a careful consideration of the data of all bore holes is certain to be of great value in later developments. If an entry encounters a fault, it is not always possible to determine whether the dislocation is an upthrow or whether the continued portion of the seam is lower down. The old law, which states that the inclination of the face of the fault, pointing away from the seam indicates the direction of the continued portion of the vein, will answer satisfactorily if the fault is normal; however, if the dislocation is of the reverse type and is overlapped, the safer method of solving the problem is either by boring, or by cutting through the base of the fault into the rock ahead, then comparing it with the strata passed through in sinking the shaft.

Since it has been discovered that coal dust plays an important part in mine explosions, the determination of the quantity of dust floating in the air has become a problem of much interest to mine operators. A simple method of performing this work is to provide a glass tube about 12 in. long and 2 in. in diameter; the bottom of the tube is drawn out to a smaller circumference, while the top is somewhat widened out. The tube is filled with cotton-wool for about two-thirds its length. It is also necessary to use a cylinder holding about 3 gal. of water; at the top of the cylinder is a small hole into which the narrow end of the tube is fitted, while at the bottom of the cylinder is a hole stopped by an india-rubber cork. The bottom stopper is removed and the water allowed to run out, which operation acts as an aspirator, causing a specified amount of air to be drawn through the filtering material in the tube. This action causes the dust to separate from the air and deposit on the cotton. The difference in the weight of the tube before and after the operation determines the amount of dust contained in the specified quantity of air.

THE ENGINEERING AND MINING JOURNAL

Issued Weekly by the

Hill Publishing Company

505 Pearl Street, New York.

London Office: 20 Bucklersbury, London E. C., Eng.

Cable Address "Engminjour, N. Y."

*Subscription, payable in advance, $5.00 a year of 52 numbers, including postage in the United States, Canada, Mexico, Cuba, Porto Rico, Hawaii or the Philippines.*

*To Foreign Countries, including postage, $8.00 or its equivalent, 33 shillings; 33 marks; or 40 francs.*

*Notice to discontinue should be written to the New York office in every instance.*

*Advertising copy should reach New York office by Thursday, a week before date of issue.*

*Copies are on sale at the news-stands of the following hotels:—Waldorf-Astoria, New York; Brown Palace, Denver; and the leading hotels in the principal cities.*

Entered at New York Post Office as mail matter of the second class.

*During* 1906 The Engineering and Mining Journal *printed and circulated* 462,500 *copies, an average of* 8896 *per issue. Of this issue* 12,000 *copies are printed. None sent regularly free. No back numbers beyond current year.*

Contents



## The Withdrawal of Public Coal Lands

There have been published in the daily papers some protests against the action of the President in advising the withdrawal of the public coal lands. These protests are evidently based on a misunderstanding of the case. In many of the Western States there are large operating coal companies which have made it a practice to approach directly or indirectly not only their own employees, but also other citizens, and attempt to purchase for a small sum the individual's coal right. If the purchase be made, a claim is filed in the name of the person from whom the right is acquired, although the payment money is not forthcoming until the entry has been satisfactorily completed. This common action on the part of large corporations is certainly deserving of the Federal attention it has received.

Criticism has also been based on the alleged impossibility of segregating the coal lands. This is entirely erroneous. The boundaries of the coal lands of West Virginia, Pennsylvania and nearly all of the older States are generally defined, and if, for instance, anyone in West Virginia should like to know the extent and definite boundary of any of the coal seams underlying parts of that State, he would only have to write the director of the State Geological Survey and receive a map showing accurately the outcrop of the various coal beds in the region. The Western States are not so far advanced in this work as are some of the Eastern, but the Geological Survey has already published folios showing the general extent and outcrop of many of the coal seams of these States.

As bearing upon the latter point it is argued that the limit of the anthracite field in Pennsylvania is still in doubt. It is true that some parts of the anthracite coal field are not yet definitely defined, but generally the owners of land in Pennsylvania will state in no unmistakable terms whether any of it is underlaid by coal, and if it be attempted to buy an acre this fact will be forcibly impressed. The running of coal outcrop in Colorado, especially the central and southern parts, where the greatest development has taken place, is a comparatively easy matter when compared with the difficulties met in running the outcrop of an anthracite vein. The coal in Colorado is generally uniform in pitch, while the anthracite beds are so folded that the dip may be anything from zero degrees to vertical.

Two points brought out in these criticisms are deserving of consideration, viz., that the present laws have not been properly enforced; and that the coal lands which the Government now controls are held at too high a price. It is a question whether the present laws could have been properly enforced; however, it is certain that considerable harm has been done by the laxity of their administration. As to the price of any coal tract, the one great influencing factor is its location. Quality, thickness, and uniformity materially influence the value of a coal bed; however, a recent tract of Pittsburg coal land that was sold for more than $2800 an acre would not actually be worth $100 an acre in many Western States.

The steps that have recently been taken are not premature. Large tracts of valuable coal lands have already been accumulated by large corporations without any adequate compensation to the State or the intermediaries who have been used as tools. Speaking from practical experience in Western coal mining, and knowing the conditions as they have existed, we trust that some policy will be satisfactorily developed to eliminate the prevalent evils.

## The Tin Production of Cornwall

The production of tin in Cornwall in 1906 does not show any substantial increase over 1905. We base this statement on the records of the tin ticketings and not on the official returns from each mine, which are not yet available; but this method of comparison is a very good index of the actual state of things. Every Cornishman knows (and every other miner ought to know, but perhaps does not) that most of the tin ore produced in Cornwall is sold by public auction at Redruth every fortnight. These ores are bid for by the five customs smelters in the neighborhood, and little, or none, goes to buyers outside the duchy. A certain amount of the product of the mines and stream works is sold by private contract. Perhaps from one-tenth to one-fifth of the output is disposed of in this way.

The total ore sold at the fortnightly ticketings during 1906 amounted to 6006 long tons, against 5796 tons in 1905. There were 27 ticketings in 1906, so that the increase is more apparent than real. The

total value of the ore sold during 1906 was £630,067, as compared with £480,628 during 1905, which reflects the result of the increase in the price of the metal. It is inadvisable to go into statistics as to average prices; for, unless the details are entered into very minutely, the figures and deductions may be easily misinterpreted. Suffice it to say that the above mentioned values are the prices actually paid by the smelters and represent the "market value." Most of the ores are very good concentrates and some of these represent 70 per cent. metallic tin. Others are second-class concentrates, while others fetch lower prices on account of the presence of arsenic, copper or wolfram. Perhaps nine-tenths of the concentrates will average 65 per cent. tin, and the remaining tenth, including poor quality of concentrates and stream tin, will range from 40 to 65 per cent.

It is interesting to compare the figures for the ticketings during 1905 with the official returns of production. At the ticketings during 1905 the ores amounted to 5796 tons, while the official returns of the actual actual output were 7201 tons, which were estimated to contain 4467⅓ tons of metal. It is inadvisable to deduce statistics for 1906 by working out a proportion sum on these figures, owing to the variation in the amounts sold by private contract; but the general position is sufficiently clear.

It may be a surprise to many to find that the amount of ore sold at the ticketings was not greater, so much having been said recently as to the revival of Cornish mining. The present high price of tin has no direct connection with the state of things in Cornwall, being due solely to the shortage of supplies from the East Indies. Consequently Cornishmen and London capitalists do not see their way clear to reopen old mines precipitately. They are going slowly and carefully, reorganizing the methods of mining and dressing at some of the producing mines, and reopening others that paid in earlier days. But as yet the output has not been increased sensibly by these new developments. Another cause for delay in the revival is the scarcity of labor. During the years 1895—1900, while the yearly output of ore was dropping from 13,000 tons to less than 7000 tons, both skilled miners and laborers left for other parts to seek work, and it is not easy to draw them back again, nor to find efficient substitutes. Though Cornishmen are returning in disgust from South Africa, their number is not sufficient to flood the labor market in their own country.

## The Safety of Workmen

The purposes of the American Institute of Social Service, which has this week opened an exposition of safety devices and industrial hygiene at the American Museum of Natural History, New York, are so praiseworthy and humanitarian that they should receive earnest support. Few realize the enormous loss of life among the workers engaged in our industries. According to Dr. Josiah Strong, president of the Institute, 57,513 persons in the United States suffered violent deaths in 1900, while half a million more were injured. A large proportion of these accidents unquestionably are needless; are due to heedlessness. In this American employers are especially guilty; the percentage of accidents appears to be decidedly greater here than in Europe, where more attention has been given to the remedial measures which the Institute is advocating.

Governor Hughes' earnest appeal at the banquet, Jan. 28, with which the exposition was inaugurated, should do much to awaken public interest in the necessity for the introduction of safety appliances for the workingmen, wherever it is possible, and that is almost everywhere. Every mining and metallurgical engineer, for whom only we shall speak, knows that although the work he conducts is inherently hazardous in some branches, nevertheless a large part of the loss of life and limb that is suffered is due to carelessness and is preventable. Our readers know the emphasis with which we have repeatedly made this statement. It will be humiliating and shocking if the employers of labor permit the unnecessary waste of men to go on without conscientious and serious effort to check it. Apart from humanitarian grounds, it is an economic waste of high consequence, as Col. Carroll D. Wright, who followed Governor Hughes, lucidly and logically pointed out.

The free exhibition of safety appliances, which it is hoped will become a permanent one, is designed to show the people at large some of the things that can be done. We recommend to our readers who can avail themselves of the opportunity the usefulness of a yisit to this exhibition.

## Clearing House for Freight Cars

The American Railway Association has decided to test the plan proposed a few weeks ago by Hamilton Fish for securing a better and more prompt distribution of rolling stock by means of a central clearing house. As J. J. Hill and other railroad officials have shown repeatedly, the transportation difficulties from which the industries of the country have been suffering are due less to an actual shortage of cars than to a low rate of service per car. The clearing house is intended to reduce unnecessary delays to a minimum and to increase the ton-mile service of cars by keeping them in motion.

The plan is still in an experimental stage, but it has so far progressed that headquarters have been established in Chicago and officers have been chosen. Various methods of relieving car congestion will be tested. The original plan involved a central office for keeping records of all cars belonging to the different railroads, distributing the cars equitably according to the quota supplied by each line and apportioning charges for the use of rolling stock.

The difficulties of the undertaking are great, and most of the roads will give the clearing house jurisdiction over only a small number of cars, and that only for experimental purposes. To keep a working record of two million or more cars belonging to several hundred different owners and consigned to ten times as many points would require an enormous and unwieldy office force, and the complications which would appear in apportioning charges would be endless. There are cars with a capacity of 100,000 lb. and cars intended to carry less than a fourth of that weight; cars which cost $10,000 and others worth less than $500. It is obvious that the car will not be accepted as a unit for distribution.

## The Geological Survey

The resignation of Doctor Walcott makes a vacancy at the head of the Geological Survey. The filling of this important post directly concerns the mining industry, with which the survey is most closely connected. Two names are prominently mentioned: Prof. C. R. Van Hise and Dr. J. A. Holmes. The former is president of the University of Wisconsin, and is a geologist of international reputation. Doctor Holmes was formerly State geologist of

North Carolina, more recently chief of the Department of Mining and Metallurgy at the St. Louis Exposition, and is now in charge of the experimental station of the Geological Survey at St. Louis.

Either Professor Van Hise or Doctor Holmes would be a good head for the Geological Survey. Both have had administrative experience, and are in close touch with the practical applications of geological science. As a geologist Professor Van Hise is the more eminent. Among scientists his acceptance of an invitation to the directorship of the survey would add to the latter a special distinction. However, much as eminence in geology is desirable, the field of the survey is so broad and the duties of the director are so multifold, its relations with the Congress, and with the people are so delicate, that the man at its head must be one who is able to obtain the support that is requisite, reconcile differences in the corps, maintain proper relations with the State surveys, and direct the work into the most useful channels. Doctor Holmes has already displayed signal ability in such administration, which will win him strong support for the directorship of the survey.

Among others who have been mentioned for this important position are Prof. William Bullock Clark, State Geologist of Maryland, and Dr. C. W. Hayes, the geologist in charge of geology in the U. S. Survey. Both are strong and able men. It is cause for congratulation that there is so good a field to chose from. The Geological Survey has many urgent problems before it, and much will depend upon the selection of the man who is most competent to handle them.

## The Economics of Mining in Mexico

The article by John B. Farish on mining conditions in the mountains of Chihuahua, published in this issue, is an excellent discussion of the economic conditions which govern operations in the Sierra Madre. We do not recall having seen a better presentation. The conditions which Mr. Farish outlines in connection with the development and operation of the Dolores mine are by no means confined to that property, or the section of Mexico in which it is located. Substantially the same conditions, in many cases precisely the same, have to be contended against throughout the entire length of the Sierra Madre. These conditions are radically different from what obtain in the United States, where railways reach to most of the important camps.

In Mexico the machinery has often to be brought in sectionalized form on mule back; lumber and brick have to be sawed and made on the ground; water supply is frequently a serious difficulty, and finally it is troublesome to secure and retain the necessary supply of labor. The building of such a mill as Mr. Hardy constructed at Dolores is an engineering feat of high character. The handling of the men and the transportation problem are factors which often determine success or failure in Mexico. In the case of the Dolores mine they were of supreme consequence, and in reporting upon that property, Mr. Farish properly emphasized the importance of careful attention to those conditions. His article is one that should be carefully studied by prospective operators in Mexico, who may learn from it a great deal which otherwise they would get only by costly experience.

## A Copper Trust?

It is reported that an association, called the Northeastern Metal Dealers' Association, has been formed to urge the Federal Government to investigate the alleged existence of a copper trust, which, it is averred, practically controls the copper-mining industry of the United States and has been instrumental in artificially maintaining high prices.

We have repeatedly heard, during the last year, expressions of that idea. Nothing could be more absurd. The high price for copper is caused by the conditions which we have discussed many times, most recently last week, namely an increase in the demand for consumption, which is greater than the ratio of increase in production, and has swept the American market bare of stocks on hand. It is perfectly true that a large part of the American production of copper is controlled by interests which have been operating in harmony, but there is a sufficient independent production to upset the idea of a trust, in which connection the recent failure of a proposed consolidation of Michigan producers is contributory evidence that anyone may read. Instead of artificially boosting the price for copper, the large interests have deprecated the upward movement and have used efforts to restrain it, realizing that some day there must be a reaction, and the greater the hight, the greater will be the fall. Conflicting interests can easily work in harmony on a rising market; the test will come on a falling market.

## Colliery Explosions in France and Prussia

On Jan. 28 two serious colliery explosions occurred in Europe, one at the Reden mine, at St. Johann am Saar, opposite Saarbrücken, Rhenish Prussia; the other at Liévin, in the Courrières district, France. In the former, it is estimated that 200 lives were lost. In the latter, fortunately only three were lost, although a large number of men were in the mine. According to the press despatches both explosions were of firedamp.

The fact that both these explosions occurred on the same day will create especial interest in the inquiry as to the atmospheric conditions at the time, and the possible connection between the latter and the development of gas in the mines. The explosion at the Reden colliery is said to have occurred at 8 a.m. That at Liévin also happened in the morning, precise time not stated. Liévin and Saarbrücken are only 220 miles apart in a direct line, wherefore the barometric pressure may be expected to have been more or less the same.

## The Standard Oil Company

The report of the Interstate Commerce Commission, delivered to Congress Jan. 28, is the most scathing indictment that has been made against the Standard Oil Company. The latter is declared to be the most perfect monopoly yet developed in the United States, and to have used, and to be using, highly unfair methods to preserve its position. All of these are old charges. The novelty in the present report is the destruction of the idea that while reaping vast profits for itself the Standard has been fair to the consumers. According to the commission the evidence shows little basis for the claim that the great dividends are the legitimate result of industrial economies. In fact it is now alleged that this idea has been created by a Standard Oil press bureau operating through many subsidized newspapers.

# CORRESPONDENCE

Discussions by Our Readers of Various Topics of Interest

## False Economy

Someone has aptly said, "Virtue carried to excess becomes a vice." Nothing could be more true than the application of this saying to the principle of economy. Not the least of a manager's qualifications for a mine should be his ability to judge of what is true or false economy.

No one will deny the necessity of keeping a strict account of expenditure and receipts, but when this accounting implies, for example, a red-tape system, employing half a dozen clerks to distribute and subdivide a pay-roll which could by a simpler method, equally trustworthy, be done by two men, it is quite time that system should be discarded.

There are a hundred and one things cropping up at outlying mining camps which require a rough and ready style of handling, and what apparently strikes the auditor at headquarters as reckless extravagance is really often exactly the reverse and *vice versa.*

I recall a case in which apparent economy was in reality the hight of extravagance. A superintendent of a mine, distant three days from a railroad and practically isolated during twelve weeks of rainy season, requested to have an assistant, he being the only white man on the place. This was refused by the company on the ground of needless expense. Shortly afterward the superintendent fell sick and died. No one could reach the camp for several days and the consequence was that nearly all the lumber, tools and supplies were *non est,* having been appropriated by the laborers, who had scattered all over the surrounding country. The net result was the loss of $12,000 against the salary of an assistant.

In another case, a hide-bound edition of frugality, who ought never to have entered the mining business, so heckled and harassed his men and made his mine contracts so onerous and irksome as to make life a burden, resulting in half-hearted service and very poor returns. The treatment meted out to the rank-and-file so disgusted them that the mine had to suspend operations. Shortly afterward the property changed hands, the new manager by a more liberal policy, not so much in the direction of increased wages as by erecting comfortable rooms, providing good meals, etc., soon created a different "atmosphere" which reacted upon the company in the form of much better results.

If the etiquette of the profession permitted, what uncalled for criticism and petty corrections emanating from auditors' offices could mine managers disclose. A particularly bright official, noted for his cheese-paring proclivities, decided to "cut out" the expense of loaning sacks to miners for their shipments of ore to smelters, which expense amounted to about 2 per cent. of the operating costs in the ore-buying department. Commencing with a shipper whose deliveries aggregated $100,000 for the year the profit from which in round figures came to 15 per cent., the "economizing order" was put into effect, with the result that the man stopped shipments, resulting in a net loss to the purchaser of $13,000.

To avoid heavy express charges on some cyanide precipitates worth $30,000 per ton, a shipper thought he would economize by shipping as ore at a declared value of $25 per ton. This proved rather more expensive than shipping by express for, upon the arrival of the shipment three sacks were missing and claim could be made only for the proportion of the declared value.

On a smaller scale but with the same principle involved, a superintendent who had purchased some garden hoes for concentrates, valued at $1.50 each at the mine, refused to issue one from the warehouse to a mason for mixing his mortar, telling him to get the blacksmith to make one out of old sheet iron. This was done, at a total cost, including labor, fuel, loss of time of the mason and his helper, of $10. "A word to the wise is sufficient."

DAVID WALLACE.

## Oil vs. Coal as a Fuel

What is the comparative cost of burning crude oil against coal for fuel purposes, in this or any other district that you may have figures on? Any information you can throw on this subject, or references you can give, would be very interesting to me as well as many other subscribers of your paper in this district.

Webb City, Mo. D. T. BOARDMAN.

One pound of oil develops about 21,000 B.t.u., while the best quality of Pittsburg coal yields about 14,000 B.t.u. These figures give oil a heating power as compared with that of coal of about 3 to 2. That is, theoretically 2 lb. of oil would equal about 3 lb. of good coal. But the practical efficiency of burning oil is relatively greater, particularly in some of the Western States, where local coals have a low heating value. In some parts of Kansas 1 lb. of oil may equal 2 lb. of coal in practical heating value irrespective of the cost.

With respect to the ordinary Kansas coal, which has a calorific power of only about 10,500 B.t.u., 1 lb. of oil would theoretically be equivalent to about 2 lb. of coal. But owing to the greater efficiency in burning the oil the ratio would be somewhat more in favor of the latter. The Kansas coal could hardly be expected to give an evaporation of more than 7½ lb. of water.

The following tests to determine the relative cost of the two fuels, made, one at Minneapolis and the other at South Chicago, are from William Kent's "Steam Boiler Economy," page 141:

"A test by the Twin City Rapid Transit Company, of Minneapolis and St. Paul, showed that with the ordinary Lima oil, weighing 6 6/10 lb. per gallon, and costing 2¼c. per gallon, and coal that gave an evaporation of 7½ lb. of water per pound of coal the two fuels were equally economical when the price of coal was $3.85 per ton of 2000 lb. With the same coal at $2 per ton, the coal was 37 per cent. more economical, and with the coal at $4.85 per ton the coal was 20 per cent. more expensive than the oil. These results include the difference in the cost of handling the coal, ashes and oil.

"Comparative tests of crude petroleum and of Indiana block coal for steam raising at the South Chicago Steel Works showed that, with coal, 14 tubular boilers 16x5 ft. required 25 men to operate them; with fuel oil, six men were required, a saving of 19 men at $2 per day, or $38 per day.

"For one week's work 2731 barrels of oil were used, against 848 tons of coal required for the same work, showing 3.22 barrels of oil to be equivalent to 1 ton of coal. With oil at 60c. per barrel and coal at $2.15 per ton, the relative cost of oil to coal is as $1.93 to $2.15."

## Luminous Paint

In the issue of the JOURNAL for Dec. 29, Mr. Dickson, in his article on "Safety Chambers in Coal Mines," states that arrows made on the sides of the entries with luminous paint could be used for pointing out the direction of the safety chambers.

For some time I have been trying to find out just what luminous paint is, but with very little success. I would be

greatly obliged if you would answer the following questions through your correspondence column:

1. What is the chemical composition of the so called luminous paint?

2. Does it actually have the property of emitting light in the dark, and if so, for how long a period will the paint retain its luminosity without replenishment?

3. Where can luminous paint be obtained?

4. Does pitch blende possess the property of luminosity; if not, are there any substances that do? B. W. L.

Argentine, Kan., Jan. 7, 1907.

Luminous paint is made in the following manner: Take oyster shells, wash and clean them in warm water; put the shells into a fire for half an hour; after taking them out and allowing them to cool, they are finely powdered by pounding, and the gray parts, which are of no use, are thrown away. The powder is then put into a crucible in alternate layers with flowers of sulphur, the lid is put on and the crucible sealed up with a paste made of sand and beer. After this is dry, the crucible is put on the fire and baked for one hour, then cooled, and the cover taken off; all gray parts are now separated, and the remaining substance is mixed into a thin paint with a mastic varnish. Before applying the luminous paint, the article should be given two coats of white lead and turpentine, to form a body ground for the luminant.

This luminous paint, which is really a polysulphide of calcium, has the property of emitting, in darkness, light which was previously absorbed, and when kept in darkness for 12 or 15 hours without being subjected to any light, loses its luminosity. Luminous paint of this sort has been used for clock dials, lanterns, etc.; however, its practical application can hardly be said to have met with success.

Such paint as here described can be obtained from the larger manufacturers of paints and varnishes. Devoe & Raynolds, 101 Fulton street, New York City, are one of the firms who have luminous paint for sale.

Pitch blende possesses the property of luminosity in a very small degree.

In connection with the use of luminous paint in mines, it may be stated that when subjected to the light from electric bulbs or an electric arc light, such paint will retain its luminosity and emit light when placed in darkness. For this reason, it is possible that where arrows are painted on the sides of an entry that has been lighted by electricity, should the light suddenly go out, the arrows painted with luminous paint would still emit the light which was previously absorbed.

## Magnetic Iron Oxide in Copper Matte Smelting

Can you refer me to any literature on the smelting of magnetic iron oxide in a copper-matting blast furnace? Our problem is to smelt copper-oxide ores, having an almandite and andradite gangue, together with a considerable quantity of magnetite and a small quantity of pyritous ore. The greater part of the iron on the furnace charge is magnetite. The small sows, and also the matte and slag, show considerable magnetic iron. D. B. H.

Denver, Colo., Jan. 5, 1907.

We infer from our correspondent's statement of his case that his problem is to smelt an oxidized ore to which only enough pyrites will be added to serve as matte-forming agent, which would involve the employment of the usual quantity of coke, it not being intended to develop any considerable portion of the necessary heat from the pyrites added. These conditions, assuming that we have correctly understood the case, will make the smelting more difficult than ordinarily, but not impracticable if the proper kind of siliceous flux be available. As stated by our correspondent, all of his silica being already pretty well neutralized by the bases with which it is combined, there would be a total lack of the energetic "free silica" so essential to combine with the ferrous oxide when the latter is formed.

We do not know of any metallurgical literature that is of value in the present case. Our opinion is that the problem is not impossible, but the furnace must be run more carefully and scientifically than copper-matting furnaces are usually run. The operator must steer between two evils, viz. (1). If he does not get reducing action enough, a lot of the magnetic iron, because of its high specific gravity, will go into the matte, lowering its grade and its fusibility, and making it hard to crush or melt. (2). If he gets too much reduction, the magnetic oxide, instead of stopping at ferrous oxide, as it ought to do, and combining with the silica, will reduce to metallic iron and go into the matte, or make sows. It will be particularly disposed to do that because of the absence of free silica, as mentioned above. Moreover, if there be much almandite and andradite in the charge, the slag will require rather a high temperature to be thoroughly liquid, owing to its magnesia and alumina contents.

We know too little of the exact conditions to give specific advice, but the above are some of the points that should receive special attention. The magnetic oxide of iron likes to go into the slag when the smelting is slow, making the slag heavy, thick and sluggish. The presence of much magnetite would make the smelting a little more expensive than if the iron flux were hematite. We think that a good metallurgist who has some originality, and some idea of surmounting obstacles, need not fear to tackle the problem.

## Bed of Cast-iron Balls in Jigs

In THE MINERAL INDUSTRY for 1905, pages 522-527, R. K. Painter describes "Pyrites Mining and Milling in Virginia" (Louisa mines, Cabin Branch mines, etc.), and in it he states that jigging is done through a bed of *cast-iron balls*. You would oblige us by kindly letting us know either the size and exact shape of these balls, or where a supply of them may be obtained. It would be interesting to know if the same size of balls is used for all grades of the jigs, or if there is any variation in the size of the balls, according to the size of the grain of the ore (whether finely grained or coarsely grained).

H. & F. B.

This request was forwarded to R. K. Painter who sends the following reply: I left the Virginia field a year or more ago and my answers to your questions in regard to jigging may not be in accord with more recent practice.

The balls employed to form a bed in the jigging of iron pyrites are spherical rough castings and those used at the Cabin Branch mine were supplied by Hy. H. Meyer, 110 So. Howard street, Baltimore, Maryland.

It was customary to use a bed made up of iron balls upon the "fines" jigs only, and the balls used were of about ½ in. diameter. These jigs were handling ore crushed to pass a 3/16-in. aperture. The coarse jigs were allowed to make their own bed or else were bedded with larger pieces of particularly hard dense ore.

The balls make a very lively bed, but the chief advantage to be gained by their use is the preservation of the fine sieves from the excessive wear always experienced in handling pyrites. ROBT. K. PAINTER.

New Brunswick, N. Y. Dec. 21, 1906.

## Small Steel for Drilling

Will you kindly answer the following inquiries: 1. What is the diameter of the smallest steel used in single jacking in gold mines? 2. Is steel as small as half-inch diameter used? 3. How deep is an average hole with such small steel? 4. What grade of explosive would be used? 5. What would be considered a fair eight hours' work for one miner drilling such small holes? WERNER.

Steel of five-eighths inch diameter is usually considered to be the minimum. Seven-eighths and one-inch are the sizes commonly used. We do not know of any use of steel as small as half-inch in single jacking.

During the twelve months ended with Dec. 31, there were exported from the United Kingdom 11,324,789 cwt. of coal products other than dyes, the value thereof being £1,447,424; this total compares with 10,319,544 cwt., valued at £1,348,491, in 1905, and 10,063,817 cwt., valued at £1,375,880, in 1904.

## New Publications

"Catechism on Producer Gas." By Samuel S. Wyer. Pp. 42; illustrated. 4½x6½ in.; cloth, $1 net. New York, 1906: McGraw Publishing Company.

"Self-propelled Vehicles. A Practical Treatise on the Theory, Construction, Operation, Care and Management of All Forms of Automobiles." By James E. Homans. Fifth edition, revised. Pp. 598; illustrated. 7½x8½ in.; cloth, $2. New York, 1907: Theo. Audel & Co.

"The Science Year Book with Astronomical, Physical and Chemical Tables, Summary of Progress in Science, Directory, Biographies and Diary for 1907." Edited by B. F. S. Baden-Powell. Pp. 365; illustrated. 6x9 in.; cloth, $2. London, 1906: King, Sell and Olding.

"California State Mining Bureau. Report of the Board of Trustees and State Mineralogist covering the Fifty-sixth Fiscal Year Ending June 30, 1905, and Fifty-seventh Fiscal Year Ending June 30, 1906." Pp. 20. 5½x9 in.; cloth. San Francisco, 1906: California State Mining Bureau.

"Second Report on Oaks View Gold Mines (Near Rockhampton) and Notes on the Mines Talgai and Thane's Creek Goldfields." By Lionel C. Ball. Publication No. 205 of the Geological Survey of Queensland. Pp. 36; illustrated. 6x9½ in.; paper. Brisbane, 1906: George Arthur Vaughn, Government Printer.

"Preliminary Report on Black Ridge, Clermont, Queensland, with Appendices on the State of the Mineral Industry in the Clermont District during 1904." By Lionel C. Ball. Publication No. 201 of the Geological Survey of Queensland. Pp. 141; illustrated. 6x9½ in.; paper. Brisbane, 1906: George Arthur Vaughn, Government Printer.

"Illustrated Technical Dictionary in Six Languages: English, German, French, Russian, Italian, Spanish. Vol. I. The Elements of Machinery and the Tools Most Frequently Used in Metal and Wood Working." Compiled by K. Deinhardt and A. Schloman. Pp. 401; illustrated. 4x7½ in.; cloth, $2 net. New York, 1906: McGraw Publishing Company.

## Patents Relating to Mining and Metallurgy

### UNITED STATES

The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by the ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. In ordering specifications, correspondents are requested to name the issue of the JOURNAL in which the notice of the patent appeared.

*Published Week Ended Jan.* 8, 1907.

PROCESS OF MANUFACTURING PRODUCER-GAS—William H. Adams and Frederick Powell, Portland, Oreg., assignors of twenty-five per cent. to said Adams, fifteen per cent. to said Powell, and sixty per cent. to The Ladd Metals Company, Portland, Oregon. No. 840,461. Filed June 20, 1904.

ELECTRIC FURNACE—Leon Dion, Wilkes-Barre, Pa., assignor to The Americus Electro-Hermetic Company, Wilkes-Barre, Pa. No. 840,481. Filed Apr. 30, 1906.

ORE-CONCENTRATING MACHINE—Henry C. Holthoff, Milwaukee, Wis. No. 840,491. Filed Apr. 22, 1905.

EXTRACTING METALS FROM SULPHIDE ORES—Robert L. Packard, Washington, D. C. No. 840,511. Filed Jan. 11, 1906.

FURNACE-CHARGING APPARATUS—Edwin H. Messiter, New York, N. Y. Nos. 840,573; 840,574; 840,575. Filed Feb. 7, 1905.

TRIPPER OR DELIVERER FOR BELT CONVEYERS—Baxter Morton, New York, N. Y. No. 840,579. Filed May 5, 1906.

TRIPPER OR DELIVERER FOR BELT CONVEYERS—Arthur B. Proal, Jr., New York, N. Y. No. 840,585. Filed May 5, 1906.

TRIPPER OR DELIVERER FOR CONVEYING APPARATUS—Thomas Robins, Jr., New York, N. Y., and Clarence K. Baldwin, Chicago, Ill. No. 840,587. Filed May 5, 1906.

BRIQUET-MACHINE—James H. Curell, New York, N. Y. No. 840,608. Filed Oct. 2, 1905.

CONVEYER—Freeman R. Willson, Jr., Worthington, Ohio, assignor to Joseph A. Jeffrey, Columbus, Ohio. No. 840,729. Filed May 4, 1906.

APPARATUS FOR CRUSHING, CONVEYING AND COOLING ROCKS, ORES, ETC.—Robert F. Wentz, Siegfried, Pa. No. 840,730. Filed Aug. 23, 1899.

APPARATUS FOR EXTRACTING AND SAVING GOLD—Joseph A. Coombes, Atlantic City, N. J., assignor to The Aurum Mining Company, Arizona. No. 840,752. Filed Nov. 10, 1905.

ELECTROSTATIC SEPARATOR—Greenleaf W. Pickard, Amesbury, Mass., assignor to Huff Electrostatic Separator Company, Boston, Mass., a Corporation of Maine. No. 840,802. Filed Jan. 29, 1906.

HAMMER-DRILL—William Prellwitz, Easton, Pa., assignor to Ingersoll-Rand Company, New York, N. Y. No. 840,803. Filed June 28, 1906.

ROCK-DRILL—Thomas E. Adams, Cleveland, Ohio, assignor to The Adams Drill Company, Cleveland, Ohio, a Corporation of Ohio. No. 840,816. Filed Oct. 24, 1901.

DRY SEPARATOR—William N. Beach, New York, N. Y. No. 840,818. Filed June 25, 1906.

CRUCIBLE—Edward A. Colby, Newark, N. J. Nos. 840,825; 840,826. Filed Nov. 23, 1905. Renewed Oct. 9, 1906.

CYANIDE PROCESS—Howard B. Goetschius, Dumont, N. J. No. 840,840. Filed Mar. 28, 1906.

TRAVELING HOPPER—William J. Patterson, Pittsburg, Pa., assignor to Heyl & Patterson, Incorporated, Pittsburg, Pa., a Corporation of Pennsylvania. No. 840,863. Filed July 13, 1906.

HYDROCARBON ROCK-DRILL—John V. Rice, Jr., Edgewater Park, N. J. No. 840,867. Filed May 9, 1903.

ROCK-DRILL—Thomas E. Adams, Cleveland, Ohio, assignor to The Adams Drill Company, Cleveland, Ohio. Nos. 840,890, 840,891. Filed Jan. 24, 1903.

ENGINEER'S TRANSIT—John A. Early, Batchtown, Ill. No. 840,923. Filed Apr. 13, 1904.

APPARATUS FOR PUMPING OIL-WELLS—Julien E. Tinker and Joseph Crawford, Jr., Bradford, Pa. No. 840,972. Filed Dec. 22, 1904.

SELF-CONTAINED ROCK-DRILL—Otho C. Duryea and Morris C. White, Los Angeles, Cal., assignors to National Gas Drill Company. No. 841,001. Filed Apr. 28, 1903.

APPARATUS FOR THE MANUFACTURE OF REDUCING AMALGAM—Herbert P. Ewell, Rochester, Mich. No. 841,006. Filed Jan. 8, 1906.

COKE-OVEN—Mathew E. Rothberg and Alfred Ernst, Pittsburg, Pa. No. 841,052. Filed Oct. 8, 1906.

SUPPORT FOR CONVEYER-BELTS—Chas. Rouse, Pittsburg, Pa. No. 841,053. Filed Mar. 22, 1905.

PNEUMATIC DRILL—Harry P. Taylor, Salt Lake City, Utah. No. 841,069. Filed Apr. 28, 1905. Renewed July 14, 1906.

CONVEYING APPARATUS—John H. Gilman, Ottawa, Ill., assignor to King & Hamilton Company, Ottawa, Ill. No. 841,085. Filed Mar. 2, 1906.

SUPPORT FOR CONVEYER-BELTS—Chas. Rouse, Pittsburg, Pa. No. 841,096. Original application filed Mar. 22, 1905. Divided and this application filed Nov. 26, 1906.

REISSUE

*Published Week Ended Jan.* 8, 1907.

ORE-CONCENTRATOR—Joseph W. Pinder, San Francisco, Cal. No. 12,590. Filed Feb. 28, 1906. Original No. 744,229, dated Nov. 17, 1903.

ORE-CONCENTRATOR—Harry P. Taylor, Howard, Oreg., assignor of one-fourth to W. P. Keady, Howard, Oreg. No. 12,592. Filed July 28, 1903. Original No. 682,371, dated Sept. 10, 1901.

### GREAT BRITAIN

The following is a list of patents published by the British Patent Office on subjects connected with mining and metallurgy.

*Published Week Ended Jan.* 12, 1907

PROCESS FOR TREATING PULP—J. D. Wolf, London. Improvements in the inventor's process for catching metallic or sulphide particles from wet pulp, by passing the pulp over a traveling belt which is coated with oil or grease. No. 20,322 of 1905.

PRODUCTION OF ALUMINA—G. Muth, Duisburg, Germany. In producing alumina from bauxite by boiling bauxite in soda lye, maintaining a certain proportion between the two so that it is not necessary to use pressure. No. 25,477 of 1905.

DESULPHURIZING COKE—W. S. Simpson, London. For removing sulphur from coke, closing the oven after distilling is complete and subjecting the coke to the action of a vacuum. No. 25,574 of 1905.

TRAY FOR CUPELS—W. L. Rawson, London. Providing assay cupels with specially designed trays on which to stand, so that the litharge may not penetrate to the floor of the muffle furnace. No. 26,073 of 1905.

HEAT TREATMENT OF STEEL—W. F. L. Frith and C. G. Grist, London. In the heat treatment of steel, surrounding the metal with mercury or its vapor in a hermetically sealed vessel which is subjected to heat, thus distributing the heat more evenly. No. 26,577 of 1905.

CHLORIDIZING PROCESS—H. Baker, Runcorn. In the process for producing chlorides from sulphides such as Broken Hill slimes by acting on them with chlorine, adding to the solution a certain amount of hydrochloric acid to prevent the precipitation of the zinc wth the lead. No. 26,790 of 1905.

ELECTROLYSIS OF FUSED SALTS—E. A. Ashcroft, London. In the system of electrolysis of fused salts in which two cells of different temperature are used, the arrangement of pipes connecting the two through which the electrolyte can circulate and so make full use of the heat. No. 26,813 of 1905.

LAMP FILAMENTS—J. Lux, Vienna, Austria. In preparing filaments of tungsten or molybdenum for electric lamps, using a compound of the hydrate of the metal with ammonia or polyamines. No. 27,002 of 1905.

REMOVAL OF SCALE FROM STEEL—W. R. Hodgkinson, J. H. Hardcastle and A. H. Coote, London. Removing metallic coatings from steel by immersing in an ammoniacal solution and passing an electric current through. No. 717 of 1906.

NITRATE OF AMMONIA PROCESS—W. Feld, Honningen, Germany. Producing nitrate of ammonia by passing blast furnace or other gases through a solution of the nitrate of an alkaline earth. No. 5776 of 1906.

SOLUBLE PYROPHOSPHATES OF TITANIUM—Peter Spence and Sons, Manchester. The production of double pyrophosphates of titanium and an alkali, which are the first phosphates of titanium that are soluble. No. 6329 of 1906.

METALLIC LAMP FILAMENTS—J. Lux, Vienna, Austria. A method of manufacturing tungsten or molybdenum filaments by mixing the oxides with ammoniacal solutions of casein or other organic substances. No. 9020 of 1906.

STORAGE BATTERIES EMPLOYING COBALT—T. A. Edison, New York, U. S. A. Improved method of forming cobalt and cobalt-nickel films used in the manufacture of the inventor's storage battery.

ROCK CRUSHER—F. Newnham, Los Angeles, Cal., U. S. A. A jaw crusher, arranged in such a way that the rock is broken along its natural line of cleavage, and so makes less fines. No. 17,776 of 1906.

## Personal

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

Chester W. Purington, of Denver, Colo., is in London.

T. R. Miller has returned to Denver from South Dakota.

R. A. Niles has left Breckenridge, Colo., and taken up his residence in Denver.

We regret to hear that J. C. Ralston is ill at his home in Spokane, Washington.

Frederic Nicholls, of Toronto, has gone on a trip to the West and the Pacific coast.

Robert Linton ,of R. M. Atwater & Co., Helena, Mont., is in Utah, on professional business.

W. E. Wilson, president of the Lost Bullion Spanish Mines Company, is in Baltimore.

F. J. H. Merrill, mining geologist, of New York, is about to go to Sonora on professional business.

L. F. S. Holland is in Nova Scotia, and is reopening the Evangeline gold mine at Cow Bay, Halifax county.

John Hays Hammond, of New York, sailed on Jan. 23 for Bermuda, where he intends to remain a month.

George C. Smith is now general manager of the Old Union Mining Company at Breckenridge, Colorado.

H. S. Joseph, a Salt Lake mining operator, has been elected speaker of the lower house of the Utah legislature.

Wm. Hedenscog has returned to Denver from Frisco, where he has been on a visit inspecting his mining holdings.

Norman Parsons, an Australian mining engineer, who has for some time past been in South America, is in Denver.

George Sage Brooks, of Milwaukee, Wis., has returned from an investigation of zinc properties in western Kentucky.

W. A. Walker, of Mt. Pleasant, O., has been appointed manager of the Gold Dust Puzzle mines at Breckenridge, Colorado.

W. F. Tye, of Montreal, representing the Canada Electric Syndicate, has gone to Mexico to take charge of engineering work.

Hudson H. Nicholson, of Chicago, passed through Denver recently, on his way to Goldfield, Nev., on professional business.

Paul R. Forbes, mining engineer, of New York, has gone to Mexico on business in connection with his personal mining interests.

L. A. Dunham, mining engineer, of New York, spent several days in Butte recently on business connected with the Lewisohn interests.

H. W. Hall, of Rockford, Ill., treasurer of the Lenawee Mining and Milling Company, has been visiting the property at Montezuma, Colorado.

Huntington Adams is manager of the Consuelo Mines Company, Ltd., and El Rosario (Taviches) Syndicate, Ltd., operating in Oaxaca, Mexico.

W. J. Freeman, secretary of the Bingham Consolidated Mining and Smelting Company, of Boston, is visiting Salt Lake City on company business.

Alex. W. Scott, who has obtained an interest in a copper property near Sudbury, Ont., has gone to Mexico to look after some of his holdings.

G. H. Hadley, manager of the property of the Butte-Montana Copper Company, of Butte, is visiting Pittsburg, where the backers of the company live.

Henry E. Callahan, for years manager of the Lake View Consols Mine in Kalgoorlie, Western Australia, is in Denver, Colo., on his way to Nevada.

Frederick F. Sharpless, mining and metallurgical engineer, of New York, has recently returned from examining the Emma mine, Dolores county, Colorado.

J. B. Risque, recently appointed manager of the Utah Consolidated Mining Company, has arrived in Salt Lake, and has entered upon his new duties.

George B. Lee, superintendent of the Copper Queen smelter, Douglas, Arizona, has been recently in New York, where he has been spending a well-earned vacation.

George W. Otterson, president of the Big Sandy Dredging Company, of Newsome, Idaho, and lessee of the Silver Boy placers, near Juneau, Alaska, is in New York.

J. C. Murray has resigned the position of chemist at the Londonderry Iron Company's plant, to accept the editorial management of the *Canadian Mining Journal*, Toronto.

Forbes Rickard has completed an examination of the Micmac Gold Mining Company's property at Leipsigate, Lunenburg county, Nova Scotia, and has returned to New York.

G. F. Carr, recently connected with O. & F. Braniff & Co., at Maconi, Mexico, has become mining engineer for the Arizona Commercial Copper Company, at Globe, Arizona.

G. H. Duggan, general manager, and Charles Fergie, superintendent of mines for the company, have been chosen also directors of the Dominion Coal Company, Cape Breton.

D. J. Heller, of Douglas, Arizona, has been a recent visitor in New York. He has gone to Index, Washington, where he will be manager for the Chelan Consolidated Copper Company.

George Hardy, of Carnegie, Penn., has taken temporary charge of the pan amalgamation mill of the Pittsburgh-San José Reduction and Railroad Company, at San José del Silio, Chihuahua, Mexico.

J. L. Parker has resigned his position as manager of the Brown-Alaska company, Prince of Wales Island, Alaska, and intends to open an office as consulting mining engineer in Seattle, Washington.

M. Parry Gosset, Mexican agent for the Tominil Mining Company, the Jalisco Mining Syndicate and the Estados Syndicate, passed through New York last week, on his way from London to Mexico.

Samuel Newhouse, William B. Thompson, president and vice-president of the Nipissing Mining Company, together with other directors of the company, have been at Cobalt this week inspecting the property of the company.

J. P. Hutchins, consulting mining engineer, of 52 Broadway, New York, is now in Dutch Guiana on professional business. He intends also to make a trip to French Guiana. His absence from New York is likely to be somewhat prolonged.

R. H. Channing, Jr., who recently retired from the management of the Utah Consolidated to accept the presidency of the Cerro de Pasco mining and railroad companies, in Peru, has left Salt Lake for New York. He will leave for South America in February.

R. B. Hutchinson, recently with the Compania Beneficiadora Concheño, at Concheño, Sonora, Mexico, has left there, as the property has been sold to the Greene Gold-Silver Company. After a visit to the United States, he will open an office as consulting engineer and metallurgist in the City of Mexico.

## Obituary

Noah W. Gray, a prominent figure in the Lake Superior charcoal-iron trade for nearly 35 years, died at Marquette, Mich., Jan. 9, aged 59 years. In 1873 Mr. Gray and William Burt built Carp furnace at Marquette, Mich. Later in turn he became connected with the Peninsular furnace at Detroit and afterward took charge of Ashland furnace at Ashland, Wis. In 1899 Mr. Gray and Charles H. Schaffer were associated in the reconstruction of the Carp furnace at Marquette, and were identified with that enterprise until the furnace was sold to the Pioneer Iron Company. The Boyne City Charcoal Iron Company was then organized, with Mr. Schaffer as president and Mr. Gray as secretary and treasurer, the company rebuilding at Boyne City, Mich., the old St. Ignace furnace. The headquarters of the company were at Marquette.

John F. Snyder, for 44 years chief mining engineer for the Delaware, Lackawanna & Western Railroad, died a few days ago, after a brief attack of grip, aged 71 years. He was a prominent factor in anthracite operations and was known throughout the State of Pennsylvania in mining circles. He was born in Auresville, N. Y., and removed with his

parents to Scranton, when 12 years of age, and later went to Indiana. He returned in 1855 to the anthracite region and after being employed for a few years by the Delaware & Hudson was appointed chief mining engineer for the Lackawanna in 1861, which position he held until 1905, when he retired upon a pension well earned. There is not a breaker in all the system of the company which does not bear some indications of the work of Mr. Snyder in its planning. When he was appointed chief mining engineer the output of the company was only a matter of a few hundred thousand tons and during his last year it reached 9,000,000 tons.

## Societies and Technical Schools

*Canadian Society of Civil Engineers*—The twenty-first annual meeting was held in Montreal, Jan. 29-31. The program included three business meetings, visits to various manufacturing plants in and near the city, and the annual dinner.

*Canadian Mining Institute*—The nominating committee has submitted the following nominations for officers for 1907: President, Frederic Keffer, Greenwood, B. C.; vice-presidents, J. Bonsall Porter, Montreal, P. Q.; W. G. Miller, Toronto, Ont.; W. Fleet Robertson, Victoria, B. C.; secretary, H. Mortimer Lamb, Montreal; treasurer, J. Stevenson Brown, Montreal; members of council, E. W. Gilman, Montreal; James McEvoy, Fernie, B. C.; Frank B. Smith, Edmonton, Alberta; R. W. Brock, Ottawa; J. C. Gwillim, Kingston, Ont.; F. D. Adams, Montreal; H. E. T. Haultain, Craigmont, Ont.; David H. Browne, Copper Cliff, Ont. Other nominations may be announced later.

## Industrial

The Crocker-Wheeler Company, Ampere, N. J., notes among recent sales an equipment of direct-current generators for the Edna No. 2 mine at Wendel, Penn., owned by the Pittsburg & Baltimore Coal Company.

The Crane Company, Chicago, now has the new steel foundry in full running order. In this department steel valves and fittings will be a specialty, and the facilities are such that promptness in the filling of orders for these goods is assured.

The National Producer Gas Power Company has been organized, with $500,000 capital, to make suction-gas producers under the patents of J. R. Wilmot; also gas engines and power-plant accessories. J. R. Wilmot is president, with office at 1123 Broadway, New York.

The DuBois Iron Works, DuBois, Penn., have taken over the entire business of the Lazier Engine Manufacturing Company, Buffalo, N. Y. The DuBois Iron Works have been manufacturing gas and gasolene engines for years under the patents and designs of Arthur A. Lazier, who has now sold out his entire interests and retires from the business management. While in general appearance the future engine manufactured may look the same, numerous improvements and changes will be made in the DuBois engines. It will be possible to operate them on natural, illuminating and coke-oven gas, gasolene, alcohol, distillate, crude oil and kerosene, in sizes ranging from 5 to 300 horse-power. Peter Eyermann is chief of the engineering department and under his designs and supervision the new "DuBois" engines will be produced. The officers of the company are: John E. DuBois, president; W. C. Pentz, vice-president; E. A. Badger, secretary and treasurer; I. N. Hamilton, general manager. The head office and entire management will be at DuBois, Penn., and at Buffalo a branch office will be retained.

## Trade Catalogs

Receipt is acknowledged of the following trade catalogs and circulars:

Stephens-Adamson Mfg. Company, Aurora, Ill. "Conveying and Transmission." Pp. 24, illustrated, paper, 6x9 in.; Jan., 1907.

Chas. Butters & Company, Ltd., Virginia City, Nevada. Catalog A. The Butters Patent Filter. Pp. 10, illustrated, paper, 6x9 inches.

Wendell & MacDuffie, 26 Cortlandt street, New York. Catalog No. 16 with supplement and discount sheet. "Everlasting" Asbestos-Cement Material. Pp. 23, illustrated, paper, 4x6 in.

## Construction News

*Big Stone Gap, Virginia*—The Kentenia Corporation has been organized to develop coal and iron-ore lands, and will soon be in the market for machinery. George L. Taylor, Big Stone Gap, Va., is secretary.

*Weimer, Idaho*—The Weimer Copper Company, owner of property in Fremont county, Idaho, but with headquarters in Salt Lake City, Utah, is considering the matter of building a smelter. J. B. Weimer is manager.

*Mount Troy, Virginia*—The National Manganese Company will develop manganese deposits at Mount Troy, near Staunton, and will need machinery. J. H. Ralston, Bond building, Washington, D. C., is president.

*Dorchester, Virginia*—The Sutherland Coal and Coke Company is preparing to open a coal mine; also to build coke ovens. A power plant and other machinery will be needed. John A. Esser, Dorchester, Va., is general manager.

## Special Correspondence

**San Francisco** Jan. 22

The miners' strike at Grass Valley is at an end. At a late hour on Jan. 19 committees of the Miners' Uuion and the Mine Owners' Association agreed upon terms to settle the strike that has been on since Jan. 1. The men are to start down the shaft at 7 o'clock, and work until 12 o'clock. They will have a half hour for lunch, and will work until 3.30 when they will start for the cage to leave the mine. The terms are satisfactory to both sides. In the two largest mines, the North Star and the Empire, the management had prepared to hoist out their mules and stop the pumps. Quite a number of miners had also left for other camps, and for some days the deadlock continued. The result settles the eight-hour day in the district, when 10 hours has always been the rule heretofore.

Secretary Hitchcock has issued an order withdrawing from all forms of disposal under the public land laws, except mineral, the vacant public lands in Siskiyou and Modoc counties, California. The lands withdrawn will be added to the Modoc forest reserve. They include about 469,160 acres in northeastern California, adjoining the Mount Hoffman withdrawal and the Modoc reserve. The order was issued primarily for the benefit of the miners, and will stop scrippers and timberland grabbers from making further raids on the public domain in those two counties.

All the lands of the Southern Pacific Company included in the Government grant to the Central Pacific Railroad in California, Nevada and Utah, with the exception of the timber property, will be placed on sale not later than July 1 this year. The railroad company's holdings in these States amount approximately to 6,000,000 acres. The sale of this vast area has been urged by the public for more than a decade. While small pieces of the Government grants were sold from time to time through the land office, this will be the first general disposal. The timber lands are reserved from this sale, but nothing is said about the mineral lands. Miners have not cared to prospect on these railroad lands because if they found anything of value high prices were charged.

The miners have always contended that the mineral lands were reserved from the grants and have made many efforts to have Congress take action as to segregation of mineral from agricultural land before passing patent to the railroads. The railroad companies, however, have always had more influence with Congress than the miners or the California Miners' Association did. The latter organization gave the railroad company a hard fight on the question, but finally had to give it up.

The Mammoth Copper Company, of

Shasta county, which some months ago voluntarily introduced the eight-hour schedule for its miners and smeltermen, has now raised wages without being asked. In order to adjust wages and at the same time give the employees a share in the benefit due to the advanced price of copper, the company has compiled a new schedule of wages, to go into effect Jan. 15. The advance in wages is contingent upon the price of electrolytic copper in New York being 18c. or higher per pound and a reduction will be made when the price drops below that figure. The company employs from 750 to 800 men and the wages are increased from 9 to 12 per cent. The smelters of the company are reducing 1500 tons of ore daily.

The long expected has happened at last. The State Anti-Débris Association—a private organization having no authority whatever from the State—has commenced suit against every dredging company in the Oroville district, Butte county, for letting material go into the Feather river, increasing the hight of water plane and causing floods and damage to the surrounding country.

This would seem rather a high-handed proceeding but it is in strict keeping with the former actions of this association. By having the suits tried before judges of courts in the anti-mining counties of the valleys, the miners have always got the worst of the litigation. The association contends that the companies can, at comparatively small expense, erect levees or barriers of cobbles or rock along the river channel which will prevent the débris from reaching the stream, and that they have failed to do this. Those right in the stream can do this and have done it, but the others working inland from the river have no necessity of doing it. Their débris is dumped back of them into the pit gradually vacated by the dredge as it moves onward in the course of daily work.

The United States Supreme Court has handed down a decision confirming the judgment of the California Supreme Court in the case of the East Central Eureka Mining Company and others, plaintiffs in error, against the Central Eureka Mining Company of Amador county. This was a case of a defendant holding under a mineral patent against a plaintiff, the holder of an agricultural patent, to quiet title to the mineral ledge underlying the farm of the plaintiff. The Supreme Court of the United States confirms the former judgments, which finally settled the right of the Central Eureka Company to follow its ledge even under the ground covered by the agricultural patent.

Judgment by default has been rendered in the United States Circuit Court in favor of Wellington Gregg, Jr., in the suit of Wm. H. Daily and the Pacific Coast Smelting and Refining Company vs. Christopher Furness, Frank P. Deering, the Copper King, Ltd., and Wellington Gregg, Jr. A decree was entered to the effect that the deeds signed and acknowledged by Daily on February 13, 1900, and May 25, 1900, were valid and did convey to the Copper King, Ltd., the title to all the lands therein described, and recognizing Gregg as guarantee of the Copper King and as the owner in fee simple absolute of those lands. The court ordered also that the complainants must convey the lands to Gregg within 30 days by a quit-claim deed. The property is near Bay Point, Contra Costa county. Gregg recovers costs also.

---

### Salt Lake City Jan. 26

At the annual election of the Kennebec Mining Company, operating near Alta, W. J. Craig was named president; S. M. Levy, vice-president; Charles Dupont, secretary; Bismark Snyder and Alex Colbath, all of Salt Lake, directors.

Much interest is being taken here in the Seven Troughs, Nevada, district, where more sensational gold discoveries have been reported. Several prominent Utah mining men have acquired property there.

The management of the Yampa Smelting Company, at Bingham, has experienced considerable difficulty in keeping its plant in operation during the past two weeks, owing to a scarcity of fuel and ore. The Copper Belt railroad, upon which the company depends to transport ore from the mine, is short of motive power. The Utah Copper Company has been unable to keep its mill going for the same reason. During December about 8000 tons were received at the plant, whereas between 24,000 and 30,000 tons should have been received. In Beaver county mine operators are handicapped in the same manner, and at this writing practically every mine in the county which is using coal for fuel is out of commission.

The Federal authorities are still probing into the alleged coal-land frauds. A civil action has been brought against the estate of Stanley B. Milner, to set aside title to several thousand acres of coal lands in Iron and Emery counties, which are said to have been obtained fraudulently. The grand jury has indicted C. M. Freed, Walter G. Filer, Don C. Robbins and E. W. Senior, all prominent Salt Lake citizens, for having been parties to other alleged coal-land irregularities.

The annual election of the Lower Mammoth Mining Company resulted in the selection of A. C. Ellis, president; John Dern, vice-president; W. S. McCornick, treasurer; August Reeves, secretary; all of Salt Lake. The condition of the mine was reported to be excellent.

Official announcement of the settlement of the Silver King-Magnolia-St. Louis litigation at Park City has been released. In addition to the purchase of the property and rights of the Magnolia-St. Louis Mining Company, the Silver King Mining Company acquires all the interests of the Pinyon Ridge and Baltimore mining companies; as well as those belonging to James McGregor.

The name of the Copper Glance Mining Company, of Bingham, has been changed to that of the Bingham Amalgamated Copper Company.

At the annual election of the Bingham Central Mining Company the matter of consolidation with the Bingham Standard Copper Company was brought up and the arranging of the deal in behalf of the Bingham Central Company has been left to Samuel Newhouse, who has been chosen president of that corporation. The Bingham Central Company has a cash balance of $26,000 on hand, with about 106,000 shares of treasury stock.

---

### Duluth Jan. 27

There will be 13 new electrically driven Brown hoists ready for operation at lower lake receiving docks by spring, and these should add about 300,000 tons each to the capacity for taking out ore by receiving ports. Most of these are at Cleveland and Fairport.

Total shipping capacity on the lakes for iron ore the coming season will be 42,000,000 gross tons, as against 39,000,000 capacity during 1906. It is considered probable by vessel-men that this capacity will be in use, and most of them have covered their tonnage by contracts at the prevailing rates well into the fall. Some of the chief concerns have taken tonnage to 80 per cent. of their capacity, and the various steel-making concerns with vessels have arranged to maintain their ships full all season. The United States Steel Corporation will have some 2,000,000 tons greater capacity in 1907 than last year, and expects to move all the ore its mines can produce and its roads handle to docks. Last year it shipped in its own vessels 11,355,000 tons of ore, which was about half its total business.

---

### Scranton Jan. 28

An effort is being made throughout the anthracite region to boost up the assessments upon the properties of the coal companies. The grand jury in the county of Luzerne conducted an investigation of the coal assessments throughout the valley and on Saturday presented a report to the court suggesting that the assessment of the county be increased $40,000,000, or, by one stroke of the pen, more than doubling the assessment of the entire county, all the increase to fall upon the coal lands. The report is the most drastic in the history of the anthracite region and the authorities in Lackawanna and Schuylkill counties are taking up a similar movement.

In the case of Luzerne county the grand jury examined a number of witnesses to test the assessment made by the regular assessors and cite the valuations now in force. In the case of the holdings of the Pennsylvania Coal Company in Jenkins

township the jury recommended that the valuations be increased at least 150 per cent., while a considerable increase should be made on the breakers and other buildings. In connection with the holdings of the Lehigh Valley Coal Company and the Hillside Coal and Iron Company in the same townships they recommended that the valuation be raised from $2,000,000 to $5,000,000. In Pittston township they recommended that the average price per acre be increased from $180 to $500 in the case of the lands of the Pennsylvania Coal Company. The Lattimer colliery of the Lehigh Valley Coal Company, which is assessed at $91,400, it was recommended should be assessed at $488,000. Other recommendations were made, but the examples given indicate the wholesale manner in which it is threatened to tax the coal companies. Similar action is being taken in the other anthracite counties.

Representative Herbst has introduced a resolution in the State house of representatives directing the attorney-general to institute *quo warranto* proceedings against the Temple Iron Company to determine by what right it mines and transports coal.

Judge Kelly, of the court of common pleas of Lackawanna county, decided in the case of William Miles vs. The Pennsylvania Coal Company that the defendant company had the right to mine coal under the property of the plaintiff, regardless of the effect it may have upon the surface, as the lease gave that right.

## London Jan. 19

The shareholders in the Montana Mining Company, which operates the Drumlummon mine, have been much pleased to hear that the Supreme Court at Washington has decided the lawsuit between the company and the St. Louis Mining Company in their favor. The lawsuit was originated by the St. Louis Company and based on the complicated mining laws of the United States, which are too deep to be fathomed on this side. The local court had awarded the St. Louis Company $195,000 as damages for trespass and for the value of ore extracted from the disputed area. The Montana Company appealed, but had to put up £35,000 as security. During all this time the capital of the company has been locked up in this way. The earthquake at San Francisco and the subsequent fire caused delay, because the records of the trials were kept there. The end has come at last, and the capital will once more be available for the legitimate purposes of the company. There have been lawsuits between these two companies for the last 15 years, the St. Louis always being the aggressor and always the eventual loser. It stands to reason that the energies of the officers of the Montana company are alienated from their legitimate work by lawsuits of this sort.

# General Mining News

## ARIZONA

### COCHISE COUNTY

*San Simon Copper Company*—This company was recently organized at Tucson, as successor to the Chiricahua Development Company. The following directors were elected: Thomas F. Cole, N. M. Kauffman, N. W. Haire, J. A. Duncan, W. G. Rice, S. R. Kaufman, Thomas H. Collins. The officers of the new company are: N. M. Kaufman, president; N. W. Haire, vice-president; S. R. Kaufman, secretary and treasurer. The capital is $2,500,000 in $10 shares.

*Butte & Arizona*—This company has completed the purchase of a group of copper claims in the Huachuca mountains, 35 miles from Bisbee. Work will be begun on the property at once, under charge of Capt. Jack Hoatson.

## CALIFORNIA

### AMADOR COUNTY

*Asbestos*—The asbestos claims owned by Fayette Mace & Sons, in Mt. Echo district, have been bonded to Eastern men who will at once begin doing necessary work.

### CALAVERAS COUNTY

*Benson*—At this claim, near Angels, the mill is being enlarged to 30 stamps. A 14-ft. vein has been encountered on the 500 level.

### EL DORADO COUNTY

*Hardscrabble*—At this mine work is soon to begin on a tunnel to prospect the gravel channel.

*Alpine*—At 300 ft. a ledge of good paying ore has been struck in this mine near Georgetown.

### INYO COUNTY

*Rochelle Mining and Milling Company*—This company, with Ringwald Brothers and Ira C. Jackson as chief stockholders, owns six claims east of Hamil station, and has been organized to open up the property.

### LAKE COUNTY

*Iron Ore*—R. C. Wight has found a body of iron ore south of the Rincon School district, but no work has been done upon it.

### MODOC COUNTY

*Hoag District*—Work is now being done in two claims in this district and others will shortly be operated. So far no production has been made, development work only being done.

### NEVADA COUNTY

*Boss*—For this mine near Sweetland, J. H. Collier, superintendent, machinery has been ordered and shaft-sinking will be commenced at once. The machinery consists of a pumping plant, hoist and compressor.

*Delhi*—This mine is near Columbia hill and was at one time a large producer. A rich shoot of ore has been found and Superintendent H. Eddie will start the 20-stamp mill as soon as conditions permit. The mine is well equipped.

### PLUMAS COUNTY

*At Beckwith*—Between the heads of Big and Little Grizzly creeks, near the old emigrant road, between Beckwith Pass and Quincy, a Salt Lake syndicate has secured many acres of land covering the southern extension of a region on Ward creek that contains gold and copper. Another company, the California Hercules, is opening up ground that adjoins that of the Salt Lake syndicate.

## COLORADO

### LAKE COUNTY—LEADVILLE

*New Monarch*—One of the latest of the big propositions in the Leadville district is the New Monarch mine in South Evans. The New Monarch territory comprises about 100 acres on the northwest slope of Little Ellen hill, in the vicinity of such well known properties as the Resurrection, the Diamond group, the Fortune and the Penfield. This great mine, a genuine bonanza in the best sense of the word, came into existence only about ten years ago, the New Monarch company being organized by Timothy Goodwin, Mr. Kortz and others interested in the Ohio & Colorado Smelting and Refining Company. In a short time after active work was started the mine was shipping a high grade of ore, and its record has been that of a continuous dividend-earner up to the present time. Arrangements are being made to tap the deposit at a lower depth, to add to the stoping room of the mine as much as for any other reason, and during the last few days a contract has been let to Leadville parties for sinking the New Monarch shaft 150 ft. at that part of the workings known as the Cleveland. At this point the shaft is already down 500 ft. The management has already for any emergencies that may result from the deepening of the shaft a heavy pumping plant, capable of taking care of any large volume of water that may be encountered.

*Jaybird*—The Jaybird property, one of the oldest mining claims in the district, has been leased to a party of Leadville people, and work has been started on the mine. In cleaning out the workings, which have lain idle for many years, and in opening up an old shaft, the lessees have uncovered a considerable body of sulphides. The deposit runs well in copper and carries about 23 per cent. in zinc. The ore also contains about 15 oz. silver to the ton and some gold, which is expected to increase as depth is gained. Shipments from this property will be started within the next few days.

### PARK COUNTY

*Horseshoe*—Reports from the Horseshoe mining district in Park county indi-

cate quite a lively campaign in progress at that point, just across the Mosquito range from the head of Iowa gulch. The lessees on the Clover group of claims in the Horseshoe report the discovery of a 14-ft. vein of quartz running well in both silver and gold. The Mudsill has also opened up a large body of good milling ore from which shipments will begin at once.

LAS ANIMAS COUNTY

*Colorado Fuel and Iron Company*—On Jan. 23 an explosion occurred in this company's colliery at Primero, by which 20 men are reported killed. It is said to have been caused by a windy shot.

## IDAHO

SHOSHONE COUNTY

It is reported that smelting works are to be built at Mullan. The Greenough interests are said to be concerned.

*Arlington*—At this mine, near Burke, a strike has been made in the lower tunnel. The vein is said to carry 3 ft. of good milling ore.

## MICHIGAN

HOUGHTON COUNTY—COPPER

*Copper Range*—It has been decided by the management that the mills operated by the company will not be equipped with electric power. The stamps and pumps must be supplied with steam and it was thought to be unnecessary to introduce electric power in addition. The mines, shafts and shops will, however, be electrically operated and power will be supplied by a power-house which is being considered. It will probably be constructed near the Michigan smelter, but the time for construction has not been decided upon. It is believed that 2000 kw. will be sufficient power at first and the plans are so drawn that this may easily be increased.

## MONTANA

BUTTE DISTRICT

*Boston & Montana*—After a suspension of nearly three days on account of cold weather and a shortage of coal, the mines of this company have gone into commission again, the weather having moderated sufficiently to permit resumption. Considerable time has been lost by the company during the last 10 days, and the result will be a reduction in the output of copper for the month. All other companies of Amalgamated have suffered a similar experience.

*North Butte*—The new vein of copper ore struck in Gem ground is showing up well, and has been developed sufficiently to bring it into prominence as a factor in the company's assets. While not the equal of the Jessie vein, it promises to develop into as great a producer as either the Jessie or Edith May. The company is drifting east and west on it, and is driving the cross-cut north to tap the Berlin vein.

*Montana Consolidated Company*—This company has taken over the property held by the General Development, a Lewisohn company, with the exception of the Granite Mountain, which adjoins North Butte possessions. It is developing the Montgomery group, in which it has cut a 6-ft. vein of sulphide copper ore at 200 ft. which is said to carry high values in copper and silver. It is equipping the property with heavy machinery preparatory to more extensive development. The company is backed by the Lewisohns.

## NEVADA

NYE COUNTY TONOPAH

No ore shipments were made for the week. The sampling and other mills were closed down, on account of scarcity of fuel.

*Tonopah Company*—For the quarter ending Nov. 30 this company reports 26,452 tons of ore mined, of which 8902 tons were shipped, 9978 tons sent to mill and 7572 tons placed on dumps. The receipts from ore shipped were $304,334; ore milled, $161,177; total, $465,512. In addition the sum of $137,129 was received from the Tonopah & Goldfield Railroad. Dividends amounting to $350,000 were paid.

## SOUTH DAKOTA

CUSTER COUNTY

*Ohio Beaver Creek Placer*—A placer dredge will be installed by this company, which owns 1068 acres of ground along Beaver creek. This dredge has a capacity of 1000 tons of gravel per day.

LAWRENCE COUNTY

The present strike in the Black Hills has again brought before the mine operators the question of an aërial tramway between the mines of Bald Mountain and the mills of Deadwood. It is estimated that this tramway, 7 miles in length, could be equipped at a cost of from $13,000 to $14,000 a mile, or about $150,000 for the whole. The cost of transporting ore over the railroads from this district is 50c. a ton for all $6 ore, and a sliding scale for higher values. Ore could be carried over the tramway for 25c. a ton at most, thus cutting in two the cost of transportation. The companies directly benefitted would be the Golden Reward, Dakota, Mogul, Portland-Clinton and Imperial, all of which are now shut down because of their inability to grant the eight-hour day.

## TENNESSEE

The board of prison commissioners by a majority vote has passed a resolution to close negotiations for the purchase of the Kittel coal lands, known as the Herbert domain. The property is located in Bledsoe, White, Van Buren and Sequatchie counties, comprising about 11,000 acres, and is said to be underlaid with seams of Bon Air and Sewanee coal. The purchase price is stated at $12 per acre. The property will be worked by the State, with convict labor, as the Brushy Mountain mines are now operated.

## UTAH

JUAB COUNTY

*May Day*—This company has resumed operations at its dry concentrating plant.

*Tintic Ore Shipments*—Operators have experienced a shortage of cars and the output last week was only 86 carloads, the contributing mines being: Ajax, Black Jack, La Clede and Swansea, 1 each; Bullion Beck, Godiva, May Day, Yankee Consolidated and Uncle Sam, 2 each; Eureka Hill, 3; Grand Central and Scranton, 4 each; Beck Tunnel, Eagle and Blue Bell and Tintic Iron, 5 each; Gemini and Mammoth, 6 each; Centennial Eureka, 32 cars.

*Colorado Mining*—This company has made an important strike of ore on the 250 level near the sidelines of the Beck tunnel mine. It carries high-grade values in gold, silver and lead.

SALT LAKE COUNTY

*Tiwaukee*—A deal is pending for the sale of the property of this company, which is located in Bingham.

*Laura May*—A compressor plant has been ordered for the Laura May mine in the Little Cottonwood district, and development will be resumed. H. L. Berkey, of Salt Lake, is manager.

SUMMIT COUNTY

*Park City Ore Shipments*—Shipments last week amounted to 1,285,300 lb., the contributing mines and respective amounts being: Daly Judge, 508,000; Daly Judge (zinc middlings), 743,000; Little Bell, 161,500; Ontario, 94,300; Silver King, 992,000; Daly West, 786,000 pounds.

*Naildriver*—This company has arranged with the New York Bonanza Mining Company for power, and will resume development work. Ernest Bamberger, of Salt Lake, is manager.

## WEST VIRGINIA

UPSHUR COUNTY

Twelve miners, five Americans and seven Italians are known to be dead as the result of an explosion of firedamp in the Pennsylvania Company mine at Lorentz, near Buckhannon, which occurred on Jan. 27. After the explosion the mine caved in and 100 miners narrowly escaped. The explosion occurred just as the day force was leaving the mine. The mine cage had just started up the shaft with 20 men on board, leaving 80 more at the foot of the shaft. The cage was kept running, however, until all were brought up. A rescue party found the bodies of the men who were killed about 100 ft. back in the mine. Apparently they had been overcome with gas, as their bodies were not burned.

# Coal Trade Review

NEW YORK, Jan. 30

Coal trade in the West shows little variation. There is still complaint of car shortage, but the condition is not as acute as it has been, and supplies are generally fair, except in some remote places.

In the East both anthracite and bituminous trades are quiet. There has been a little cold weather, but not enough to put any marked activity into the markets.

COAL-TRAFFIC NOTES

Shipments of coal and coke originating on the Pennsylvania Railroad Company's lines east of Pittsburg for the year to Jan. 19 were as follows, in short tons:

| | 1906. | 1907. | Changes. |
|---|---|---|---|
| Anthracite | 285,951 | 270,447 | D. 15.504 |
| Bituminous | 2,040,021 | 2,109,498 | I. 69,477 |
| Coke | 723,673 | 730,785 | I. 7,112 |
| Total | 3,049,645 | 3,110,730 | I. 61,085 |

The average daily tonnage was 152,482 tons in 1906, and 163,723 tons in 1907; an increase of 11,241 tons.

Shipments of Broad Top coal over the Huntingdon & Broad Top Railroad for the year to Jan. 26 were 76,745 tons.

Coal and coke tonnage of the Norfolk & Western Railroad for the 11 months ending Nov. 30, was as follows, in short tons:

| | Coal. | Coke. | Total. |
|---|---|---|---|
| To Line points | 7,682,382 | 1,930,064 | 9,612,446 |
| To Tidewater | 2,763,421 | 151,344 | 2,914 765 |
| Total | 10,445,803 | 2,081,408 | 12,527,211 |
| Total, 1905 | 9,393,768 | 2,197,122 | 11,590,890 |

The total increase in 1906 was 936,321 tons, or 8.1 per cent. The tidewater tonnage in 1906 was 23.3 per cent. of the total.

Shipments of anthracite coal in December were rather less than expected, chiefly on account of shortage of cars. The total was 4,836,028 tons, which was 346,125 tons less than in November, and 559,085 tons less than in December, 1905. For the full year the shipments by companies were as follows, in long tons:

| | 1905. Tons. | Per Ct. | 1906. Tons. | Per Ct. |
|---|---|---|---|---|
| Reading | 12,574,502 | 20.5 | 11,258,295 | 20.2 |
| Lehigh Valley | 10,072,120 | 16.4 | 8,536,254 | 15.4 |
| N. J. Central | 7,983,274 | 13.0 | 6,983,217 | 12.5 |
| Lackawanna | 9,554,046 | 15.6 | 9,201,875 | 16.5 |
| Del. & Hudson | 5,640.528 | 9.2 | 5,346,695 | 9.6 |
| Pennsylvania | 4,890,635 | 8.0 | 4,856,004 | 8.8 |
| Erie | 6 225,622 | 10.1 | 5,636,537 | 10.2 |
| N. Y., Ont. & W. | 2,864,096 | 4.6 | 2,444,273 | 4.4 |
| Del., Sus. & Schu'l | 1,605,378 | 2.6 | 1,435,445 | 2.4 |
| Total | 61,410,201 | 100.0 | 55,698,595 | 100.0 |

The total decrease was 5,711,606 tons, or 9.3 per cent. The largest proportional decrease was 1,535,866 tons, or 15.2 per cent., on the Lehigh Valley; the smallest, 34,631 tons, or 0.7 per cent., on the Pennsylvania.

The shipments by months in 1906 were as follows:

| | | | |
|---|---|---|---|
| Jan | 5.458,084 | July | 4 981.448 |
| Feb | 4.712.099 | Au | 5 400 511 |
| March | 5,797 167 | Sept | 4.527.886 |
| April | 488,203 | Oct | 5 384 768 |
| May | 3 254.230 | Nov | 5,182.153 |
| June | 5,676,018 | Dec | 4,836,028 |

Six months of the year—January, February, March, July, August and October—showed increases over the corresponding months in 1905; the remaining months showed decreases. If the quantity of coal in the storage yards at the close of each year is taken into account, there was probably little difference in actual consumption between 1905 and last year.

## New York Jan. 30

ANTHRACITE

The market is very dull, although there are a few dealers who report that trade has been fairly active during the past week. Cars have been in better supply during the last two days than for some time, and there seems to be less difficulty in getting coal through on schedule time. Small steam sizes are still scarce. Prices remain at $4.75 for broken, $5 for egg, stove and chestnut. Prices for small steam sizes are nominally $3 for pea, $2.25 @2.50 for buckwheat, $1.50 for rice, $1.40 for barley; all f.o.b. New York Harbor shipping points.

BITUMINOUS

The Atlantic seaboard soft-coal trade continues to show little change. Shipments come with fair regularity, but the tone has a tendency toward quietness. Car supply is better than it has been for some time.

Trade in the far East is about the same as when last reported. Along the Sound the demand is fairly good. New York Harbor trade is quiet, there being a light demand and a fair offering of steam coal at $2.50@2.75 f.o.b. New York Harbor shipping points. All-rail trade shows some activity, with car supply better than usual and coal coming through quite rapidly.

In the coastwise vessel market, boats are in fair supply, but there is a growing tendency to substitute coal barges for many of the small schooners that have heretofore been used. We quote freight rates as follows: From Philadelphia to Salem and Boston 95c.@$1 and discharge, the loading and discharging clause being included.

## Birmingham Jan. 28

Coal operations in Alabama continue steady and further development is noticed on all sides almost.

Whitfield Brothers during the past week sold their coal properties in the vicinity of Palos, in the western part of Jefferson county, 800 acres, for $300,000 to Daniel Pierson and associates, who have organized the Pratt Central Coal Company.

The Sloss-Sheffield Steel and Iron Company is making an output daily of 500 tons of coal at the Bessie mines.

There is but little likelihood that the new administration in Alabama will make any changes in the convict system in coal mines.

J. R. Kennamer, of Piper, Ala., has been elected president of the Alabama district No. 20, United Mine Workers of America, to succeed Edward Flynn, who becomes assistant State mine inspector.

## Cleveland Jan. 29

The supplies of coal on hand have about been exhausted and in a comparatively short time the market here will be dependent upon the shipments direct from mines. The best grades of mine-run steam coal are selling at $1.15@1.25 at the mines for Ohio, with Pennsylvania lower. Ohio slack is selling at $1.10 and Pennsylvania at 85c. at mines.

There is a good demand for coke. The best grades of 72-hour coke are selling at $4 to 4.25 and furnace coke at $3.50@ 3.60 at oven.

Owing to the large increase of Coshocton, Middle district, or No. 8, and Pennsylvania lump, the price of Massillon lump has about reached the maximum for the year at $2.30 at mines.

## Chicago Jan. 28

The coldest weather of the last two years, coming at the end of a long period of mildness, has greatly increased the demand for both bituminous and anthracite, in the city trade. Country business has felt less stimulation from the change, but its increase is pronounced satisfactory by dealers.

Shipments from Illinois and Indiana mines have been curtailed. Some of the mines have been closed and others are operating at much less than full capacity. Lump and egg from Illinois and Indiana mines sells for $2@3.50; run-of-mine for $1.75@2.50, and screenings for $1.30@1.75. Smokeless lump and egg are in large supply, making prices weak, the circular quotation of $4.30 being cut 25@35c. Smokeless run-of-mine holds up to $3.40, the supply being short. Hocking is weak at $3@3.25. Youghiogheny has been overabundant and sells for $3@3.15. Pittsburg is also plentiful and brings $2.90@3.05, for No. 8 lump.

## Indianapolis Jan. 26

After three weeks of turbulent deliberations the eighteenth annual convention of the Mine Workers of America closed Jan. 21. The sessions were characterized by factional differences, personal and district grievances and efforts to secure advancement in the order. The report of Secretary-Treasurer Wilson showed a decrease in membership of 16,000 and also a material decrease in the finances. Vice-President Lewis sought to forestall the policy of President Mitchell by a resolution declaring that the settlement of strikes by the body as a whole would result in a greater good to the organization than the policy of sectional settlements. President Mitchell opposed this and defended his policy of local settlement, and was sustained by the delegates.

The question that most concerned the mine workers was how to secure a resumption of the joint conference with the operators. It was generally admitted that this was both advisable and desirable, and the work of renewing such relations was left to a committee.

After a warm discussion the engineers, firemen and blacksmiths in a number of districts, who had petitioned for separate charters and said they would no longer pay dues to the union without representation, were denied the right to form a separate organization.

Senator Beveridge's child-labor law was indorsed. Patrick Gilday, of Pennsylvania, and Thomas Burk, of Illinois, were elected delegates to the International Mining Congress to be held this summer in Saulzberg, Austria. The convention opposed the reappointment of James Epperson as mine inspector for Indiana and sent a resolution to the legislature asking for an investigation of the recent mine explosions in the State.

John Mitchell was elected president for the ninth time; Vice-President Lewis and Secretary Wilson were also re-elected.

### Pittsburg Jan. 29

*Coal*—Prices are a trifle weaker and sales are being made on the basis of $1.10 @1.15 a ton for mine-run coal at mine. There is a good supply of railroad cars, but a number of mines are idle owing to a lack of orders. The river mines are running to capacity, and the harbor and pools are crowded with empty coal-boats and barges that came up on the recent high water. The rivers were navigable all week, and all the coal loaded was shipped to lower ports, but there was not a great deal remaining after the recent heavy shipments. It is estimated that about 2,000,000 bu. got out on the last rise. Tow-boats are still coming in with empties.

*Connellsville Coke*—The coke market is as strong as ever, and prices are unchanged. Furnace coke for February delivery is quoted at $3.40@3.50, and for shipments through the year at $3@3.15. Foundry coke for prompt shipment is quoted at $4@4.25, and for all year at $3.85@4. According to the *Courier*, the production for the week amounted to 286,944 tons, and in the lower Connellsville region to 125,067 tons. Shipments aggregated 14,650 cars distributed as follows: To Pittsburg, 4616 cars; to points west of Pittsburg, 8306 cars; to points east of Connellsville, 1728 cars.

## Foreign Coal Trade

Jan. 30

Coal production in the Transvaal for the month of November was 328,026 tons, of which 239,395 tons were sold, and 88,631 tons used at mines or stored.

The coal production of Natal in November was 110,662 tons, an increase of 15,825 tons over November, 1905. The coal exported and bunkered during the month was 62,335 tons.

Shipments of Nova Scotia coal for the full year are reported as follows, by companies:

| | 1905. | 1906. | Changes. | |
|---|---|---|---|---|
| Dominion | 2,913,000 | 3,131,000 | I. | 218,000 |
| N. S. Steel | 635,000 | 658,000 | I. | 23,000 |
| Acadia | 258,000 | 275,000 | I. | 17,000 |
| Intercolonial | 208,000 | 280,000 | I. | 72,000 |
| Cumberland | 417,000 | 379,500 | D. | 37,500 |
| Inverness | 133,000 | 206,000 | I. | 73,000 |
| Small Companies | 229,500 | 241,000 | I. | 11,500 |
| Total | 4,793,500 | 5,170,500 | I. | 377,000 |

The increase was 7.9 per cent. Only one company showed a loss in trade. The Dominion Coal Company's shipments, in 1906, were 60.5 per cent. of the total.

## Iron Trade Review

New York, Jan. 30

The iron and steel markets are somewhat quieter this week. Buying of pig iron is less, and there is comparatively little new business in finished material. The inclinations are that a lot of structural steel will be called for later, but matters are quiet for the present. The mills are all busy, however, and specifications on contracts are being received, which keeps them up to their work.

*United States Steel Corporation*—The preliminary statement, issued Jan. 30, gives the net earnings for the fourth quarter and the full year as follows:

| | 1905. | 1906. |
|---|---|---|
| Fourth quarter | $35,278,688 | $41,744,964 |
| Year | 119,850,282 | 156,619,111 |

This shows for the year an increase of $36,768,829, or 30.7 per cent. The financial statement for the fourth quarter may be summed up as follows:

| | |
|---|---|
| Net earnings | $41,744,964 |
| Depreciation, reserve, etc | $6,046,374 |
| Special reserve fund | 1,000,000 |
| Interest, sinking fund, etc. | 7,027,613 |
| Total deductions | $14,073,987 |
| Net balance | $27,670,977 |

Appropriations from this surplus were $6,304,919 for a dividend of 1¾ per cent. on preferred stock; $2,541,513 for one of 0½ per cent. on the common stock; $15,500,000 for additions to property—includng $9,000,000 for the Gary steel plant; a total of $24,346,437, leaving a final surplus of $3,324,545. The total unfilled orders on the books Dec. 31 were 8,489,718 tons, the largest quantity ever reported.

### Baltimore Jan. 29

Included in the exports from the port of Baltimore for the week were 3097 tons rails and 224 tons splice-bars to Havana; 2122 tons rails and 121 tons splice-bars to Vera Cruz; 1900 tons rails and 96 tons splice-bars to Buenos Aires.

In the imports were 816 tons spiegeleisen and 304 tons ferromanganese. Imports of iron ore were one cargo, 4800 tons, from Cuba.

### Birmingham Jan. 28

Despite the fact that the shipments of pig iron out of the Southern territory during this month have been much better than those for the last three months of 1906, there will be a large quantity of iron still in Alabama on Feb. 1. The advance of 25c. per ton will go into effect Feb. 1. The manufacturers made a strong protest against the advance on such of the iron as had accumulated by reason of the railroad-car shortage, but the protest was in vain. The iron make in Alabama has not been improved this year. It is a hard proposition to increase the raw-material supply with labor not abundant, and the work of repairing furnaces is not a light task. However, there is hope for an appreciable improvement in the output during the spring.

### Chicago Jan. 28

The iron market remains strong, but there is considerable variation of prices.

For delivery in the second half, Southern iron brings $18.50@19 Birmingham ($22.85@23.35 Chicago.) Northern iron is selling at $24@25 for the second half, with the demand variable but sales in general large. Spot iron brings $23@24 for No. 2 foundry.

Coke is still scarce for immediate deliveries, Connellsville 72-hour bringing $6.65. Supplies are increasing, however.

### Cleveland Jan. 29

*Iron Ore*—The market continues to hear of small lots of iron ore being sold for immediate delivery, most of these lots being off Lake Erie docks. In a majority of instances these lots are sold at prices unchanged from 1907 quotations, being therefore $5 f.o.b. Lake Erie docks for bessemer Old Range. In this case the quotation is straight, the new metallic-content guarantee not being a feature. The movement away from Lake Erie docks is beginning to be heavy.

*Pig Iron*—For spot shipment most of the Northern consumers of foundry iron are depending upon imports. It is known this supply is comparatively small for some time to come. Prices vary considerably on all deliveries, but it can be said the spot-shipment material is selling at $26 delivered, while second-half No. 2 Northern is selling at $22 at furnace as a minimum. There is a good stiff demand for basic and bessemer; some producers are asking $24.50@25 for second-half material.

*Finished Material*—There is a good demand for material, which goes into second-quarter and second-half delivery extensively. The strongest demand comes in semi-finished materials such as sheet-bars and billets. Bars are strong, especially

bar iron, which is selling on the basis of 1.85@1.90c. Youngstown. Plates and shapes are in big demand.

### Philadelphia Jan. 30

*Pig Iron*—The pig-iron market is showing some contradictory features in which a weakening of prices appears to be indicated, but careful inquiry fails to substantiate any break or even downward tendency. We have been treated to so many surprises of late that it is dangerous to draw inferences from patent facts. The present indications are that there will be shortly a resumption of ordering, especially by foundries, engineering plants and pipe works. Basic is under urgent inquiry, and it is understood that while orders have not been accepted under recent inquiries, these orders are liable to be placed at any time. Quotations may be fairly given at $26.50 for No. 1 X foundry; $24.50@26.50 for No. 2 X foundry, according to delivery; $23 for No. 2 plain; $22.50@23 for standard gray forge; basic, $25.50 for second-quarter delivery. Scotch irons are quoted at $25 on dock; Middlesboro, $23.

*Steel Billets*—While there are very few buyers openly in the market at the present time, prices are firm at $34 for ordinary steel and forging steel brings from $38 to $40.

*Bars*—The bar-iron situation is about as it has been for some time past, and prompt shipments command premiums.

*Sheets*—New business continues to come in, taxing the facilities of the manufacturers for delivery within the next 60 days.

*Pipes and Tubes*—A large demand is presenting itself for spring delivery and the mills are reported as booking large orders.

*Plates*—A good deal of nervousness prevails among some of the larger buyers on account of the failure of some consumers to obtain promise of delivery during the second quarter at dates desired.

*Structural Material*—There is a fresh rush of small orders for construction purposes in cities for lots ranging from about 100 tons up to 1000, for which premium prices are readily paid.

*Steel Rails*—The steel-rail market is rather quiet, and premium prices have been offered for special accommodations.

*Scrap*—Scrap prices are dodging up and down in a way which cannot be easily explained. No. 1 steel scrap is in more request than any other kind at present, but only a moderate amount of business has been done, owing to the difficulty of agreeing upon prices. Wrought railroad is quoted at $23; No. 1 forge fire at $17; machinery scrap will bring $22 readily.

### Pittsburg Jan. 29

The iron and steel markets continue strong despite the fact that there is but little buying in any line. Heavy buying in the past few months has filled the mills and in plates deliveries cannot be guaranteed this side of July 1. The event of the week was the advance in galvanized sheets, corrugated roofing and blue annealed sheets, ordered by the American Sheet and Tin Plate Company, effective Jan. 24. Galvanized sheets were advanced $2 a ton to 3.75c. for No. 28 gage; galvanized corrugated roofing 10c. a square, from $3.15 to $3.25 a square, for No. 28 gage, 2½-in. corrugations; blue annealed sheets $1 a ton, making prices as follows per 100 lb.: No. 10 gage and heavier, $1.90; 11 to 12, $1.95; 13 to 14, $2; 15 to 16, $2.05. The advance in galvanized sheets was predicted several weeks ago and is due to the high price of spelter. Blue annealed sheets have been selling at a higher price than was quoted and the advance will have no effect on the market. No change was made in prices of black sheets or painted corrugated roofing. Sales of spelter in carload lots were made in Pittsburg during the past few days at $6.77½ per 100 lb., and it is now quoted at $6.80. This is a record price in this market for spelter. While black sheets remain unchanged, mills are behind in deliveries and consumers are offering premiums in some instances for prompt shipment.

*Pig Iron*—Consumers of bessemer and basic iron continue out of the market for second half, and while there is considerable buying of foundry iron, secrecy is being observed regarding the transactions. It is understood the Standard Sanitary Manufacturing Company bought about 20,000 tons of foundry, 15,000 of Northern and 5000 tons of Southern. The Westinghouse Electric and Manufacturing Company also is reported to have closed for a large tonnage. Furnaces have advanced the price. Until last week No. 2 foundry for second half was quoted at $21.50@21.75; now some furnaces are quoting $22, Valley, as the minimum for deliveries extending through the last half. For prompt, $25@25.50 is quoted, and for second quarter the price is $23@24. A sale of 16,000 tons of bessemer was made three weeks ago, but no announcement was made of the transaction. It leaked out, however, and it was learned that the price was $22, Valley furnaces; deliveries are to extend through the first half. The only sales recorded this week include 1000 tons of bessemer at $22.50 and 800 tons of basic at $22, Valley furnaces, for February and March deliveries. For last half furnaces continue to quote $21.50 for bessemer and $21.25 for basic. Gray forge is quoted at $20.85@22.85, Pittsburg, according to delivery.

*Steel*—Deliveries of billets on regular contracts continue to show improvement, but prices remain firm, bessemer billets still being quoted at $29.50 and open-hearth at $32. Plates are firm at 1.70c. and merchant-steel bars at 1.60c.

*Ferro-Manganese*—There has been a slump in the ferro market, and for prompt shipment sales have been made at $73, and for second half $70@71 is quoted.

### Dusseldorf, Germany Jan. 20

Imports of iron and steel, and manufactures thereof, into Germany for the 11 months ended Nov. 30 were, in metric tons:

| | 1905. | 1906. | Changes. |
|---|---|---|---|
| Iron and steel | 295,337 | 592,655 | I. 297,318 |
| Machinery | 70,580 | 75,940 | I. 5,360 |
| Total | 365,917 | 668,595 | I. 302,678 |

The total increase was 82.7 per cent.; the gain being chiefly in raw and semi-finished iron and steel. The exports for the 11 months were as follows:

| | 1905. | 1906. | Changes. |
|---|---|---|---|
| Iron and steel | 2,985,876 | 3,324,313 | I. 338 437 |
| Machinery | 274,190 | 269,314 | D. 4,876 |
| Total | 3,260,066 | 3,593,627 | I. 333,561 |

The total increase was 10.2 per cent. The gain was largely in finished products.

### Cartagena, Spain Jan. 12

*Iron and Manganiferous Ores*—Messrs. Barrington & Holt report for the week: Shipments were, for the week, four cargoes, 10,935 tons dry ore, to Great Britain; one cargo, 2450 tons dry ore, to France; one cargo, 4600 tons dry ore, to Philadelphia; total, 17,985 tons. The demand for iron ore of every description remains unaltered, and sellers in most cases seem indisposed to make quotations, probably owing to available stocks having been disposed of. The port continues full of tonnage waiting turn to load, and although freights are still ruling high, a considerable amount of chartering is taking place.

## Metal Market

NEW YORK, Jan. 30

**Gold and Silver Exports and Imports.**
**At all United States Ports in December and year.**

| Metal. | Exports. | Imports. | Excess. |
|---|---|---|---|
| Gold: | | | |
| Dec. 1906... | $1,729,194 | $ 7,588,623 | Imp. $5,859,429 |
| " 1905 . | 2,668,532 | 4,028,881 | " 1,360,349 |
| Year 1906.. | 46,560,397 | 155,550,766 | " 108,990,369 |
| " 1905.. | 46,794,467 | 50,293,405 | " 3,498,938 |
| Silver: | | | |
| Dec. 1906... | 5,486,094 | 4,122,324 | Exp. 1,363,770 |
| " 1905.. | 8,196,149 | 4,692,746 | ,, 3,503,403 |
| " 1906.. | 59,036,340 | 44,350,896 | ,, 14,685,444 |
| 1905 .. | 57,512,102 | 35,939,135 | ,, 21,573,967 |

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 Jan. 26 and years from Jan. 1.**

| Period. | Gold. | | Silver. | |
|---|---|---|---|---|
| | Exports. | Imports. | Exports. | Imports. |
| Week..... | $ 870,970 | $ 48,584 | $572,666 | $ 65,248 |
| 1907..... | 1,344,585 | 352,699 | 1,908,125 | 277,364 |
| 1906..... | 1,036,000 | 165,779 | 7,602,604 | 156,809 |
| 1906..... | 12,561,460 | 135,736 | 2,642,058 | 72,905 |

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

The joint statement of all the banks in the New York Clearing House for the week ending Jan. 26 shows loans, $1,085,985,400, an increase of $22,028,100; deposits, $1,007,011,600, an increase of $24,577,200, as compared with the preceding week. Reserve account shows:

| | 1906. | 1907. |
|---|---|---|
| Specie | $193,006,400 | $196,873 200 |
| Legal tenders | 84,601,600 | 85,442,500 |
| Total | $277,608,000 | $282,315,700 |
| Surplus | $15,562,800 | $15,829,150 |

The surplus over legal requirements shows a decrease of $2,897,900, as compared with the previous week.

Specie holdings of the leading banks of the world on Jan. 26 are reported as below, in dollars:

| | Gold. | Silver. | Total. |
|---|---|---|---|
| Ass'd New York | ..... | ..... | $196,873,200 |
| England | $168,007,625 | ..... | 168,007,625 |
| France | 530,359,230 | $197,596,395 | 727,953,625 |
| Germany | 162,660,000 | 54,220,000 | 216,880 000 |
| Spain | 76,980,000 | 121,635,000 | 198,615 000 |
| Netherlands | 27.702,500 | 28 875,500 | 56,578.000 |
| Belgium | 16 590,000 | 8,295,000 | 24.885,000 |
| Italy | 160,980,000 | 23,800,500 | 184,780,500 |
| Russia | 590,255,000 | 23,675,000 | 613,930,000 |
| Aust.-Hungary | 232,485,000 | 59,645,000 | 292,130,000 |
| Sweden | 19,980,000 | ..... | 19,980,000 |

The banks of England and Sweden report gold only. The New York banks do not separate gold and silver in their reports.

Shipments of silver from London to the East are reported by Pixley & Abell as follows, for the year to Jan. 17:

| | 1905. | 1906. | Changes. |
|---|---|---|---|
| India | £ 1,227,200 | £ 224,610 | D. £ 1,002,590 |
| China | ..... | ..... | ..... |
| Straits | ..... | ..... | ..... |
| Total | £ 1,227,200 | £ 224,610 | D. £ 1,002,590 |

Receipts for the week were £260,000 in bars from New York, and £92,000 in dollars from Mexico; a total of £352,000. Exports were £188,500 to India.

Indian exchange has been strong, the council bills offered in London being taken at an average of 16.09d. per rupee. Business is active in India, and further purchases of silver are expected.

### Prices of Foreign Coins

| | Bid. | Asked. |
|---|---|---|
| Mexican dollars | $0.53 | $0.55 |
| Peruvian soles and Chilean | 0.47¾ | 0.49 |
| Victoria sovereigns | 4.85⅞ | 4.87⅞ |
| Twenty francs | 3.86 | 3.89 |
| Spanish 25 pesetas | 4.78 | 4.80 |

### SILVER AND STERLING EXCHANGE.

| January. | Sterling Exchange. | Silver. New York, Cents. | Silver. London, Pence. | January. | Sterling Exchange. | Silver. New York, Cents. | Silver. London, Pence. |
|---|---|---|---|---|---|---|---|
| 24 | 4.85⅛ | 68½ | 31⅛ | 28 | 4.85⅛ | 68¼ | 31⅛ |
| 25 | 4.85⅛ | 68¼ | 31⅛ | 29 | 4.85⅛ | 67¾ | 31⅜ |
| 26 | 4.85⅛ | 68¼ | 31 1/16 | 30 | 4.85⅛ | 67¾ | 31⅛ |

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

## Other Metals

Daily Prices of Metals in New York.

| January. | 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. |
|---|---|---|---|---|---|---|---|
| 24 | 25 @25¼ | 24⅝ @24⅞ | 106⅝ | 42 | 6.00 | 6.70 @6.80 | 6 55 @6.65 |
| 25 | 25 @25¼ | 24⅝ @24⅞ | 107 | 42 | 6.00 | 6.70 @6.80 | 6.55 @6.65 |
| 26 | 25 @25¼ | 24⅝ @24⅞ | ..... | 42 | 6.00 | 6 70 @6.80 | 6.55 @6.65 |
| 28 | 25 @25¼ | 24⅝ @25 | 107 | 41⅛ | 6.00 | 6.70 @6.80 | 6.55 @6.65 |
| 29 | 25 @25⅜ | 24⅝ @25 | 106¼ | 41¼ | 6.00 | 6.70 @6.80 | 6.55 @6.65 |
| 30 | 25 @25⅜ | 24⅝ @25 | 106¾ | 41⅛ | 6.00 | 6.70 @6.80 | 6.55 @6.65 |

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

*Copper*—Business during the week has not developed any new features. Europe has not been buying anything, but there has been some buying by home consumers which was sufficient in volume to bring about a further advance in prices, the supply being so scant. The close is firm at 25@25⅜c. for Lake copper; 24⅝@25c. for electrolytic in ingots, cakes and wirebars. Business in casting copper was done at from 24¼@24½.

The standard market has been barely steady, there being a great deal of pressure on the part of European dealers, which in a measure was offset by the supporting orders from this side. The closing quotations are cabled at £106 7s. 6d. for spot, £107 12s. 6d. for three months.

Refined and manufactured sorts we quote: English tough, £108 10s.; best selected, £113 10s.; strong sheets, £122 10s. @123 10s.

It is reported that the average price received by the United Metals Selling Company for all its electrolytic copper for December was 23.03c. per lb., delivered, 30 days. This would correspond to 22.78@22.83c. per lb., cash, New York. The average of our quotations for the same month was 22.885c.

*Copper Sheets*—The base price of copper sheets is 30c. per pound.

*Copper Wire*—The base price of copper wire, No. 0000 to No. 8, is 27¼@27½c. per pound.

*Tin*—Prices continue to move within a narrow range. During this week the bears had the best of it and were able to depress the quotations in London to £189 17s. 6d. for both spot and three months'. Consumers here persist in their indifferent attitude, and only buy their current supplies on weak spots. Business was done in this market at 41½c.

*Lead*—The quotation remains unchanged at 6c. New York.

Following the advance in the London market during the previous week, there has been a steady gradual decline, which brought quotations at the close down to £19 12s. 6d. for Spanish lead, £19 15s. for English lead.

*St. Louis Lead Market*—The John Wahl Commission Company telegraphs under date of Jan. 30 as follows: Lead is quiet, and is selling at 6.07½c. for ordinary Missouri brands, and 6.15c. for refined corroding lead.

*Spanish Lead Market*—Messrs. Barrington & Holt report from Cartagena, Spain, under date of Jan. 12, that the price of pig lead has been 89.50 reales per quintal, silver being paid for at 14 reales per ounce. Exchange, 27.21 pesetas to £1. The price of silver, on current exchange, is equal to £18 8s. 4d. per long ton, f.o.b. Cartagena. The total export of pig-lead from the port of Cartagena during 1906 was 38,876 tons, of which 23,338 tons was argentiferous, the remaining 15,538 tons having been desilverized in the district before exportation. Of the total quantity 23,394 tons was shipped to England, 11,352 tons to France, and the remainder was divided up in small quantities to various Continental ports.

*Spelter*—Owing to the shortage of cars and the congested condition of the railroads, there appears to be quite a scarcity of near-by spelter at the consuming centers and premiums have been paid for early deliveries. There has been a fair amount of business for the future months. The market closes at 6.70@6.80c. New York, 6.55@6.65 St. Louis.

The foreign spelter market eased off somewhat during the week, closing at £26 15s. for good ordinaries, £27 for specials.

*Spanish Zinc Ore Market*—Messrs. Barrington & Holt report from Cartagena, Spain, under date of Jan. 12, that exports for the week were 1509 tons blende to Antwerp. The total export of zinc ore (blende and calamine) from the port of Cartagena during 1906 was 89,189 tons, of which 63,688 tons went to Antwerp, 15,550 tons to Stettin, and 5377 tons to Swansea, the remainder having gone in small quantities to other ports.

*Zinc Sheets*—The base price is $8.40 per 100 lb. (less discount of 8 per cent.) f.o.b. cars at Lasalle and Peru, in 600-lb. case for gages No. 9 to 22, both inclusive; widths from 32 to 60 in., both inclusive; the lengths from 84 to 96 in., both inclusive. The freight rate to New York is 27.5c. per 100 pounds.

*Antimony*—Quite an active inquiry for this metal is reported, the market being firm at 23½@24¼c. for the outside brands, 24¼@25¼c. for Hallett's, 25@26c. for Cookson's, the ranges in price being chiefly according to delivery.

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

*Platinum*—Demand continues strong and prices high. Unmanufactured platinum is quoted at $38 per oz. For good scrap $31.50@32 is paid.

*Quicksilver*—There is no change. New York prices are $40.50@42 per flask of 75 lb., according to size and conditions of order. San Francisco prices are $39@40 per flask for domestic orders, and $37@38 for export trade. The London quotation is £7 per flask, with £6 18s. 9d. asked by jobbers.

*Aluminum*—Prices are steady and demand good. Prices for ton lots, or over, are: No. 1, over 99 per cent. pure metal, 36c. per lb.; No. 2, over 90 per cent., 34c. Small lots are 1 to 3c. higher, according to size. Rods, according to size, are 1c. per lb. up, over the price of ingots. Granulated metal is 2c. per lb. over ingots.

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

| | Per Lb. |
|---|---|
| Cadmium, 99.5% f. o. b. Hamburg | 1.40@1.46 |
| Chromium, pure (N. Y.) | 80c. |
| Copper, red oxide | 50c. |
| Ferro-Chrome (70) | 13c. |
| Ferro-Chrome (7-9% carbon, per lb. Cr.) | 10½c. |
| Ferro-Chrome (1% C. for each 10% Cr.) | 11@11½c. |
| Ferro-Chrome (60-64% Cr., 3-4% C.) | 12@12½c. |
| Ferro-Chrome (60-70% Cr., 1% C. or less) | 38c. |
| Ferro-Molybdenum (50%) | 1.00 |
| Ferro-Titanium (20%) | 80c. |
| Ferro-Tungsten (37%) | 30c. |
| Ferro-Vanadium (25-50%, per lb. vanadium contents) | $5.50 |
| Magnesium, pure (N. Y.) | 1.50 |
| Manganese, pure 98@99% N. Y. | 75c. |
| Manganese—Copper (30@70%) N. Y. | 45c. |
| Molybdenum (96@99%, N. Y.) | $1.75 |
| Phosphorus, foreign red (f. o. b. N. Y.) | 90c. |
| Phosphorus, American yellow (f. o. b. Niagara Falls) | 42c. |
| Tungsten (best) pound lots | 1.25 |
| Ferro-Silicon (50%) spot. Ex. ship Atlantic ports | $97@100 ton. |

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

## Missouri Ore Market

JOPLIN, Jan. 26

The highest authenticated price paid for zinc concentrate was $51 per ton, but semi-official information indicates that $52.50 was paid for at least one bin, where a three-cornered competition was on. The assay basis price was very elastic, as low as $45 and as high as $49 being reported offered. The average price was $46.10 per ton.

Sharp competition was noted in the lead market; $88.50 per ton is known to have been offered for at least one bin of concentrate assaying 83 per cent. metallic lead, and another bin of this grade was rumored sold at $89. The average price was $85 per ton.

Broken gas mains, from which the supply of natural gas is drawn, reduced the output approximately one-sixth each of the two past weeks, and this lower capacity, added to an already strained market for both minerals, is the cause of the flurry, which may be only temporary, yet producers are expecting to receive $90 for lead and $55@56 for zinc by the end of February. Following are the shipments for the week:

| | Zinc, lb. | Lead, lb. | Value. |
|---|---|---|---|
| Webb City-Carterville | 2,730,540 | 520,800 | $86,300 |
| Joplin | 2,533,480 | 315 990 | 72,965 |
| Galena-Empire | 1,480,140 | 81,510 | 38,247 |
| Alba-Neck City | 1,084,320 | 37,440 | 28,156 |
| Duenweg | 411,990 | 233,010 | 19,583 |
| Oronogo | 575,970 | 15,470 | 14,480 |
| Prosperity | 306,820 | 115,420 | 12,115 |
| Badger | 421,690 | ..... | 10,331 |
| Spurgeon | 351 590 | 69 540 | 9,409 |
| Granby | 330,000 | 90 000 | 8,688 |
| Aurora | 352,760 | 13,220 | 6,717 |
| Cave Springs | 175,540 | ..... | 4,125 |
| Sherwood | 95,050 | 54,800 | 3,712 |
| Zincite | 118,960 | 6,880 | 3,027 |
| Carthage | 107,020 | ..... | 2,621 |
| Carl Junction | 65,090 | 5,250 | 1,785 |
| Stott City | 60,400 | ..... | 1,389 |
| Totals | 11,201,360 | 1,539,330 | $323.650 |
| January totals | 42,823,150 | 6,098,280 | $1,257,490 |
| January, 1906 | 42,066,100 | 5,443,130 | 1,163,245 |
| Increase | 757,050 | 655,150 | 74,253 |

Zinc value, the week, $258,213; the month, 981,534
Lead value, the week, 65,437; the month, 255,964

The following table shows the average monthly prices of zinc and lead ores in Joplin, by months; the average for zinc being based on the prices of assay basis ores carrying 60 per cent. zinc:

| ZINC ORE AT JOPLIN. | | | LEAD ORE AT JOPLIN. | | |
|---|---|---|---|---|---|
| Month. | 1906. | 1907. | Month. | 1906. | 1907. |
| January | 47.38 | 45.84 | January | 75.20 | 83.58 |
| February | 47.37 | ..... | February | 72.83 | ..... |
| March | 42.68 | ..... | March | 73.73 | ..... |
| April | 44.63 | ..... | April | 75.13 | ..... |
| May | 40.51 | ..... | May | 78.40 | ..... |
| June | 43.83 | ..... | June | 80.96 | ..... |
| July | 43.25 | ..... | July | 74.31 | ..... |
| August | 43.56 | ..... | August | 75.36 | ..... |
| September | 42.58 | ..... | September | 79.64 | ..... |
| October | 41.55 | ..... | October | 79.84 | ..... |
| November | 44.13 | ..... | November | 81.98 | ..... |
| December | 43.68 | ..... | December | 81.89 | ..... |
| Year | 43.24 | ..... | Year | 77.40 | ..... |

## Wisconsin Ore Market

PLATTEVILLE, Jan. 26

A marked improvement in zinc in this district was shown in the week. A slight scramble between two of the buyers set the price of $48 for 60 per cent. ore. Some few lots are reported as having been sold for $51.50. In spite of the cold snap, the usual turn-in has been reported, with a small surplus in the bins at the different mines. Prices on low-grade ores are holding up above the average of last year.

The camps of the district loaded ore for the week ending Jan. 26 as follows:

| Camps. | Zinc, Lb. | Lead, Lb. | Sulphur, Lb. |
|---|---|---|---|
| Platteville | 439,620 | ..... | ... |
| Buncombe-Hazel Green | 742,950 | ..... | ..... |
| Benton | 192,710 | ..... | ..... |
| Highland | 132,000 | ..... | ..... |
| Rewey | 121,800 | 66,900 | ..... |
| Cuba City | 89,550 | ..... | ..... |
| Mineral Point | 81,160 | ..... | 48,000 |
| Linden | 59 350 | 57,640 | ..... |
| Livingston | 50,000 | ..... | ..... |
| Total for week | 1,909,140 | 124.540 | 48,000 |
| Year to Jan. 26 | 5,729,765 | 297,890 | 48,000 |

A little better condition exists in the car supply, more cars being furnished to the district.

## Chemicals

NEW YORK, Jan. 30

*Copper Sulphate*—The market remains steady and firm, though rather quiet. Prices continue $7.25 per 100 lb. for carload lots, and $7.50 for smaller orders.

*Nitrate of Soda*—There is nothing new to report. Prices are $2.55@2.60 per 100 lb. for spot, and a little higher for futures.

*Phosphate Rock*—Shipments of hard rock from southern ports during the years 1905 and 1906 are given in the following table, in tons of 2000 lb.:

| Ports. | 1905. | 1906. | Change. |
|---|---|---|---|
| Savanah | 180,219 | 152,744 | D. 27,475 |
| Port Tampa | 65,767 | 54,990 | D. 10,777 |
| Fernandina | 117,302 | 154,893 | I. 37,591 |
| Pt. Inglis | 185,211 | 158,952 | D. 26,259 |
| Brunswick | 23,812 | 39,461 | I. 15,649 |
| Total | 572,311 | 561,040 | D. 11,271 |

Shipments of land pebble through Port Tampa for the same years amounted to 404,985 and 482,912 tons, respectively, showing an increase of 77,297 tons in 1906. In 1905 the total tonnage included 238,668 tons of foreign pebble, while in 1906 there were 214,727 tons shipped through this port.

## Mining Stocks

NEW YORK, Jan. 30

An irregular market, with spasmodic liquidation, still continues, and a hardening of money rates has helped to make matters unfavorable. Mining stocks have followed the general market and have been quiet and rather weak. The Boston market has cooled down considerably, but San Francisco is still rampant.

### Boston Jan. 29

The market has been hammered considerably through the week, and this was aided by stiffer money rates. Yesterday and today, however, its underlying strength was shown. Today, especially, great rallying power was evident, and there were many recoveries.

Copper Range, which had been off to $88.25, gained to $90.75, losing only a fraction. Shannon, which had been $20, went up to $21.75. The Trinity craze is still in evidence and the stock went to $39.50, closing at $38.75. Calumet & Arizona closed at $181; North Butte, $111.25; Bingham, $31; Osceola, $166; Mohawk, $87.50.

The statement that the rumored Lake deal was off, owing to the high prices asked for properties—notably Copper Range—is accepted by some; most people, however, believe that there is more to come in this matter.

The American Gold Dredging Company stockholders have notice of a meeting on Feb. 8 for the purpose of dissolving and winding up the company.

A matter of much interest to State Street is the report on taxation just submitted to the General Court. One of the recommendations is for a stock transfer

tax, similar to that now levied in New York. There will be strong opposition to this.

### Colorado Springs Jan. 25

Trading on the local stock market has been fairly active the past week, but there has been a general decline in prices. Portland showed the greatest falling off, dropping from $1.29 to $1.15; El Paso and Work each declined several points, but Isabella held firm, with a fair amount of sales. The semi-annual report of the Mary McKinney shows this company to be in good condition, which accounts for the advance the stock has made on a declining market. The report that Pharmacist will soon be in the shipping list encourages holders to wait for better prices.

## STOCK QUOTATIONS

| NEW YORK Jan. 29 | |
|---|---|
| Name of Comp. | Clg. |
| Alaska Mine | 1 |
| Am.Nev.M.&P.Co. | 4⅛ |
| Amalgamated | 111⅝ |
| Anaconda | 273 |
| Balaklala | 12¼ |
| British Col. Cop. | 10⅛ |
| Buffalo Cobalt | 3 |
| Butte & London | 2¾ |
| Butte Coalition | 35¼ |
| Butte Cop. & Zinc. | 5¾ |
| Cobalt Contact | ¾ |
| Colonial Silver | 3⅝ |
| Cum. Ely Mining. | 12¾ |
| Davis Daily | 17½ |
| Dominion Cop. | 6¾ |
| El Rayo | 6½ |
| Foster Cobalt | 2⅛ |
| Furnace Creek | 2⅛ |
| Giroux Mine | 9⅛ |
| Gold Hill | 5 |
| Greene Gold | 1⅞ |
| Greene G. & S | 2 |
| Greenw'r & D.Val. | 1⅜ |
| Guanajuato | 5⅛ |
| Guggen. Exp | 290 |
| Hanapah | ⅜ |
| McKinley Dar. | 2⅛ |
| Micmac | 6¼ |
| Mines Co. of Am | 2⅛ |
| Mitchell Mining. | 5⅜ |
| Mont.Sho.C.(New) | 13 |
| Nev. Utah M. & S. | 4¼ |
| Newhouse M. & S. | 16⅜ |
| Nipissing Mines | 11⅛ |
| Old Hundred | 4 |
| Silver Queen | 2 5/16 |
| Stewart | 2 |
| Tennessee Copper | 49 |
| Union Copper | ⅞ |
| Utah Apex | 8⅛ |
| West Columbus | 17 |

| N. Y. INDUSTRIAL | |
|---|---|
| Am. Agri. Chem. | 23⅛ |
| Am. Smelt. & Ref. | 144¼ |
| Am.Sm. & Ref., pf. | 115 |
| Bethlehem Steel | 18½ |
| Colo. Fuel & Iron. | 48⅝ |
| Federal M.& S.,pf. | 93 |
| Inter. Salt | 20 |
| Notional Lead | 69⅛ |
| National Lead, pf. | 102¾ |
| Pittsburg Coal | 15⅝ |
| Republic I. & S. | 36¾ |
| Republic I.& S.,pf. | 97½ |
| Sloss-Sheffield | 71 |
| Standard Oil | 531 |
| Tenn. C. & I. | 155 |
| U. S. Red. & Ref. | 29 |
| U. S. Steel | 44½ |
| U. S. Steel, pf. | 105 |
| Va. Car. Chem. | 34½ |
| Va. I. Coal & Coke | 89 |

| ST. LOUIS Jan. 26 | | |
|---|---|---|
| N. of Com. | High. | Low. |
| Adams | .40 | .25 |
| Am. Nettie | .08 | .06 |
| Center Cr'k | 2.40 | 2.25 |
| Cent. C. & C. | 65.50 | 63.50 |
| C.C. & C. pd. | 80.00 | 79.00 |
| Cent. Oil | 60.00 | 50.00 |
| Columbia | 5.00 | 4.50 |
| Con. Coal | 24.00 | 22.00 |
| Doe Run | 150.00 | 140.00 |
| Gra. Bimet. | .40 | .22 |
| St. Joe | 20.00 | 18.00 |

| BOSTON Jan. 29 | |
|---|---|
| Name of Comp. | Clg. |
| Adventure | 5¼ |
| Allouez | 64½ |
| Am. Zinc† | 45⅝ |
| Arcadian | 12 |
| Atlantic | 16¼ |
| Bingham | 30½ |
| Boston Con. | 30¾ |
| Calumet & Ariz. | 181 |
| Calumet & Hecla. | 940 |
| Centennial | 38¼ |
| Con. Mercur | .50 |
| Copper Range | 90¼ |
| Daly-West | .... |
| Franklin | 24 |
| Granby*, New | 130 |
| Greene Con. | 30⅜ |
| Isle Royal | 28¼ |
| Mass. | 8¼ |
| Michigan | 20¾ |
| Mohawk* | 87½ |
| Mont. C. & C.(new) | 1¾ |
| Nevada | 18 |
| North Butte | 111¼ |
| Old Colony | .... |
| Old Dominion | 55 |
| Osceola* | 165½ |
| Parrot | 30½ |
| Phoenix | 2¾ |
| Quincy† | 120 |
| Rhode Island | 10½ |
| Santa Fe | 5¾ |
| Shannon | 21¾ |
| Tamarack* | 144 |
| Tecumseh | .... |
| Trinity | 38 |
| United Cop., com. | 71⅞ |
| U. S. Oil | 12 |
| U. S. Smg. & Ref. | 64 |
| U.S.Sm.& Re.,pd.* | 47 |
| Utah Copper* | 71 |
| Victoria | 8 |
| Washington | .... |
| Winona | 12¼ |
| Wolverine | 190 |
| Wyandotte | 3¼ |

*Ex. Div. †Ex. Rights.

| BOSTON CURB | |
|---|---|
| Ahmeek | 110 |
| Ariz. Com. | 36 |
| Black Mt. | 8½ |
| Cananea Cent. | 29 |
| East Butte | 15¼ |
| Hancock Con. | 15 |
| Keweenaw | 13¼ |
| Majestic | 3⅞ |
| Raven | 1¼ |
| Shawmut | 1¾ |
| Superior | 20⅞ |
| Superior & Pitts | 27½ |
| Troy Man. | 3⅛ |

| LONDON Jan. 30 | | | |
|---|---|---|---|
| Name of Com. | Clg. | | |
| Dolores | £1 | 11s | 3d |
| Stratton'sInd. | 0 | 3 | 3 |
| Camp Bird | 1 | 8 | 6 |
| Esperanza | 2 | 18 | 9 |
| Tomboy | 2 | 2 | 6 |
| El Oro | 1 | 5 | 4½ |
| Oroville | 1 | 0 | 3 |
| Somera | 0 | 5 | 7½ |
| Utah Apex | 1 | 11 | 3 |
| Ariz.Cop.,pfd. | 3 | 15 | 0 |
| Ariz.Cop.,def. | 3 | 12 | 6 |

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

| S. FRANCISCO Jan. 23 | |
|---|---|
| Name of Comp. | Clg. |
| COMSTOCK STOCKS | |
| Belcher | .64 |
| Best & Belcher | 1.55 |
| Caledonia | .70 |
| Challar | .18 |
| Con. Cal. & Va. | 1.20 |
| Crown Point | .28 |
| Exchequer | .65 |
| Gould & Curry | .38 |
| Hale & Norcross | 1.00 |
| Mexican | 1.10 |
| Ophir | 3.10 |
| Overman | .24 |
| Potosi | .21 |
| Savage | 1.00 |
| Sierra Nevada | .70 |
| Union | .54 |
| Utah | .07 |
| Yellow Jacket | 1.05 |
| TONOPAH STOCKS | |
| Golden Anchor | .43 |
| McNamara | .65 |
| Montana-Pitts.ex. | .21 |
| North Star | .41 |
| Rescue | .20 |
| GOLDFI'D STOCKS | |
| Black Ants | .14 |
| Blue Bull | .66 |
| Columbia Mt. | 1.17 |
| Comb. Frac. | 5.50 |
| Conquerer | .30 |
| Daisy | 2.85 |
| Florence | 3.62 |
| Frances-Mohawk | .95 |
| Goldfield Con. | 9.00 |
| Grandma | .27 |
| Great Bend | 1.25 |
| Red Hills | .38 |
| St. Ives | .94 |
| BULLFROG STOCKS | |
| Amethyst | .65 |
| Bonnie Claire | .37 |
| Mayflower Con. | .56 |
| Montgomery Mt. | .41 |
| Original | .24 |
| MANHAT'N STOCKS | |
| Gold Wedge | .18 |
| Manhattan Mg. | .18 |
| Pine Nut | .28 |
| Ruby Wonder | .33 |
| Yellow Horse | .09 |

| NEVADA Jan. 30 (Weir Bros. & Co., New York) | |
|---|---|
| TONOPAH STOCKS | Clg. |
| Tono'h Mine of N. | 17.75 |
| Tonopah Exten. | 5.25 |
| Montana Tonop'h | 3.87½ |
| Belmont | 5.25 |
| Tonopah Midway | 2.15 |
| West End Con. | 1.75 |
| Jim Butler | 1.23 |
| GOLDFI'D STOCKS | |
| Sandstorm | .72 |
| Kendall | .62 |
| Red Top | 4.00 |
| Jumbo | 4.00 |
| Goldfield Mining. | 1.58 |
| Dia'dfield B. B. C. | .59 |
| Atlanta | .88 |
| Mohawk | 17.00 |
| Silver Pick | 1.45 |
| Laguna | 1.45 |
| BULLFROG STOCKS | |
| Mont. Shoshone C. | 12.62½ |
| Tramps Con. | 1.72 |
| Gold Bar | 1.35 |
| Bullfrog Mining. | .40 |
| Bullfrog Nat. B. | .57 |
| Homestake Con. | 1.35 |
| MANHAT'N STOCKS | |
| Manhattan Con. | .95 |
| Manhat'n Dexter. | .75 |
| Jumping Jack | .... |
| Stray Dog | .... |
| Indian Camp | .... |

| COLO. SPRINGS Jan. 26 | |
|---|---|
| Name of Comp. | Clg. |
| Acacia | 12½ |
| C. C. Con. | 5⅝ |
| Dante | 5¾ |
| Doctor Jack Pot. | 8 |
| Elkton | 62 |
| El Paso | 55 |
| Findley | 70 |
| Gold Dollar | 7⅞ |
| Gold Sovereign | .... |
| Isabella | 23 |
| Jennie Sample | 8 |
| Mary McKinney | 65 |
| Pharmacist | 7 |
| Portland | 1.15 |
| Vindicator | .... |
| Work | 11½ |

### New Dividends

| Company. | Payable. | Rate. | Amt. |
|---|---|---|---|
| Alaska Mexican | Jan. 28 | $1.00 | $200,000 |
| Alaska Treadwell | Jan. 28 | 0.50 | 90,000 |
| Alaska United | Jan. 28 | 0.30 | 90,000 |
| Amalgamated Copper | Feb. 25 | 2.00 | 2,100,000 |
| Consolidation Coal | Feb. 1 | 3.50 | 358,750 |
| Dolores | Feb. 25 | 0.15 | 49,500 |
| Dominion Coal, pfd. | Feb. 1 | 3.50 | 105,000 |
| Fairmont Coal | Feb. 1 | 3.00 | 360,000 |
| International Nickel, pfd. | Feb. 1 | 1.50 | 133 659 |
| Mexican Co. M. & S. | Feb. 25 | 0.50 | 120,000 |
| Philadelphia Co., pfd. | Mar. 1 | 1.25 | 143,620 |
| Pocahontas Collieries, pfd. | Feb. 1 | 1.50 | 22,500 |
| Snowstorm, Idaho | Feb. 1 | 0.03 | 45,000 |
| Tennessee C., I. & R. R. | Feb. 1 | 1.00 | 225,536 |
| Tennessee C., I & R R., pfd | Feb. 1 | 2.00 | 4.960 |
| Tonopah of Nevada | Jan. 21 | 0.35 | 350.000 |
| United Copper | Jan. 30 | 1.75 | 787,500 |
| U. S. Cast Iron Pipe | Mar. 1 | 1.00 | 150,000 |
| U. S. Cast Iron Pipe, pfd. | Mar. 1 | 1.75 | 262,500 |
| U. S. Smelt. Ref. & Mg. | Apr. 1 | 0.87½ | 1,312,500 |
| U. S. Smelt. Ref. & Mg., pfd. | Jan. 15 | 0.87½ | 1,312,500 |
| Vindicator Con., Colo. | Jan. 25 | 0.03 | 45,000 |
| Yankee Con., Utah | Jan. 21 | 0.03 | 15,000 |

### Assessments

| Company. | Delinq. | Sale. | Amt. |
|---|---|---|---|
| Belmont, Idaho | Feb. 7 | Mar. 7 | $0.002 |
| Black Diamond, U. | Feb. 13 | Mar. 6 | 0.01 |
| Bullion. Nev. | Feb. 11 | Mar. 8 | 0.05 |
| Crown Point, Nev. | Feb. 5 | Feb. 26 | 0.10 |
| Golden Gate, Cal. | Jan. 7 | Feb. 6 | 0.01 |
| Mexican, Nev. | Jan. 10 | Jan. 31 | 0.15 |
| Naildriver, Utah | Dec 24 | Jan. 10 | 0.05 |
| Nevada Superior | Jan. 21 | Feb. 9 | 0.10 |
| Potosi, Nev. | Jan. 7 | Jan. 29 | 0.10 |
| Scottish Chief. | Feb. 6 | Feb. 25 | 0.02 |
| Star Con., Utah. | Dec. 20 | Jan. 9 | 0.03 |
| Tetro, Utah | Feb. 6 | Mar. 11 | 0.03 |
| Union Con., Nev. | Feb. 11 | Mar. 4 | 0.10 |
| Wabash, Utah | Jan. 12 | Feb. 2 | 0.05 |
| West'nMinesCo.,Nv. | Dec. 24 | Jan. 24 | 0.02 |
| Yellow Jacket | Dec. 17 | Jan. 27 | 0.15 |

### Monthly Average Prices of Metals

#### AVERAGE PRICE OF SILVER

| Month. | New York. | | London. | |
|---|---|---|---|---|
| | 1906. | 1907. | 1906. | 1907. |
| January | 65.288 | | 30.113 | |
| February | 66.108 | | 30.464 | |
| March | 64.597 | | 29.854 | |
| April | 64.765 | | 29.984 | |
| May | 66.976 | | 30.968 | |
| June | 65.394 | | 30.185 | |
| July | 65.105 | | 30.113 | |
| August | 65.949 | | 30.529 | |
| September | 67.927 | | 31.483 | |
| October | 69.523 | | 32.148 | |
| November | 70.813 | | 32.671 | |
| December | 69.050 | | 32.003 | |
| Year | 66.791 | | 30.868 | |

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

#### AVERAGE PRICES OF COPPER

| | NEW YORK. | | | | LONDON. | |
|---|---|---|---|---|---|---|
| | Electrolytic | | Lake. | | | |
| | 1906. | 1907. | 1906. | 1907. | 1906. | 1907. |
| January | 18.310 | | 18.419 | | 78.869 | |
| February | 17.869 | | 18.116 | | 78.147 | |
| March | 18.361 | | 18.641 | | 81.111 | |
| April | 18.375 | | 18.688 | | 84.793 | |
| May | 18.475 | | 18.724 | | 84.867 | |
| June | 18.442 | | 18.719 | | 83.994 | |
| July | 18.190 | | 18.585 | | 81.167 | |
| August | 18.380 | | 18.706 | | 83.864 | |
| Septemb'r. | 19.033 | | 19.328 | | 87.831 | |
| October | 21.203 | | 21.722 | | 97.269 | |
| November | 21.833 | | 22.398 | | 100.270 | |
| December | 22.885 | | 23.350 | | 105.226 | |
| Year | 19.278 | | 19.616 | | 87.282 | |

New York, cents per pound. Electrolytic is for cakes, ingots or wirebars. London, pounds sterling, per long ton, standard copper.

#### AVERAGE PRICE OF TIN AT NEW YORK

| Month. | 1906. | 1907. | Month. | 1906. | 1907. |
|---|---|---|---|---|---|
| January | 36.390 | | July | 37.275 | |
| February | 36.403 | | August | 40.606 | |
| March | 36.662 | | September | 40.516 | |
| April | 38.900 | | October | 42.852 | |
| May | 43.313 | | November | 42.906 | |
| June | 39.260 | | 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 | | 16.850 | |
| February | 5.464 | | 16.031 | |
| March | 5.350 | | 15.922 | |
| April | 5.404 | | 15.959 | |
| May | 5.685 | | 16.725 | |
| June | 5.750 | | 16.813 | |
| July | 5.750 | | 16.525 | |
| August | 5.750 | | 17.109 | |
| September | 5.750 | | 18.266 | |
| October | 5.750 | | 19.350 | |
| November | 5.750 | | 19.281 | |
| December | 5.900 | | 19.609 | |
| Year | 5.657 | | 17.370 | |

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

#### AVERAGE PRICE OF SPELTER

| Month. | New York. | | St. Louis. | | London. | |
|---|---|---|---|---|---|---|
| | 1906. | 1907. | 1906. | 1907. | 1906. | 1907. |
| January | 6.487 | | 6.337 | | 28.225 | |
| February | 6.075 | | 5.924 | | 25.844 | |
| March | 6.209 | | 6.056 | | 24.563 | |
| April | 6.078 | | 5.931 | | 25.781 | |
| May | 5.997 | | 5.846 | | 27.000 | |
| June | 6.096 | | 5.948 | | 27.728 | |
| July | 6.006 | | 5.856 | | 26.800 | |
| August | 6.027 | | 5.878 | | 26.938 | |
| September | 6.216 | | 6.056 | | 27.563 | |
| October | 6.222 | | 6.070 | | 28.075 | |
| November | 6.375 | | 6.225 | | 27.781 | |
| December | 6.593 | | 6.443 | | 27.938 | |
| Year | 6.198 | | 6.048 | | 27.020 | |

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

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

| | | |
|---|---|---|
| **ABRASIVES—** | | |
| Bort, good drill quality, carat | | $85.00 |
| Carborundum, f.o.b. Niagara Falls, powd. | lb. | .08 |
| Grains | " | .10@.17 |
| Corundum | " | .07@.10 |
| Crushed Steel, f.o.b. Pittsburg | " | .05¾@.06 |
| Emery, in kegs: Turkish flour | " | .01½@.02½ |
| Grains | " | .03½@.04½ |
| Naxos flour | " | .01½@.02½ |
| Grains | " | .03½@.04½ |
| Chester flour | " | .01½ |
| Grains | " | .03½@.04½ |
| Peekskill, f.o.b. Easton, Pa., flour | " | .01½@.01½ |
| Grains, in kegs | " | .02@.02½ |
| Garnet, per quality | sh ton | 25.00@35.00 |
| Pumice Stone, Am. Powd. 100 lb. | | 1.60@2.00 |
| Italian, powdered | " | .01¼@.01½ |
| Lump, per quality | " | .03@.20 |
| Rottenstone, ground | " | .02½@.03½ |
| Lump, per quality | " | .05@.25 |
| Rouge, per quality | " | .06@.30 |
| Steel Emery, f.o.b. Pittsburg | " | .07½@.07¾ |
| **ACIDS—** | | |
| Acetic 28% | lb. | .02¼@.02½ |
| Boric | " | .09¾@.10 |
| Hydrofluoric, 30% | " | .02¾@.03 |
| " 48% | " | .06 |
| " 60% | " | .10@.10½ |
| 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@20.00 |
| Oxalic | " | .08½@.09 |
| **ALCOHOL**—Grain | gal. | 2.46½ |
| Refined wood, 95@97% | " | .70@.75 |
| **ALUM**—Lump | 100 lb. | $1.75 |
| Ground | " | 1.85 |
| Chrome Alum | lb. | .03¾@.03¾ |
| **ALUMINUM**—Sulphate, com'l. | " | 1.25@1.60 |
| **AMMONIA**—24 deg. | lb. | .04½@.05½ |
| " 26 " | " | .04½@.05¾ |
| **AMMONIUM—** | | |
| Bromide | lb. | .23 |
| Carbonate | " | .07¾@.08 |
| Muriate grain | " | .06¾@.06¾ |
| Lump | " | .09½@.09½ |
| Sulphate, 100 lb. | | 3.10@3.15 |
| Sulphocyanide com. | " | .30 |
| " " chem. pure | " | .40 |
| **ANTIMONY**—needle, lb. | | .15@.16 |
| **ARSENIC**—White (nominal) | " | .07½@.08 |
| Red | " | .06½@.06½ |
| **ASPHALTUM—** | | |
| Barbadoes | per ton. | 40.00@80.00 |
| West Indies | " | 20.00@60.00 |
| Egyptian | lb. | .06@.07 |
| Gilsonite, Utah ordinary | per ton. | 50.00 |
| Trinidad | " | 30.00@40.00 |
| California | " | 20.00@30.00 |
| **BARIUM—** | | |
| Carb. Lump, 80@90% | sh. ton. | 30.00@35.00 |
| Powdered 80@90% | lb. | .02@.02½ |
| Chloride com'l | ton. | 37.50@40.00 |
| Nitrate, powdered, in casks | lb. | .08 |
| Sulphate (Blanc Fixe) | " | .02¼ |
| **BARYTES—** | | |
| Am. Ground | sh. ton. | 14.50@21.00 |
| Floated | " | 22.00 |
| Foreign floated | " | 19.50@22.50 |
| **BISMUTH**—Sub-nitrate | lb. | 1.50 |
| **BLEACHING POWDER**—35%, 100 lb. | | 1.30@1.50 |
| **BLUE VITRIOL**—(copper sulphate), carload, per 100 lb. | | 7.25 |
| **BONE ASH** | lb. | .02½@.03 |
| **BORAX** | " | .07½@.07¾ |
| **CALCIUM**—Acetate, gray | " | 2.35@2.40 |
| 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. | " | 13.00@15.00 |
| **CEMENT—** | | |
| Portland, Am. 500 lb. | bbl. | 1.55@1.60 |
| Foreign | " | 2.25@2.50 |
| "Rosendale," 300 lb. | " | .85 |
| (in sacks) | | .65 |
| Slag cement | " | .75@1.25 |
| **CHROME ORE—** | | |
| New Caledonia 50% ex. ship N. Y. | per lg. ton | 17.00@19.75 |
| Bricks, f.o.b. Pittsburg, M. | " | 175.00 |
| **CLAY, CHINA**—Am. common ex-dock, N. Y. | " | 8.00@9.00 |
| Foreign | " | 11.00@18.00 |
| **COBALT**—Oxide | lb. | 2.50 |
| **COPPERAS**—Bulk | 100 lb. | $0.55 |
| In bbls. | " | .65@.75 |
| In bags | " | .60@.70 |
| **CRYOLITE** | lb. | .06½ |
| **FELDSPAR**—Ground best | sh. ton. | 12.00@15.00 |
| **FIRE BRICK.** | | |
| American | per M. | 30.00@40.00 |
| Imported | " | 30.00@45.00 |
| St. Louis No. 1 | " | 16.00 |
| " No. 2 | " | 14.00 |
| Extra | " | 20.00@23.00 |
| **FIRE CLAY.** | | |
| St. Louis mill | per ton | 2.50 |
| **FLUORSPAR—** | | |
| Domestic f.o.b. shipping port: | | |
| Lump | sh. ton. | 8.00@10.00 |
| Ground | " | 11.50@13.50 |
| Gravel | " | 4.25@4.50 |
| Foreign crude ex. dock | | 8.00@10.00 |
| **FULLER'S EARTH**—Lump | 100 lb. | .80@.85 |
| Powdered | " | .85@.90 |
| **GRAPHITE—** | | |
| American, ore, common | lb. | .01@.10 |
| Artificial | " | .06 |
| Ceylon, common pulv | " | .02½@.03½ |
| Best, pulverized | " | .04@.08 |
| German, com. pulv | " | .01½@.01½ |
| Best, pulverized | " | .01½@.02 |
| Italian, pulverized | " | .01@.02 |
| **GYPSUM—** | | |
| Fertilizer | " | 7.00 |
| Rock | lg. ton. | 4.00 |
| **INFUSORIAL EARTH—** | | |
| Ground Am. best | lb. | .01¾ |
| French | lg. ton. | 56.00 |
| German | lb. | .02½@.03 |
| **LEAD**—Acetate (sugar of) | lb. | .07¾ |
| Nitrate, com'l | " | .08½@.09 |
| **MAGNESITE**—Greece. | | |
| Crude (95%) | lg. ton. | 7.00@8.00 |
| Calcined | sh. ton. | 30.00@35.00 |
| Bricks, domes, per qual. f.o.b. Pittsburg | M. | 160@200 |
| **MAGNESIUM—** | | |
| Chloride, com'l | 100 lb. | .90@1.25 |
| Sulphate (Epsom salt) | 100 lb. | .90@1.25 |
| **MANGANESE—** | | |
| Crude powdered: | | |
| 70@75% binoxide | lb. | .02 |
| 75@85% binoxide | " | .02½ |
| 85@90% binoxide | " | .04 |
| 90@95% binoxide | " | .05½ |
| Ore, 80%-85% | sh. ton. | 27.00@35.00 |
| **MARBLE**—Flour | sh. ton. | 9.00@9.50 |
| **MINERAL WOOL—** | | |
| Slag, ordinary | " | 19.00 |
| Selected | " | 25.00 |
| Rock, ordinary | " | 32.00 |
| Selected | " | 40.00 |
| **MONAZITE SAND—** | | |
| Guar. 9?%, with 5% Thorium oxide, nominal | lb. | .08 and up. |
| **NICKEL—** | | |
| Oxide, crude, lb. (77%) for fine metal contained | | .47 |
| Sulphate, single | lb. | .16@.20 |
| " double | " | .10@.12 |
| **NITRATE OF SODA**—100 lb. 96% for 1907 | | 2.45 |
| 95% for 1908 | | 2.35 |
| 95% for 1909 | | 2.30 |
| 96% is 5c higher per 100 lb. | | |
| **OZOKERITE**—best | lb. | .14@.17 |
| **PAINTS AND COLORS—** | | |
| Litharge, Am. powdered | " | .07½@.07½ |
| English glassmakers' | " | .08½@.08½ |
| Lithopone | " | .04@.05 |
| Metallic, brown | sh. ton. | 19.00 |
| 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 | " | .21@.23 |
| Red lead, American | " | .07½@.07½ |
| Foreign | " | .08½@.08½ |
| Turpentine, spirits bbl., per gal. | | .70@.71 |
| White lead, Am., dry | lb. | .06½@.06½ |
| American, in oil | " | .07@.07½ |
| Foreign, in oil | " | .09½@.10 |
| Zinc white, Am. extra dry | " | .05½@.05½ |
| Foreign, red seal, dry | " | .07½@.07½ |
| Green seal, dry | " | .07½@.08½ |
| **PHOSPHATES**—Acid | .65@67½c per unit | |
| *Fla., hard rock | | 7.50 |
| land pebble 68% | | 4.50 |
| †Tenn., 78@80% | | 6.50@7.00 |
| 78% | | 5.50 |
| 75% | | 5.00 |
| 68@72½% | | 4.50 |
| ‡So. Car. land rock | | 6.00 |
| " " river rock | | .... |
| **POTASSIUM—** | | |
| Bicarbonate crystal | lb. | $0.8½@.09 |
| Powdered or granulated | " | .09@.09½ |
| Bichromate, Am. | " | .08½@.08½ |
| Scotch | " | .11 |
| Bromide | " | .16 |
| Carbonate (80@85%) | " | .04@.04½ |
| Caustic, ordinary | " | .04½@.05 |
| Elect. (90%) | " | .06@.06½ |
| Chloride (muriate), 100 lb. | | 1.90 |
| Chlorate, powdered | " | .09½@.09½ |
| Crystals | " | 09@09½ |
| Cyanide (98@99%) | " | .18@.19 |
| Kainite, long ton, bulk, 8.50; bags, 9.50. | | |
| Permanganate | lb. | 10@10½ |
| Prussiate, yellow | " | .16½@.17 |
| Red | " | .35@.38 |
| Sulphate | 100 lb. | 2.18½@2.21½ |
| **PYRITE—** | | |
| Domestic, non-arsenical, furnace size | per unit | 11@11½c |
| Domestic, non-arsenical, fines, per unit | | 10@10½c. |
| Imported non-arsenical, furnace size, per unit | | .13@.13½ |
| Imported, arsenical, furnace size, per unit | | 12@12½c. |
| Imported fines, arsenical, per unit. | | 8½@9c. |
| " " 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@4.40 |
| **SALTPETER**—Crude | 100 lb. | 4.25@4.50 |
| Refined, crystals | " | 5.25@5.75 |
| **SILICA—** | | |
| Ground quartz, ord'ry | sh. ton | 13.00@15.00 |
| Silex | " | 30.00@40.00 |
| Lump Quartz | " | 2.50@4.00 |
| Glass sand | " | 2.75 |
| **SILVER**—Nitrate, crystals | oz. | .43½@.45½ |
| **SODIUM—** | | |
| Acetate | lb. | .04@.04¼ |
| "Alkali," per 100 lb., 58/48 | | .80@.87½ |
| Bicarb. soda, per lb | | 1.20@1.50c. |
| Soda, caustic, per 100 lb., 76/60 | | 1.80@1.90 |
| " " powdered | | .02¾@.03 |
| Salt cake, per 100 lb. | | .65@.85 |
| Soda, monohydrate, per lb. | | 1½c. |
| Bichromate | lb. | .06½@.06¾ |
| Bromide | " | .16 |
| Chlorate, com'l | " | .08½@.09 |
| Cyanide, ("100% KUN") | " | .18@.19 |
| Hyposulphite, Am. | " | 1.35 up |
| German | " | 1.60@1.70 |
| Phosphate | 100 lb. | 1.85@2.00 |
| Prussiate | " | .12@.12½ |
| Sal soda, f.o.b. N. Y. | 100 lb. | .65@.75 |
| Foreign, f.o.b. N. Y. | " | .85@.90 |
| Silicate, com'l | 100 lb. | .75@1.00 |
| Sulphate, com'l, (Glauber's salt) | 100 lb. | .50@.60 |
| " " calcined | | .65@.85 |
| **STRONTIUM**—Nitrate | lb. | .08½@.08¾ |
| **SULPHUR—** | | |
| Louisiana (prime) to New York, Boston or Portland | lg. ton | 22.12½ |
| To Philadelphia or Baltimore | " | 22.50 |
| Roll | 100 lb. | 1.85@2.15 |
| Flour | " " | 2.00@2.40 |
| Flowers, sublimed | " " | 2.20@2.60 |
| **TERRA ALBA**—French & Eng. | 100 lb. | .90@1.00 |
| **TALC**—Domestic | sh. ton. | 15.00@20.00 |
| French, best | " | 25.00 |
| Italian, best | " | 35.00@40.00 |
| **TIN**—Bi-chloride, 50% | lb. | .12½ up |
| Crystals | " | .25 up |
| Oxide, lb. | | .44 |
| **URANIUM**—Oxide | " | 3.50 |
| **ZINC**—Metallic ch. pure | " | .15 |
| Chloride solution, com'l | " | .02½@.04 |
| Chloride, granular | " | .04½@4½ |
| Dust | " | .05½@.06 |
| Sulphate | " | .02½@.02¾ |

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.

# DIVIDENDS.

## 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 | $1,572,381 | Jan. 1907 | $ .50 |
| Alaska Treadwell, g. | Al'ka | 5,000,000 | 200,000 | 25 | 9,235,000 | Jan. 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 | 44,461,272 | Nov. 1906 | 2.00 |
| Am.Sm.&Ref.,com. | U. S. | 50,000,000 | 500,000 | 100 | 9,375,000 | Jan. 1907 | 1.75 |
| Am. Sm. & Ref. pf. | U. S. | 50,000,000 | 500,000 | 100 | 23,456,553 | Jan. 1906 | 1.75 |
| Am. Smelters, pf. A | U. S. | 17,000,000 | 170,000 | 100 | 1,175,000 | Dec. 1906 | 1 50 |
| Am. Smelters. pf. B | U. S. | 30,000,000 | 300,000 | 100 | 2,250,000 | Dec. 1906 | 1.25 |
| Anaconda,c. | Mont | 30,000,000 | 1,200,000 | 25 | 32,750,000 | Jan. 1907 | 1.75 |
| Annie Laurie, g. | Utah | 5,000,000 | 25,000 | 100 | 465,061 | July 1905 | .50 |
| Arizona, c. | Ariz | 3,775,000 | 3,682,520 | ..... | 6,182,361 | Apr. 1906 | .05 |
| Atlantic, c | Mich | 2,500,000 | 100,000 | 25 | 990,000 | Feb. 1905 | .02 |
| B. & H., l. z. | Mo | 400,000 | 400,000 | 1 | 40,000 | Dec. 1905 | .01 |
| Beck Tunnel, g.s.l. | Utah | 1,000,000 | 1,000,000 | 1 | 235,000 | Jan. 1907 | .04 |
| Bingham & N.H.,c.g | Utah | 2,000,000 | 226,000 | 5 | 22,600 | sept. 1906 | .10 |
| Boston & Montana. | Mont | 3 750,000 | 150,000 | 25 | 47,875,000 | Nov. 1906 | 12.00 |
| Bull.Beck.&Cham.g | Utah | 1,000,000 | 100,000 | 10 | 2,518,400 | Oct. 1906 | .10 |
| Bunker Hill & Sull. | Ida | 3,000,000 | 300,000 | 10 | 8,046,000 | Jan. 1907 | .60 |
| Bute Coalition, c.s. | Mont | 15,000,000 | 1,000,000 | 15 | 800,000 | Dec. 1906 | .40 |
| Calumet & Arizonac | Ariz | 2 500,000 | 200,000 | 10 | 6,000,000 | Dec. 1906 | 4.00 |
| Calumet & Hecla,c. | Mich | 2,500,000 | 100,000 | 25 | 98,350,000 | Dec. 1906 | 20.00 |
| Camp Bird, g., s. | Colo | 5,500,000 | 820,000 | 5 | 3,382,500 | Feb. 1906 | .24 |
| Carisa, c.g. | Utah | 500,000 | 500,000 | 1 | 55,000 | Nov. 1906 | .01 |
| Central Eureka, g. | Cal | 400,000 | 398,425 | 1 | 778,921 | Mar. 1906 | .07 |
| Columbus Con. c. | Utah | 1,500,000 | 300,000 | 5 | 45,000 | Jan. 1907 | .15 |
| 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 | 286 000 | Jan. 1907 | .50 |
| Copper Range Con. | Mich | 38,500,000 | 383,781 | 100 | 3,791,334 | Dec. 1906 | 2.00 |
| Creede United, g. | Colo | 2,000,000 | 1,625,000 | 1 | 214 053 | July 1906 | .00½ |
| Cripple Creek Con.g | Colo | 2,000,000 | 2,000,000 | 1 | 180,000 | Mar. 1906 | .00½ |
| Daly Judge, g. s. l. | Utah | 300,000 | 300,000 | 1 | 112,500 | Jan. 1907 | .37½ |
| Daly West, g. s. l. | Utah | 3,600,000 | 180,000 | 20 | 5,499,000 | Dec. 1906 | .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 1906 | .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 | 933,010 | May 1906 | .50 |
| Elkton Con., g. | Colo | 3,000,000 | 2,500,000 | 1 | 1,681,960 | Sept. 1906 | .00½ |
| 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 | 1,748,750 | Dec. 1906 | 5.00 |
| Federal Sm., pf. | Idaho | 20,000,000 | 120,000 | 100 | 2,441,250 | Dec. 1906 | 1.75 |
| Findley, g. | Colo | 1,250,000 | 1,250,000 | 1 | 325,000 | Aug. 1906 | .01 |
| Frances-Mohawk,g | Nevada | 1,000,000 | 1,000 000 | 1 | 141,000 | Dec. 1906 | 1.10 |
| Gemini-Keystone | Utah | 500,000 | 5,000 | 100 | 1,850,000 | July 1906 | 10.00 |
| Gold King Con | Colo | 5 750,370 | 5,750,370 | 1 | 1,407,504 | May 1905 | .01 |
| Gold Sovereign | Colo | 2,000,000 | 2,000,000 | 1 | 10,000 | Jan. 1906 | .00½ |
| Grand Central, g. | Utah | 250,000 | 250,000 | 1 | 1,131,000 | Jan. 1907 | .06 |
| 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 | 780,000 | Sept. 1905 | .02 |
| Homestake, g. | S. D | 21,840,000 | 218,400 | 100 | 15,425,350 | Jan. 1907 | .50 |
| HornSilver,g.s.c.l | Utah | 10,000 000 | 400,000 | 25 | 5,522,000 | Dec. 1906 | .05 |
| Inter'l Nickel, pf. | N. Y. | 12,000,000 | 87,415 | 100 | 524,490 | Feb. 1907 | 1.50 |
| Iron Silver | Colo | 10,000,000 | 500,000 | 20 | 3,900,000 | Jan. 1907 | .20 |
| Jamison, g. | Cal | 3,900 000 | 390,000 | 10 | 247,270 | July 1906 | .03 |
| Jerry Johnson. | Cal | 2,500,000 | 2,500,000 | 1 | 61,700 | Apr. 1906 | .03 |
| Kendall, g. | Mont | 2,500,000 | 500 000 | 5 | 1,035.000 | Dec. 1906 | .03 |
| 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. 1906 | .05 |
| Mammoth, g. s. l. | Utah | 10,000 000 | 400,000 | 25 | 2,080 000 | Oct. 1906 | .05 |
| Mary McKinney, g. | Colo | 1,500,000 | 1,304,252 | 1 | 723,509 | Oct. 1906 | .06 |
| Mohawk, c. | Mich | 2,500,000 | 100,000 | 25 | 900,000 | Jan. 1907 | 4.00 |
| Mont. Ore Purch. | Mont | 2,500,000 | 80,833 | 25 | 9,437,274 | Jan. 1907 | 15.00 |
| Monument, g | Colo | 300,000 | 300,000 | 1 | 27,124 | Apr. 1905 | .01 |
| New Century, z., l. | Mo | 300,000 | 300,000 | 1 | 211,500 | Nov. 1906 | .01 |
| New Idria, q | Cal | 500,000 | 100,000 | 5 | 880,000 | Jan. 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 | 3,400,000 | Dec. 1906 | 2.00 |
| North Star, g. | Cal | 2,500,000 | 250,000 | 10 | 1,286,989 | Dec. 1906 | .40 |
| Northern Light,g.s. | Utah | 2,000,000 | 400,000 | 5 | 20,000 | Feb. 1904 | .05 |
| 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 | 6,362,600 | Jan. 1907 | 6.00 |
| Parrot, c,s. | Mont | 2,300,000 | 229,850 | 10 | 6,635,262 | Dec. 1905 | .25 |
| Pennsylvania, g. | Cal | 5,150,000 | 51,500 | 100 | 284,925 | July 1905 | .10 |
| Platteville, l. z. | Wis. | 20,000 | 500 | 40 | 82,500 | Oct. 1905 | 10.00 |
| Portland, g. | Colo | 3,000,000 | 3,000,000 | 1 | 7,417,086 | Oct. 1906 | .05 |
| Quincy, c | Mich | 2,500,000 | 100,000 | 25 | 16,470,000 | Dec. 1905 | 2.50 |
| Rob Roy, z. | Mo | 15,000 | 15,000 | 1 | 9,600 | May 1906 | .03 |
| Rocco Homest'k,l.s. | Nevada | 300,000 | 300,000 | 1 | 112,000 | Dec. 1906 | .02 |
| Sacramento, g, q. | Utah | 5,000,000 | 1,000,000 | 1 | 245,000 | Nov. 1906 | .00½ |
| Salvator, g. s. l. | Utah | 200 000 | 200,000 | 1 | 6,500 | Aug. 1904 | .01 |
| St. Joseph, l. | Mo | 20,000,000 | 1,000 000 | 10 | 4,658,357 | June 1906 | .15 |
| Silver Hill, g. s | Nevada | 108,000 | 108,000 | 1 | 59,400 | Feb. 1906 | .05 |
| Silver King, g. s. l. | Utah | 3,000,000 | 150,000 | 20 | 10,325,000 | Oct. 1906 | .33½ |
| Shannon, c. | Ariz | 3,000,000 | 300,000 | 10 | 150.000 | Dec. 1906 | .50 |
| Snowstorm, s. l. | Ida | 1,500,000 | 1,500,000 | 1 | 90,000 | Oct. 1906 | .06 |
| Spearfish, g. | S. D | 1,500,000 | 1,500,000 | 1 | 165,500 | Jan. 1905 | .01½ |
| Standard Con., g. s. | Cal | 2,000,000 | 178,394 | 10 | 4,222,772 | Dec. 1906 | .10 |
| Stratton'sIndepend | Colo | 5,500,000 | 1,000,007 | 5 | 4,895,865 | Apr. 1906 | .12½ |
| Tamarack, c | Mich | 1,500,000 | 60,000 | 25 | 9,180,000 | Jan. 1907 | 3.00 |
| Tennessee, c. | Tenn | 5,000,000 | 175,000 | 25 | 1,093,750 | Jan. 1907 | 1.25 |
| 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 | 2,650,000 | Jan. 1907 | .35 |
| Tonopah Belmont | Nevada | 2,000,000 | 1,295,007 | 1 | 259,000 | Jan. 1907 | .10 |
| Tonopah Midway | Nevada | 1,000,000 | 928,433 | 1 | 278,530 | Apr. 1906 | .15 |
| Uncle Sam, g.s.l. | Utah | 1,000,000 | 1,000,000 | 1 | 300,000 | Jan. 1907 | .05 |
| United Cop. com. | Mont | 500,000 | 500,000 | 1 | 130 000 | Oct. 1906 | .01 |
| United, c. pf | Mont | 75,000,000 | 450,000 | 100 | 4,387,500 | Jan. 1907 | 1.75 |
| United, z. l., com | Mo | 5,000,000 | 50,000 | 100 | 1,350,000 | Nov. 1906 | 3.00 |
| United, z. l., pf | Mo | 500,000 | 92,400 | 5 | 27,450 | Oct. 1903 | .05 |
| United, (Crip'le C'k) | Colo | 500,000 | 19,556 | 25 | 247,680 | Jan. 1907 | .50 |
| United Verde, c. | Ariz | 5,000,000 | 4,009,100 | 1 | 280,071 | Apr. 1906 | .00½ |
| Un.States,pf.g.s.c.l* | Utah | 3,000,000 | 300,000 | 10 | 17,085,322 | Dec. 1904 | .75 |
| U.S. Red. & Ref. Pf. | Colo | 37,500,000 | 750,000 | 50 | 2,625,000 | Jan. 1907 | .87½ |
| Utah, g.(Fish Sp'gs) | Utah | 4,000,000 | 39,458 | 100 | 887,806 | Jan. 1907 | 1.50 |
| Utah Con., c. | Utah | 1,000,000 | 100,000 | 10 | 240,000 | Nov 1905 | .05 |
| Victoria, Utah | Utah | 1,500,000 | 300,000 | 5 | 6,036,000 | Jan. 1907 | 3.00 |
| Vindicator Con., g. | Colo | 250,000 | 250,000 | 1 | 77,000 | Jan. 1907 | .04 |
| Wolverine, c. | Mich | 1,500,000 | 1,500,000 | 1 | 1,560,000 | Jan. 1907 | .03 |
| Work, g | Colo | 1,500,000 | 60,000 | 25 | 3,450,000 | Oct. 1906 | 9.00 |
| Yankee Con | Utah | 1,500,000 | 1,500,000 | 1 | 75,000 | Dec. 1906 | .02 |
| | | 500,000 | 500,000 | 1 | 140,000 | Jan. 1907 | .03 |

*Previous to consolidation $1,436.250 were divided.

## Coal, Iron and Other Industrials—United States.

| Name of Company and Location. | | Author. ized Capital. | Shares. Issued. | Par Val. $ | Dividends. Total to Date. | Latest. Date. | Amt. |
|---|---|---|---|---|---|---|---|
| Ala. Con., C. & I., pf. | Ala | $2,500,000 | 24,638 | 100 | $905,265 | May 1905 | $1.75 |
| Allis-Chalmers, pf. | U S | 25,000,000 | 200,000 | 100 | 3,213,750 | Feb. 1904 | 1.75 |
| Amer. Ag. Chem., pf. | U. S | 20,000,000 | 181,530 | 100 | 6,831,280 | Oct. 1906 | 3.00 |
| American Cement. | Pa. | 2,000,000 | 200,000 | 10 | 1,028,000 | Jan. 1907 | .40 |
| American Coal. | Md. | 1,500,000 | 50,000 | 25 | 1,820,000 | Sept. 1905 | 1.25 |
| Associated Oil. | Cal. | 21,000,000 | 21,000,000 | 1 | 630,000 | ug. 1906 | .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 | 7,650,000 | Oct. 1906 | 1.00 |
| Caribou Oil. | Cal. | 100,000 | 80,000 | 1 | 56,000 | July 1906 | .07 |
| Central C & C., com. | Mo | 5,125,000 | 51,250 | 100 | 1,845, 00 | Jan. 1907 | 1.80 |
| Central C. & C., pf. | Mo | 1,875,000 | 18,750 | 100 | 1,242,188 | Jan. 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 1906 | .01 |
| Col. & Hock. C. & I. | Ohio | 7,000,000 | 69,244 | 100 | 173,086 | Feb. 1906 | .25 |
| Consolidated Coal | Ill. | 5,000,000 | 50,000 | 100 | 350,000 | July 1904 | 1.00 |
| Consolidation Coal. | Md. | 10,250,000 | 102,500 | 100 | 8,531,650 | Feb. 1907 | 3.50 |
| Crucible Steel, pf. | Pa. | 25,000,000 | 250,000 | 100 | 1 000,000 | Sept. 1905 | 1.50 |
| Empire S. & I., pf. | N. J | 5,000,000 | 25,000 | 100 | 637,500 | Jan. 1907 | 3.10 |
| Fairmont Coal, | W. Va. | 12,000,000 | 120,000 | 100 | 840,000 | Feb. 1906 | 2.00 |
| Four Oil | Cal. | 500,000 | 300,000 | 1 | 105 406 | July 1905 | .01 |
| General Chem. com. | U. S | 12,500,000 | 74,103 | 100 | 1,596,919 | Sept. 1906 | 2.00 |
| General Chem., pf. | U. S | 12,500,000 | 100,000 | 100 | 4,375,178 | Jan. 1907 | 1.50 |
| George's C'k Coal | Md. | 2,500,000 | 22,000 | 100 | 1,188,000 | July 1904 | 3.00 |
| Home Oil. | Cal. | 100,000 | 100,000 | 1 | 507,500 | Oct. 1904 | .02½ |
| Ill. Crude Oil | Cal. | 200,000 | 200,000 | 1 | 12,500 | Dec. 1904 | .01½ |
| Imperial Oil | Cal. | 1,000,000 | 100,000 | 100 | 880,000 | July 1906 | .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. 1906 | 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. | 14,345,650 | 346,897 | 50 | 24,920,891 | Nov. 1906 | 2.00 |
| Maryland Coal,pf. | Md. | 2,000,000 | 18,850 | 100 | 1,517,160 | Dec. 1906 | 4.00 |
| Monon R. Coal, pf. | Pa. | 10,000,000 | 100,000 | 100 | 3,154,945 | Jan. 1906 | .97 |
| Monte Cristo Oil. | Cal. | 500,000 | 500 000 | 1 | 120,000 | July 1905 | .01 |
| National Carbon, pf. | U. S | 4,500,000 | 45.000 | 100 | 2,047,500 | May 1906 | 1.75 |
| National Lead, com. | N. Y. | 15,000,000 | 149,054 | 100 | 1,788.648 | Jan. 1907 | 1.00 |
| National Lead, pf. | N. Y. | 15,000,000 | 149,040 | 100 | 15,801,688 | Dec. 1906 | 1.75 |
| Nat'l Steel & Wire,pf. | N. Y. | 5,000,0 0 | 25,778 | 100 | 631,561 | May 1905 | 1.75 |
| New Central Coal | Md. | 1,000,000 | 50,000 | 20 | 330,000 | Nov. 1906 | .40 |
| New River Coal, pfd | W. Va. | 4,000,000 | 3,761,700 | 100 | 564,255 | Nov. 1906 | 1.50 |
| Pacific Coast Borax. | Cal. | 2,000,000 | 19,000 | 100 | 2,086,500 | Aug. 1906 | 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 | 13,988,000 | Oct. 1906 | 3.00 |
| Penna. Steel. | Pa. | 25,000,000 | 168,214 | 100 | 7,026,995 | Nov. 1906 | 3.50 |
| Phila. Gas, com | Pa. | 28,953,029 | 579,061 | 50 | 6,684,142 | Nov. 1905 | .75 |
| Phila. Gas, pf. | Pa. | 5,744,813 | 114,896 | 50 | 1,583,505 | Mar. 1906 | 1.25 |
| Pittsburg Coal, pf. | Pa. | 32,000,000 | 297,010 | 100 | 11,434,962 | Apr. 1906 | 1.75 |
| Pocahontas Coll., pf. | W. Va. | 1,500,000 | 15,000 | 100 | 437,500 | Feb. 1907 | 1.50 |
| Republic I. & S., pfd. | Ill. | 25,000,000 | 204,169 | 100 | 3,371.282 | Jan. 1907 | 3.75 |
| Sloss-Sheffield, com. | Ala | 7,500,000 | 75,000 | 100 | 750,250 | Oct. 1906 | 2.50 |
| Sloss-Sheffield, pf. | Ala | 20,000,000 | 67,000 | 100 | 3,093,500 | Jan. 1907 | 1.75 |
| Standard Oil. | U. S | 100,000,000 | 970,000 | 100 | 319,285,000 | Dec. 1906 | 10.00 |
| Tenn. C. & I., com | Tenn | 22,553,600 | 225,536 | 100 | 2,906,425 | Feb. 1907 | 1.00 |
| Tenn. C. & I., pf. | Tenn | 248,000 | 2,480 | 100 | 380,090 | Feb. 1907 | 2.00 |
| Texas & Pacific Coal. | Texas | 2,000,000 | 20,000 | 100 | 1,930,000 | Mar. 1906 | 2.00 |
| Thirty-three Oil. | Cal. | 500,000 | 100,000 | 5 | 430,000 | July 1906 | .10 |
| Union Oil | Cal. | 10,000,000 | 100,000 | 100 | 1,118,766 | May 1906 | .50 |
| U. S. SteelCorp.,cm. | U. S | 550,000,000 | 5,083,025 | 100 | 60,98 .515 | Dec. 1905 | .50 |
| U. S. Steel Corp., pf. | U. S | 360,281,100 | 3,603,141 | 100 | 168,539,389 | Nov. 1906 | 1.75 |
| Va. Carolina Ch., pf. | U. S | 20,000,000 | 180,000 | 100 | 11,460,869 | Jan. 1907 | 2.00 |
| Westmoreland Coal. | Pa. | 3,000,000 | 60.000 | 50 | 8,580,000 | Oct. 1905 | 2.50 |

## Canada, Mexico, Central and South America.

| Name of Company and Location. | | Author-ized Capital. | Shares. Issued. | Par Val. $ | Dividends. Total to Date. | Latest. Date. | Amt. |
|---|---|---|---|---|---|---|---|
| Amistad y Conc'rdia. | Mex | $480,000 | 9,600 | 50 | $258,064 | Jan. 1905 | $1.71 |
| Buffalo, s. | Ont. | 1,000,000 | 900,000 | 160 | 14,000 | Jan. 1907 | .03 |
| Butters' Salvador, g. | Salv | 750,000 | 150,000 | 5 | 600,000 | Apr. 1906 | .25 |
| Cariboo McKin'y, g. | B. C. | 1,250,000 | 1,250,000 | 1 | 546,837 | Feb. 1904 | .04 |
| Consolidated M & S. | B. C. | 5,500,000 | 48,338 | 100 | 473,255 | Feb. 1907 | 2.50 |
| Copiapo, c. | Chile | 1,125,000 | 112,500 | 10 | 6,000,900 | Oct. 1904 | 1.20½ |
| Crow's Nest Pass | B. C. | 3,500,000 | 140,000 | 25 | 1.581,148 | Apr. 1906 | .62½ |
| Dominion Coal, com. | N. S. | 15,000,000 | 150,000 | 100 | 1,050,000 | Dec. 1903 | 1.75 |
| Dominion Coal, pf. | N. S. | 3,000,000 | 30,000 | 100 | 3,330,000 | Jan. 1905 | 4.00 |
| Dos Estrellas. g. s. | Mex | 150,000 | 3,000 | 50 | 1,020,555 | July 1905 | 13.65 |
| El Oro, g. s. | Mex | 5,750,000 | 1,080,000 | 5 | 2,708,800 | July 1904 | .15 |
| Esperanza, s. g. | Mex | 2,275,000 | 455,000 | 5 | 5,520,449 | Jan. 1907 | 2.52 |
| Foster Cobalt, s. | Ont. | 1,000,00 | 1,000,000 | 1 | 50,000 | Jan. 1907 | .05 |
| Granby Con. | B. C. | 15,000,000 | 1,350,000 | 10 | 1,753,630 | Dec. 1906 | .30 |
| Greene Con., copper. | Mex | 8,640,000 | 864,000 | 10 | 5,468,600 | Nov. 1906 | .40 |
| Greene Con., gold. | Mex | 5,000,000 | 500,000 | 10 | 300,000 | July 1906 | .20 |
| Guanajuato | Mex | 3,000,000 | 540,000 | 5 | 74,250 | Oct. 1905 | .07½ |
| Guggenheim Expl. | Mex | 17,000,000 | 105,000 | 100 | 2,910,000 | Jan. 1907 | 2.50 |
| LeRoi No. 2, g. | B. C. | 3,000,000 | 120,000 | 25 | 687,600 | Oct. 1906 | .48 |
| McKinley-Darragh,s. | Ont. | 2,500,000 | 2,000,000 | 1 | 60,000 | 1906 | .03 |
| Mexican Coal & Coke | Mex | 5,000,000 | 50,000 | 100 | 600,000 | Dec. 1905 | 3.00 |
| Mex. Con. M. & S. Co. | Mex | | 240,000 | | 600,000 | Feb. 1907 | .50 |
| Mines Co. of Am. | Mex | 2,000,000 | 2,000,000 | 1 | 2,425,000 | Dec. 1905 | .02 |
| N. Y. & Hond. Ros. | C. A | 1,500,000 | 150,000 | 10 | 2,213,000 | Dec. 1906 | .20 |
| Nipissing, s | Ont | 6,000,000 | 1,200,000 | 5 | 780,000 | Jan. 1907 | .25 |
| 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 | 49,703 | 100 | 788,600 | Nov. 1904 | 2.00 |
| N. S. St. & Coal, pf. | N. S. | 1,030,000 | 10,300 | 100 | 329,600 | July 1906 | 2.00 |
| Penoles* | Mex | 250,000 | 2,500 | 100 | 7,813,375 | Dec. 1906 | 20.00 |
| Platemillo | Mex | 500,000 | 206,989 | 1 | 5,580 | Sept. 1905 | .00½ |
| Reco, g. s.l. | B. C. | 1,000,000 | 958,000 | 1 | 327,062 | Apr. 1906 | .02 |
| Silver Queen, s. | Ont. | 1,500,000 | 1,500,000 | 1 | 130,000 | 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 | 3,202,000 | 1 | 402,120 | Oct. 1905 | .02 |
| Tezuitlan Copper | Mex | 1,000,000 | 10,000 | 100 | | Jan. 1907 | 2.00 |
| Tilt Cove, c. | N. F. | 1,000,000 | 89,000 | 2 | 21,360 | Jan. 1906 | .48 |
| Tretheway, s | Ont. | 1,000,000 | 1,000,000 | 1 | 40.000 | Dec. 1906 | .04 |
| Tyee, c | B. C. | 940,000 | 180,000 | 5 | 136,800 | Dec. 1904 | .24 |

*Mexican Currency.

# THE MINING INDEX.

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

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

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

## ABRASIVES

2071—CARBORUNDUM—The Modern Abrasive. J. G. Lorriman. (Amer. Engineer, Jan., 1907). Short outline of the process of manufacturing carborundum carried on by the Carborundum Co. at Niagara Falls. 20c.

## ALUMINUM

2072—ALUMINUM—Recherches recentes sur la fabrication de l'Aluminum. (L'Echo des Mines, Jan. 10, 1907). A brief review of all recent experiments which aimed at new means of producing aluminum. 40c.

## ASPHALT

2073—ASPHALTUM—El Asfalto y sus aplicaciones. E. Coliand. (La Ingenieria, Nov. 30, 1906). Gives a very complete account of the history and origin of asphaltum, with a discussion of its uses as a pavement, together with the methods of preparation. 40c.

## CEMENT INDUSTRY

2074—Cement for Sea-Water Construction. S. B. Newberry. (Cement Age, Jan., 1907; 4 pp.). Brief description of the chemical action of sea-water upon cement, and a discussion of the production of a new cement which shall be unaffected by salt water. Gives analyses of and methods of working the new "ore cement" designed to be used under these new conditions. 20c.

2075—CEMENT INDUSTRY of the World. Compiled by R. W. Lesley. (Cement Age, Jan., 1907; a brief review of the production of cement in the United States, and the chief producing foreign foreign countries. 20c.

2076—CEMENT INDUSTRY—The Industrial Relations of the American Cement Industry. E. C. Eckel. (Eng. Mag., Jan., 1907; 8 pp.) Discusses the expansion of the cement industry, its concentration, and the influence of the steel corporation upon the cement industry as a whole. 40c.

2077—PORTLAND CEMENT—Fabbricazione moderna del cemento Portland. L. Fabre. (Rassegna Mineraria, Nov. 24 and Dec. 1, 1906; 5 pp.) Illustrated description of various plants for making cement. 60c.

2078—PORTLAND CEMENT—R. W. Lesley. (Eng. & Mg. Jl., Jan. 12, 1907). An analysis of the present condition of the portland cement industry, together with a tabulation of imports and exports. 20c.

## COAL AND COKE

2079—ALABAMA COAL. L. W. Friedman. (Eng. & Mg. Jl., Jan. 5, 1907). Short summary of the important events which happened in this field during 1906. 20c.

2080—BORE HOLES—The Use of Bore Holes in Coal Mining. R. Lee. (Eng. & Mg. Jl., Jan. 12, 1907), Gives a few practical hints of the various uses to which bore holes can be put. 20c.

2081—CAR SHORTAGE in the Middle West. (Mg. & Sci. Press, Jan. 12, 1907). Short discussion of some of the causes for the prevailing car shortage throughout the western States. 20c.

2082—CHICAGO COAL MARKET. E. Morrison. (Eng. & Mg. Jl., Jan. 5, 1907). Review of prices of coal during the past year. 20c.

2083—CLEVELAND COAL TRADE. G. H. Cushing. (Eng. & Mg. Jl., Jan. 5, 1907). An account of the influences which a threatened coal strike and car shortage have had on prices. 20c.

2084—COAL CUTTING by Machinery. M. Robson. (Sci. & Art of Mining, Dec. 15, 1906). Paper read before the So. Yorkshire Mining Student's Assn., reviewing the progress made in installing coal-cutting machinery in Great Britain during 1906. 20c.

2085—COAL CUTTING—Notes on the Hardening of Coal Cutter Picks. W. Walker. Iron & Coal Tr. Rev., Dec. 28, 1906). Paper read before the Nat. Assn. of Colliery Managers, describing a new method of hardening coal cuttters by the use of a lead bath for tempering. 40c.

2086—COAL CUTTING—The Ingersoll-Sergeant Radialax Coal Cutter. L. Nettleship. (Sci. & Art of Mg., Dec. 15, 1906). Paper read before the So. Yorkshire Mg. Student's Assn., giving an account of the construction of this new coal cutter, and directions for operating 20c.

2087—COAL HANDLING—Anlage für Transport von Griesskohle auf der Königlichen Grube Heinitz bei Saarbrücken. L. Hoffman. (Glückauf, Jan. 5, 1907). Describes and illustrates the equipment and operation of a plant for the rapid and economical handling of foundry coal at the Heinitz mine at Saarbrücken. 40c.

2088—COAL IN THE UNITED STATES and other Countries. E. W. Parker. (Mfgrs. Rec., Jan. 3, 1907). Reviews the production and consumption of coal in the United States since 1846, and discusses the question of exhausting the coal supply; also gives an account of the coal situation in various foreign countries. 20c.

2089—COAL MINING—Operations of the Union Pacific Coal Co., at Rock Springs, Wyo. (Elec. Mining, Jan., 1907; 12 pp.) Illustrated description of the equipment of the mines of the above company, where electricity is largely employed. 20c.

2090—COAL MINING—Progress in Coal Mining in 1906. F. W. Parsons. (Eng. & Mg. Jl., Jan. 5, 1907). Comprehensive review of all the features attending coal mining during the past year, and an account of recent legislative action as affecting coal mining. 20c.

2091—COAL MINING—The Technics of Coal Mining. Geo. H. Winstanley. (Mg. Engineering, Jan., 1907; 3½ pp.) Second of a series of articles, giving examples of computing weight of coal on a given mine area, calculating calorific power, and directions for measurement of dip of seams. 40c.

2092—COKE OVEN—Die neuesten Koksöfen von r. h. von Bauer nebst Veriadevorrichtung. (Stahl u. Eisen, Dec. 15, 1906). Detailed account of the construction, operation and method of working a new coke oven invented by Dr. Th. von Bauer. 40c.

2093—COKING PEAT—The Ziegler Process for Coking Peat. O. K. Zwingenberger. (Eng. & Mg. Jl., Jan. 19, 1907; 2½ pp.) The construction and operation of this German plant is described, giving a complete account of the ovens for coking the peat and the methods of recovering the by-products. 20c.

2094—COLLIERY EQUIPMENT—The Hulton Colliery. J. Tonge. (Mines & Min., Jan., 1907; 5½ pp.) A complete account of various methods of developing and working the seams at this mine in the Lancashire coal-field, England. 40c.

2095—ELECTRICAL PLANT of the Dahibusch Mine. A. Gradenwitz. (Eng. & Mg. Jl., Jan. 12, 1907;). Gives an account of the installation of electric machines in this German mine, together with a description of the power generating units. 20c.

2096—EXPLOSION—A Lesson from the Courrieres Explosion. R. H. Dundas. (Iron & Coal Tr. Rev., Jan. 11, 1907.) Consideration of some of the causes of explosions in coal mines and measures for their prevention; also description of a proposed new method of working, whereby most of these causes will be done away with. 40c.

2097 — EXPLOSIVES — Accidents in Mines and the Use of Explosives. (Iron & Coal Trades Rev., Jan. 11, 1906.) A reprint of the new Act issued by the British Home Office, dealing with notices of accidents. 40c.

2098—FIRST AID TO THE INJURED CONTEST by Teams from Collieries of the Pennsylvania Coal Co., and the Hillside Coal Co., at Scranton, Pa., November 24, 1906. (Mines & Minerals, Jan., 1907; 2½ pp.) Gives an account of the present organization of first aid societies in Pennsylvania coalfields, and describes a series of competitive tests held by various first-aid teams. 20c.

2099—FUEL ECONOMY. H. B. Maxwell. (Coll. Guard., Dec. 28, 1906.) Discusses the influence of coal handling, type of boiler, stoking, super-heating, etc., upon the efficient utilisation of fuel. 20c.

2100—GASES Enclosed in Coal and Certain Coal Dusts. F. G. Trobridge. (Jl. Soc'y of Chem. Ind., Dec. 15, 1906.) Gives an account of the method of extracting gases from coal and analysing these gases, and results of proximate analyses. 80c.

2101—HAULAGE—A Propos du Manque de Wagons. (L'Echo des Mines, Dec. 24, 1906.) Discussion of a proposition made the Compagnie du Nord, to haul coal and coke in cars owned by the public at a reduced rate; the proposition was made in hopes of relieving car shortage. 40c.

2102—HAULAGE—Underground Haulage at the Mirfield Collieries. T. Nevin. (Iron & Coal Tr. Rev., Jan. 4, 1907.) Paper read before the National Association of Colliery Ingrs., Dec. 1, 1906, describing the development of the present haulage system at these English collieries, with a complete account of the equipment and method of operation; contains also the discussion on the paper. 40c.

2103—ILLINOIS—Coal in Illinois in 1906. F. W. Parsons. (Eng. & Mg. Jl., Jan. 12, 1906.) Gives a brief review of conditions during the past year, with a forecast for future production. 20c.

2104—ILLINOIS—Equipment and Methods of the Illinois Midland Coal Company. M. F. Peitier. (Eng. & Mg. Jl., Dec. 29, 1906; 3 pp.) Gives a complete illustrated description of the equipment and methods of operation at this mine, with a brief account also of the method used in establishing workings under ground. 20c.

2105—ILLINOIS COAL—Illinois State Geological Survey Bulletin No. 3. (Urbana, Ill., 1906; University of Illinois; 86 pp.) Contains "Composition and Character of Illinois Coal," by S. W. Parr; "Distribution of the Coal Beds of Illinois," by A. Bement; and "Tests of Illinois Coals Under Steam Boilers," by L. P. Breckenridge.

2106—MEXICO—Carbon de Piedra en el Estado de Coahuila. (El Comercio, Jan. 15, 1907.) Brief description of the occurrence of anthracite coal in Coahuila, Mexico, giving production and future prospects. 20c.

2107—MINE GASES—Carbon Monoxide in Mines. J. T. Beard. (Mines & Min., Jan., 1907.) Complete account of the properties of carbon monoxide and tests for its detection. 20c.

2108—MONTANA COAL AND LIGNITE DEPOSITS. J. P. Rowe. (Mg. Wld., Jan. 19, 1907; 3½ pp.) Statement of the present condition of the coal and lignite market in Montana, and description of the development of coal and lignite mining which is taking place in the principal fields of the State. 20c.

2109—NEW MEXICO—Coal in New Mexico. J. E. Sheridan. (Eng. & Mg. Jl., Jan. 5, 1907.) Gives a brief analysis of statistics of the past year in this field. 20c.

2110—PENNSYLVANIA—Coal in Pennsylvania. F. W. Parsons. (Eng. & Mg. Jl., Jan. 5, 1907.) Brief comments on the value of the product, shortage of cars and employment of boys in the Pennsylvania coal mines. 20c.

2111 — PENNSYLVANIA — Pittsburg District Coal. S. F. Luty. (Eng. & Mg. Jl., Jan. 5, 1907.) Short review of the principal events of the past year, with brief description of proposed operations for 1907. 20c.

2112—SHAFT SINKING—Das Abteufen der beiden Schächte der Bergwerks-Gesellschaft Laura en Vereenigung zu Eygellshoven (Holl. Limburg.) H. Kuklmeier. (Bergbau, Jan. 3, 1907; 2½ pp.) An illustrated account of the sinking of two shafts on the Laura coal mine in the province of Limburg, Germany. Describes the methods used in overcoming, damming and removing water during the process of sinking. 40c.

2113—SHAFT SINKING in the Pocahontas Coal Field. H. Rawie. (Mines & Min., Jan., 1907.) Gives the costs of shaft sinking in this coal region, and also figures on the rate of sinking. 20c.

2114 — SOUTHERN COAL MINING, Strides in. F. E. Saward. (Manufacturers' Rec., Jan. 3, 1907.) Discusses the possibility of continued gains in coal production in light of the production of previous years. 20c.

2115—WEST VIRGINIA—Coal in West Virginia. F. W. Parsons. (Eng. & Mg. Jl., Jan. 5, 1907). Gives a brief description of the operations of the principal plants in this region. 20c.

## COPPER

2116 — ARIZONA — Developments in Mining and Smelting at Douglas during 1906. H. C. Warnack. (Ores & Metals, Jan. 5, 1907.) Brief account of the construction and development that has taken place in this Arizona camp during 1906. 20c.

2117—AUSTRALIA—A New Copper Field in Australia. J. Plummer. (Mg. Wld., Jan. 5, 1907.) Gives an account of the discovery of copper in three new districts in Australia, and briefly describes some of the development work that has been done. 20c.

2118—BLAST FURNACE SMELTING—Overfire in Copper-Matting Blast Furnace Smelting Practice. L. S. Austin. (Mg. & Sci. Press, Jan. 5, 1907.) Plea for reducing the overfire in blast furnaces, and utilizing in the smelting zone the heat wasted by the overfire. 20c.

2119—CALIFORNIA—Handling California Copper. C. F. Dittmar. (Ores & Metals, Jan. 5, 1907.) Brief account of projected methods for handling the copper output of various mines in Shasta Co. 20c.

2120—CALIFORNIA—The Copper of Shasta Co., California. D. F. Campbell. (Mg. & Sci. Press, Jan. 5 and 12, 1907; 5½ pp.) First and second instalments of series, dealing with the geology of the region, and giving a description of the various rocks and ores occurring in the district and methods of mining employed. 40c.

2121—CALIFORNIA—Some Notes on Greenwater. E. R. Zalinski. (Eng. & Mg. Jl., Jan. 12, 1907; 5½ pp.) Gives a general description of this camp, with its geology, means of access, and its present state of development as seen in the recent trip by the author. 20c.

2122—CALIFORNIA—The Greenwater District. J. W. Abbott. (Mg. & Sci. Press, Jan. 12, 1907.) An account of a visit to this copper camp by the author, giving his impression that the occurrence of copper is very disappointing. 20c.

2123—CALIFORNIA'S COPPER OUTPUT. (Mineral Wealth. Jan. 1, 1907; 2½ pp.) Statement of the conditions of various principal copper producers in California, with some discussion of proposed development of different claims. 20c.

2124—COLORADO—Copper in Colorado. (Mg. Rep., Dec. 27, 1906; 3 pp.) Second and third instalments of article previously indexed, giving a detailed account of copper production in Colorado by counties, and discussing the possible future production of various Colorado camps. 40c.

2125—COPPER AND NICKEL MATTE—Verblasen von Kupfer- und Kupfer-Nickelstein. (Metallurgie, Jan. 8, 1907; 4½ pp.) A comparison and discussion of the different features of converting copper and nickel mattes. Reviews and comments upon an article by H. W. Hixon in the ENGINEERING AND MINING JOURNAL, dealing with this subject, and amplifies it along the lines of present German practice. 40c.

2126—COPPER CONSUMPTION—Die Kupfernot. (Bergbau, Jan. 10, 1907.) Gives the German view of the remarkable increase in copper consumption; also discusses the demand for copper in Germany, and comments briefly on the copper situation in North America. 40c.

2127 — COPPER PRODUCTION and Prospects. (Eng. & Mg. Jl., Jan. 5, 1907; 3 pp.) Statistics, conditions and commercial history of copper in 1906. 20c.

2128—COPPER SMELTING and Refining. Wm. Bettel. (So. Afr. Mines, Dec. 22, 1906.) Gives some of the experiences of the author in refining copper contaminated with nickel, cobalt and arsenic, and describes briefly some of the methods used by him in refining copper in its various stages of smelting. 40c.

2129—ELECTROLYSIS — Elektrolytischer Kupfergewinnungsprozess. Walter Stoeger. (Metallurgie, Dec. 22, 1906; 6½ pp.) Describes in detail the theory and practice of a method of extracting copper from ores by electrolysis. 40c.

2130—ELECTROLYSIS OF COPPER—Ueber as Acetatkupfer das sogen. allotrope Kupfer. C. Benedicks. (Metallurgie, Jan. 8, 1907; 17 pp.) A contribution to the present knowledge of so-called allotropic form of copper which is produced by electrolysing a solution of copper acetate. Describes in detail various experiments with this form of copper along metallographical lines. 60c.

2131—JAPAN—Sumitono Bessi; the Great Copper Mine of Japan. O. G. Bennett, Jr. (Eng. Mag., Jan., 1907; 16 pp.) Detailed account of the region surrounding this mine on the island of Shikoku, also of the power equipment and crushing and concentrating plants; also a special description of the Japanese "Mabuki method" of copper smelting. Illustrated. 40c.

2132—LAKE SUPERIOR—Some Problems Connected with Deep Mining in the Lake Superior Copper District. F. W. McNair. (Eng. Rec., Jan. 12, 1907.) Address before the Engineering Section of the Amer. Assn. for the Advancement of Science, giving an account of new features which deep mining has demanded in estimating pillar load and supporting walls, in surveying, and in hoisting and pumping. 20c.

2133—LEACHING PROCESS—Beschreibung des Arbeitsverfahrens für die Kupferlaugerei bei Barby a. E. der Gewerkschaft Klingental-Graslitzer Kupferbergbau in Klingental i. S. (Montan-Zeitung, Jan. 1, 1907.) Description of the process of leaching copper ores in Germany, by which the solutions are regenerated and used over again, and all by-products recovered. 40c.

2134—LONDON COPPER MARKET in 1906. (Eng. & Mg. Jl., Jan. 22, 1907.) Gives a review of the year's progress in London mining stock month by month. 20c.

2135—MONTANA—Operations of Butte Mines during 1906. E. E. Thum. (Ores & Metals, Jan. 5, 1907.) Short outline of the causes which have prevented any considerable increase of copper production in this camp; also describes the smelter improvements of the Amalgamated plant, and gives the present condition of deep ore mining in the Butte district. 20c.

2136—ORE REDUCTION—The Boston Consolidated Reduction Plant. (Salt Lake Mg. Rev., Dec. 30, 1906.) Gives a general description of the new mill of the Boston Consolidated Mining Co. to be erected at Garfield, Utah. 20c.

2137—PYRITIC SMELTING — Einige neuere Betrieb-resultate der Verhüttung der Erze des Mount Lyell-Grubendistriktes. G. Kroupa. (Oest. Zeit. f. Berg- u. Hüttenw. Dec. 22, 1906.) A short account of the pyritic smelting of low-grade copper ore by the Mt. Lyell Mining and Railway Co. of Tasmania, and the subsequent refining of the matte. 40c.

2138—PYRITIC SMELTING—Notes and Comments on the Pyritic Process of Mount Lyell, Tasmania. R. Nicholls. (Jl. Chem., Met. & Mg. Soc'y of So. Afr., Nov., 1906; 4½ pp.) Outline of the process of pyritic smelting with analysis of the slag obtained at this plant, and discussion of the reactions taking place in the slag formation; also an account of laboratory methods in use at this smelter. 60c.

2139—SMELTING — The Wallaroo Smelting Works. T. C. Cloud. (Instn. of Mg. & Met., Bull. No. 28, Jan. 10, 1907; 14½ pp.) Further discussion on the paper of the above title, which was previously mentioned in the Index.

2140—WIRE DRAWING—Das Ziehen von Kupferdraht. W. Küppers. (Zeit. des Vereines deutscher Ingenieure, Dec. 15, 1906; 6½ pp.) Continuation of lengthy article on the process of drawing copper wire.

## DIAMONDS

2141—DIAMOND MINES—A Visit to the De Beers Consolidated Diamond Mines. W. E. P. Rathbone. (Instn. of Mg. & Met., Bull. No. 28, Jan. 10, 1907; 4 pp.) An account of a visit by the author to these diamond mines, describing briefly the equipment, method of mining and the process of disintegrating the matrix and recovering the diamonds by the use of grease.

2142—DIAMOND MINING in the Orange River Colony. (So. Afr. Mines, Dec. 1, 1906.) Continuation of article previously indexed, being an extract from the Report of the Dept. of Mines, giving a summary of the prospecting operations for the fiscal year ended June, 1906. 20c.

2143—NEW SOUTH WALES—The Occurrence of Diamonds in Matrix at Oakey Creek, near Inverell, New South Wales. T. W. E. David. (Mg. & Sci. Press, Jan. 12, 1907.) Discussion of the origin of diamonds in the light of a discovery of this gem in the original rock matrix in New South Wales. 20c.

## GOLD AND SILVER

2144—ALLUVIAL MINING: Its Necessary Plant and Appliances. S. C. N. Bell. (Proceedings, Australasian Inst. of Mg. Engrs., Sept., 1906; 33 pp.) General discussion of hydraulic mining, dredging and hydraulic sluicing, and the principles governing the installation of any particular type of hydraulic mining apparatus.

2145—ANTIMONIAL GOLD ORES—The Assay of Antimonial Gold Ores. Wm. Kitto. (Instn. of Mg. & Met., Bull. No. 28, Jan. 10, 1907.) Reply of author to remarks on his paper of the above title, which was previously indexed.

2146—ASSAY OF GOLD BARS as Conducted in the Author's Assay Office. A. C. Claudet. (Instn. of Mg. & Met., Bull. No. 28, Jan. 10, 1907; 3 pp.) Discussion by members of the Institution of the above paper which was previously indexed.

2147—ASSAY of Silver Bullion by Volhard's Method. E. A. Smith. (Instn. of Mg. & Met., Bull. No. 28, Jan. 10, 1907; 4 pp.) Describes a modification of Volhard's volumetric method of silver bullion assay, whereby the color of the end-point is much intensified and more accurate results obtained.

2148—AUSTRALIA—Deep Lead Mining in Australia. (Mg. Jl., Dec. 15, 1906.) Gives a short account of the geology of the mines of the Berry United Deep Leads, Ltd., situated in the State of Virginia; also a brief description of the method used in opening and working the mines. 40c.

2149—BRITISH COLUMBIA—The Le Roi Mine—Its Past History and Present Condition. E. Jacobs. (B. C. Mg. Rec., Nov., 1906; 9½ pp.) A complete account of the history of the Le Roi mine in British Columbia, together with its prospects under new management; gives also a very complete account of the mine's equipment. 40c.

2150—CALIFORNIA—The Past Year's Progress in Trinity Co. J. W. Bartlett. (Mineral Wealth, Jan. 1, 1907.) The conditions of quartz and placer mining in Trinity county are described and mention is made of proposed new operations for 1907. 20c.

2151—CARBONATE MINE, UTAH—The Reopening of the Carbonate Mine, Utah. F. C. Nicholas. (Mg. Wld., Jan. 5, 1907.) Discusses the advisability of prospecting this old mine with a view to reopening and working it again. 20c.

2152—CHLORINE—Cost of Electrolytic Production of Chlorine. G. H. Harrison. (Eng. & Mg. Jl., Jan. 19, 1907.) Gives a brief summary of the cost of producing chlorine from salt by electrolysis in order to apply it to the chlorination of gold ores. 20c.

2153—COBALT, ONTARIO. T. A. Rickard. (Mg. & Sci. Press, Jan. 5, 1907; 3 pp.) Description of the ores which occur in this famous camp; also an account of some of the principal mines and mining operations during the past year. 20c.

2154—COBALT, ONTARIO—The Mines at Cobalt. R. Meeks. (Eng. & Mg. Jl., Jan. 12 and 19, 1907; 6 pp.) Description of the camp, mines and general conditions existing at present in this district. 20c.

2155—COLORADO — Developments of Mining in Colorado during 1906. (Ores & Metals, Jan. 5. 1907.) An account of new installations of power equipments in some of the Colorado mining districts, which will enable the reopening of many abandoned mines and increase the profits of present productive ones. 20c.

2156—COLORADO—Review of Mining in Colorado. Geo. E. Collins. (Eng. & Mg. Jl., Jan. 5, 1907.) An outline of mining in Colorado by districts. 20c.

2157—COMSTOCK—Modern Mining on the Comstock. Claude T. Rice. (Eng. & Mg. Jl., Dec. 29, 1906; 2½ pp.) Gives a very complete review of the present conditions of mining practice on the Comstock, dealing especially with the prospects for a revival of mining interest there. 20c.

2158—CYANIDATION—A New Cyanide Plant. M. R. Lamb. (Mg. & Sci. Press, Dec. 29, 1906; 2 pp.) Discusses the design of a new cyanide plant to treat ore crushed to a maximum of 150-mesh. Illustrated by plan and elevation. 20c.

2159—CYANIDATION— Sampling Cyanide Solutions. H. E. Vail. (Monthly Jl., Chamber of Mines of W. Australia, Nov. 30, 1906.) Brief description of the method followed at the Lake View Consuls mine for checking cyanide solutions. Illustrated. 60c.

2160—CYANIDE PRACTICE at Kalgoorlie. H. T. Brett. (Mg. & Sci. Press, Dec. 22, 1906.) Reply to an article by Mr. Alfred James on Crushing and Grinding Practice at Kalgoorlie. Also contains an account of mill tests at the Ivanhoe mill, bringing out the difference between tube mills and grinding pans as fine grinders. 20c.

2161—ELECTRIC POWER for Rand Mines. (So. Afr. Mines, Dec. 1, 1906.) A comparison of the advantages between electricity and compressed air in mines, and a plea for the introduction of electric drills on the Rand. 40c.

2162—FLUME CONSTRUCTION—The Water-Race for the Chuquitambo Gold Mines, Peru. (Instn. of Mg. & Met., Bull. No. 28, Jan. 10, 1907.) Contributed remarks by Bernard Hunt on the paper of the above title, which was previously indexed.

2163—GOLD DREDGING — Electric Gold Dredge No. 3 of Conrey Placer Mining Company, at Ruby, Montana. (Jl. of Electricity, Power & Gas, Dec. 29, 1906.) Describes the design and equipment of the gold dredge, with special reference to the electric power installation. 20c.

2164—GOLD DREDGING in 1906. J. P. Hutchins. (Eng. & Mg. Jl., Jan. 5, 1907). Outlines the advances made in gold dredging during the last year, and deals with various procedures of dredging, costs, and preliminary prospecting. 20c.

2165—GOLD DREDGING PRACTICE in Central Otago. H. R. MacDonald. (N. Z. Mines Rec., Nov. 16, 1906; 7 pp.) Short historical sketch of gold dredging in Otago, New Zealand, with a description of geological conditions, methods of prospecting, and the construction of the type of dredge now in use. To be continued. 40c.

2166—GOLD MILLING—Modern Gold Milling. George P. Scholl. (Electrochem. & Met. Industry, Jan., 1907; 4 pp.) A very complete discussion of all the new features which have entered into the equipment of modern gold milling plants. 40c.

2167—GOLD MILLING—Some Accessory Stamp Mill Appliances. G. O. Smart. (Jl. Chem., Met. & Mg. Soc'y of So. Afr., Oct., 1906.) Description of a device for driving Challenge feeders, and of a new appliance for measuring the actual drop of stamps, while running. 60c.

2168—GOLDFIELD—Developments in Mining at Goldfield, during 1906. C. J. Moore. (Ores & Metals, Jan. 5, 1907.) Describes the occurrence of veins at Goldfield and their secondary enrichment, and gives a short and interesting account of profits of stock-selling companies and high-graders. 20c.

2169—GUANAJUATO—The Later History of Guanajuato. T. A. Rickard. (Mg. & Sci. Press, Dec. 22, 1906; 3 pp.) General description of various mills, plants and labor conditions in this district. 20c.

2170—IDAHO—Mining Development in the Coeur d'Alenes during 1906. W. H. North. (Ores and Metals, Jan. 5, 1907.) Short account of some of the improvements in mining and ore dressing in this district; also an outline of present condition of various mining companies. 20c.

2171—NEVADA—Review of Mining Conditions in Searchlight. E. M. Martin. (Mineral Wealth, Jan. 1, 1907.) Brief account of the geology of the Seachlight mining district in Nevada, and a description of the condition of the principal mining companies now operating there. 20c.

2172—NEVADA—Review of Mining in Nevada in 1906. (Eng. & Mg. Jl., Jan. 5, 1907.) Discusses the effect upon Nevada mining of the new Goldfield, Bullfrog and Tonopah districts; discusses also the mining laws and new prospects. 20c.

2173 — NEVADA — Round Mountain Camp, Nevada. Geo. A. Packard. (Eng. & Mg. Jl., Jan. 19, 1907.) Description of a trip made by the author to this Nevada mining district; giving an account of the crude methods of mining now being used there. 20c.

2174—NEW ZEALAND — The First Gold Discoveries in New Zealand. R. A. Loughnan. (N. Z. Mines Rec., Oct. 16, 1906; 16 pp.) Conclusion of article previously indexed. 40c.

2175—ORE REDUCTION PLANTS—Descriptions of the Ore Reduction Plants and Processes of Reduction at the Principal Gold Mines of Western Australia. (Monthly Jl., Chamber of Mines of W. A., Nov. 30, 1906; 19 pp.) Addenda to several of the articles previously published in the above Journal, describing the treatment plants of the Associated Northern Gold Mine, Great Boulder Proprietary Gold Mine, Oroya-Brownhill Gold Mines, Kalgurli Gold Mine, etc, 80c.

2176—ORE TREATMENT—Progress in Gold Ore Treatment During 1906. A. James. (Eng. & Mg. Jl., Jan. 5, 1907.) A review of improvements in this branch of metallurgy during 1906, including crushing, fine grinding, amalgamation, roasting, concentration, slimes treatment, etc. 20c.

2177—OREGON—Southern Oregon Progress. D. H. Stovall. (Ores and Metals, Jan. 5, 1907). The application of electric power to mining in Oregon is briefly discussed, and also there is given a summary of the platinum production of this State. 20c.

2178—PLACER MINING METHODS in the Atlin District. A. Carmichael. (Mines & Min., Jan., 1907; 3½ pp.) Describes the physical features of the Atlin mining district of B. C., and outlines the present conditions of hydraulic mining. 20c.

2179—PRODUCTION of Gold, Silver and Platinum. (Eng. & Mg. Jl., Jan. 5, 1906.) Statistics of production of gold and silver in the U. S., and in the world for 1906; also review of the commercial movement of gold and silver, by F. Hobart. 20c.

2180—QUEENSLAND—Second Report Oaks View Gold Mines (Near Rockhampton), and Notes on the Mines Talgai and Thane's Creek Goldfields. L. C. Ball. (Geol. Surv. of Queensland, Pub. No. 205; 36 pp., 3 plans and 2 plates.) Describes the development work accomplished on the various claims of this company, and their proposed extensions in the future.

2181—QUEENSLAND—The Starcke, Alice River (Philp), Hamilton and Coen Goldfields of the Cape York Peninsula. W. E. Cameron. (Queens. Gov. Mg. Jl., Dec. 15, 1906; 5 pp.) An account of the geology of these regions with a description of the principal mines that are worked in each district. 60c.

2182 — RAND METALLURGICAL PRACTICE and Recent Innovations. G. A. and H. S. Denny. (So. Afr. Assn. of Engrs., Nov., 1906; 16½ pp.) Discussion by members of the Association of the above paper, which was previously indexed. $1.00.

2183 — RAND METALLURGICAL PRACTICE, Recent Innovations in. G. A. & H. S. Denny. (Eng. & Mg. Jl., Dec. 29, 1906; 5½ pp.) Very complete account of the new method of continuous cyanide circulation now practiced on the Rand, with complete flow-sheet both of pulp and solution. 20c.

2184—RHODESIA—W. Fischer Wilkinson. (Eng. & Mg. Jl., Jan. 5, 1907.) Review of mining in Rhodesia during 1906, with tables of production. 20c.

2185—SAMPLING RESULTS—E. H. Garthwaite. (Instn. of Mg. & Met., Bull. No. 28, Jan. 10, 1907; 9 pp.) Very complete discussion of the differences in results obtained by varying the distance between mine samples of gold reefs.

2186—SLIMES TREATMENT — Proposed Process for Treatment of Zinc-Gold Slimes before Smelting. C. E. Meyer. (Jl. Chem., Met. & Mg. Soc'y of So. Afr., Nov., 9106.) Reply of author to the discussion of the above paper which was read before the June, 1906, meeting of the Society. 60c.

2187—SOLVENT FOR GOLD—The Manufacture of Cyanogen Bromide. T. Ewan. (Jl. Soc'y of Chem. Industry, Dec. 15, 1906; 3 pp.) Gives a detailed description of the manufacture of bromide of cyanogen, together with detailed procedure for analysis of solutions containing bromic acid. 80c.

2188—SOUTH DAKOTA—Review of Mining in South Dakota. J. V. N. Dorr. (Eng. & Mg. Jl., Jan. 5, 1907.) Short discussion of the present condition of mining in South Dakota. 20c.

2189—TAVENER PROCESS. L. A. E. Swinney. (Instn. of Mg. & Met., Bull. No. 28, Jan. 10, 1907; 7½ pp.) Discussion by various members of the Institution of the above paper which was previously indexed.

2190—TRANSVAAL. W. Fischer Wilkinson. (Eng. & Mg. Jl., Jan. 5, 1907.) Review of mining conditions in the Transvaal in 1906, with tables of production and data of costs. 20c.

2191—TUBE MILL LINING. W. W. Bradley. (Mg. & Sci. Press, Jan. 5, 1907.) Interesting account of various experi-

ments to determine the best lining for a tube mill, ending in a decision to use wrought iron bars. 20c.

2192—WESTERN AUSTRALIA—Metallurgical Methods in Western Australia. R. Stokes. (Mg. Wld., Jan. 5, 1907.) Gives an account of the present practice in Western Australia of smelting their sulphide ores. 20c.

2193—WESTERN AUSTRALIA — Wet Crushing and Concentration in Western Australia. R. Stokes. (Mg. Wld., Jan. 12, 1907.) General account of the milling practice at the different mills of this Australian field, giving the results of comparative tests on the efficiency of the plants. 20c.

## GRAPHITE

2194—QUEENSLAND — Graphite in Queensland, with Special Reference to the Mount Bopple Graphite Deposits. B. Dunstan. (Geological Survey of Queensland, Pub. No. 203; 20 pp., 5 plates.) Discusses the occurrence of graphite in Queensland, its mining and concentrating; some analyses of Mount Bopple graphite are given.

## GYPSUM

2195—PLASTER OF PARIS — Der Gips. (Tonindustrie-Zeit., Dec. 22, 1906.) Continuation of article, discussing the influence of grinding and temperature on the production of plaster of paris. Gives various tests for standard qualities of the same. 40c.

## IRON AND STEEL

2196—AUSTRALIAN IRON. J. Plummer. (Mg. Wld., Jan. 19, 1907.) The deposits of iron in the various states of Australia are briefly described, with a view to their possible development. 20c.

2197—BLAST FURNACE—Zur Frage der Berechnung des Hochofenprofils. (Stahl u. Eisen, Dec. 15, 1906; 2½ pp.) Brief article giving a method for calculating dimensions and profiles of a blast furnace. 40c.

2198—BLAST FURNACE SLAG—Zerstäuben flüssiger Hochofenschlacke. (Tonindustrie-Zeit., Dec. 22, 1906.) Brief description of a new method of granulating slags. 20c.

2199—CHROME IRON — Ueber den Einfluss des Chroms auf die Lösungsfähigkeit des Eisens für Kohlenstoff und die Graphitbildung. P. Goerens and A. Stadeler. (Metallurgie, Jan. 8, 1907; 8 pp.) An account of experiments to determine the behavior of chrome iron towards carbon and the effect of chrome upon graphite formation. Gives the melting and freezing points of definite alloys with increasing amounts of chromium, and to which silicon was added to promote the formation of graphite carbon, and discusses the results obtained. 60c.

2200—COLORADO FUEL AND IRON COMPANY. Lawrence Lewis. (Eng. & Mg. Jl., Dec. 29, 1906, Jan. 12 and 19, 1907; 11½ pp.) The first three instalments of a series of articles on the operations of this company, dealing with its history, plant equipment, water supply, coal and iron mines, production and earnings, etc. 40c.

2201—COPPER IN IRON—Kupfer im Eisen. (Stahl u. Eisen, Dec. 15, 1906.) An abstract of a paper by G. Dillner, dealing with the influence of copper upon the properties of steel and iron. 40c.

2202—DEEP MINING on the Gogebic Range. (Iron Tr. Rev., Jan. 17, 1907; 5 pp.) Detailed account of present conditions of deep mining in this Lake Superior district, containing descriptions of the equipment of the various shafts. 20c.

2203—ELECTRIC FURNACE in Iron and Steel Metallurgy. (Electrochem. & Met. Ind., Jan., 1907.) Short abstracts and discussions of some of the leading papers which have recently appeared, dealing with the production of iron and steel by electricity. 40c.

2204—ELECTRIC FURNACE Methods of Iron and Steel Production. J. B. C. Kershaw. (Iron Tr. Rev., Jan. 3, 1907; 2½ pp.) Continuation of lengthy serial previously indexed. 20c.

2205—ELECTRIC FURNACE—Ueber die Fortschritte in der Elektrostahl-Darstellung. Prof. Eichhoff. (Stahl u. Eisen, Jan. 9, 1907; 17½ pp.) A long and able review of the present knowledge of the art of producing steel by electricity, taking up and discussing the more important processes now in use, with comparisons of the workings of these processes, and analyses of the steels produced. 40c.

2206—ELECTRIC SMELTING—L'Etat actuel de l'Electrosidérurgie. L. Guillet. (Genie Civil. Dec. 22, 1906.) Continuation of article reviewing the present state of development of electric smelting. 40c.

2207—FERRO-ALLOYS — Fabrication des Alliages Ferro-Métalliques au Four Electrique. P. Girod. (Bull., Société des Ingenieurs Civils de France, Nov., 1906; 16½ pp.) Gives a long account of the method of making iron alloys in an electric furnace. Discusses the effects of various metals, such as chrome, vanadium, tantalum, etc., upon iron, and gives a description of the furnace used, and analyses of the products made therein. 60c.

2208—FERRO-ALLOYS — The Girod Ferro-Alloy Works and the New Girod Steel Furnace. R. S. Hutton. (Electrochem. & Met. Ind., Jan., 1907.) Brief description of the ferro-alloy industry at this French plant, with an account of the furnace itself and its working; also analyses of some of the products obtained. 40c.

2209—FOUNDRY—Coke Sampling for Foundries. C. Myers. Foundry, Jan. 1907.) Gives the procedure used by the author in sampling carloads of coke. 20c.

2210—FOUNDRY COSTS—A System for Obtaining Foundry Costs. C. J. Redding. (Eng. Mag., Jan., 1907; 20 pp.) Very detailed description of a method by which all estimation is eliminated in computing foundry costs. A full set of different tables and blank forms are given, with directions for using them. 40c.

2211—FOUNDRY IRON—Die Verwendung des Flammofens in der Giesserei, insbesondere zur Schmelzung von schmiedbarem Guss. Ing. Geilenkirchen. (Stahl u Eisen, Jan. 2 and 9, 1907; 9 pp.) Gives an account of the use of reverberatory furnaces in producing foundry iron, with drawings and descriptions of various types of furnaces used. To be concluded. 80c.

2212—IRON AND STEEL WORKING—Le Travail du Fer et de l'Acier a la Temperature critique. Olry and Bonet. (La Metallurgie, Dec. 19, 1906.) Continuation of article previously indexed, dealing with the working of iron and steel at their critical temperature. 40c.

2213—IRON DETERMINATION—Zur Bestimmung des Eisens in Eisenerzen nach der Reinhardtschen Methode. A. Müller. (Stahl u Eisen, Dec. 15, 1906; 7½ pp.) A discussion of the theory and practice of various methods of iron determination in iron ores, with special reference to Reinhardt's method. 60c.

2214—IRON ORE TRADE—The Lake Ore Trade in 1906. G. H. Cushing. (Eng. & Mg. Jl., Jan. 19, 1907.) A short outline of market conditions and prices, which obtained in the Lake ore trade during 1906. 20c.

2215 — MECHANICAL EQUIPMENT FOR STEEL WORKS—Maschinelle Einrichtungen für das Eisen-Hüttenwesen. F. Frölich. (Zeit. des Verines deutscher Ingenieure, Dec. 8, 1906; 7½ pp.) Continuation of article previously indexed, describing and illustrating various mechanical devices applicable to iron smelting and steel works.

2216—METALLOGRAPHY Applied to Foundry Works. A. Sauveur. (Fdy., Jan., 1907; 4 pp.) The sixth of a series of articles on this subject, this instalment treating of the microstructure of gray cast iron containing from 0.1 to 1 per cent. carbon. 20c.

2217—NITROGEN IN IRON — Ueber die Bedeutung des Stickstoffes im Eisen. H. Braune. (Stahl. u. Eisen, Dec. 15, 1906; 5½ pp.) Continuation of article previously indexed, this instalment describing the heat treatment of specimens and metallographical tests. 60c.

2218—OPEN-HEARTH STEEL CASTINGS. W. M. Carr. (Iron Tr. Rev., Jan., 17, 1907.) Twelfth and final instalment of article previously indexed, dealing with heat treatment and structure, and thermit repairs in steel castings. 20c.

2219—PIG IRON AND Iron Ore. (Eng. & Mg. Jl., Jan. 5, 1907; 9 pp.) Statistics of production; summary of commercial conditions and review of the industry by F. Hobart, S. F. Luty, G. H. Cushing, E. Morrison, L. W. Friedman and D. E. Woodbridge. 20c.

2220—RUSSIAN STEEL MAKING — Das Hüttenwerk der Metallurgischen Gesellschaft zu Taganrog. L. Fortunato. (Oest. Zeit, f. Berg- u. Hüttenw., Jan. 5, 1907; 4½ pp.) Gives a general account of the introduction of steel making in Russia, and a detailed description of the equipment of the plant at Taganrog, Russia, for making basic bessemer steel. 40c.

2221—SILICON AND CARBON IN STEEL—Beitrag zum Einfluss des Siliciums auf das System Eisen-Kohlenstoff. F. Wüst and O. Petersen. (Metallurgie, Dec. 22, 1906; 12 pp.) Reviews briefly the present condition of our knowledge of the behavior of silicon and carbon in steel; describes the apparatus and discusses the results obtained in a series of experiments to determine the amount of carbon which can exist simultaneously with a definite amount of silicon, as well as the influence of the silicon, on the fusibility and freezing points of the iron. 60c.

2222—STEEL DISTORTION — Studie über die molekularen Veränderungen eines durch Zug beanspruchten Stahlstabes. M. Kralupper. (Oest. Zeit. f. Berg- u, Hüttenw., Dec. 15, 1906; 3 pp.) Continuation of article previously indexed. 40c.

2223—THERMIT PROCESS—La Reparation des Grosses Pieces d'Acier par l'Aluminothermie. (Genie Civil, Jan. 5, 1907.) Very interesting account of mending very large steel castings by thermit. 40c.

2224—TUNGSTEN STEEL—Ueber die Wolframbestimmung im Wolframstahl. G. V. Knorre. (Stahl u. Eisen, Dec. 15, 1906; 4 pp.) Gives a method of determining tungsten in tungsten steel, with detailed notes on the influences of other elements. 40c.

## LEAD

2225—METALLURGY OF LEAD in 1906. W. R. Ingalls. (Eng. & Mg. Jl., Jan. 5, 1907.) Comments upon the progress made in the metallurgy of lead during 1906, dealing especially with lime roasting, the installation of dust chambers and Betts process of electrolytic lead refining. 20c.

2226—MISSOURI — Lead and Zinc Mines of Missouri. S. F. B. Morse. (Manufacturers' Rec., Jan. 3, 1907.) Describes the history and prospects of the famous southeast Missouri lead field. 20c.

2227—MISSOURI—The Southeast Missouri Lead District. H. A. Wheeler. (Eng. & Mg. Jl., Jan. 5, 1907.) Review of conditions in this district during 1906. 20c.

2228—PRODUCTION—Lead and Spelter Production. (Eng. & Mg. Jl., Jan. 5, 1907; 6 pp.) Development in the lead and zinc industries in 1906, with statistics of production. 20c.

2229—PUMPING—The Dewatering of Center Creek Valley. Doss Brittain. (L. & Z. News, Dec. 31, 1906; 2½ pp.) Interesting account of several repeated attempts to unwater this Missouri-Kansas mining district, the eventual successful outcome of which has opened up a rich lead and zinc district. 20c.

2230—SILVER-LEAD SMELTING — Weight of Charge as Affecting Reduction in Silver-Lead Smelting. L. S. Austin. (Mg. & Sci. Press, Jan. 12, 1907.) A short account of an interesting accident in a silver-lead smelter, whereby it was found that feeding four charges at once greatly reduced the loss of silver. 20c.

## NICKEL

2231 — COMMERCIAL NICKEL. (Brass World, Nov., 1906.) Gives a short description of the processes used in making various grades of commercial nickel. 20c.

2232—NICKEL RECOVERY — Ueber einige Versuche zur Gewinnung von Kupfer und Nickel aus Abfällen nickelplattierter Bleche. C. Richter. (Elektrochem. Zeitschrift, Dec., 1906; 5 pp.) Gives an account of some experiments to determine a method of recovering copper and nickel from by-products of nickel-plating establishments.

## PETROLEUM

2233—MID-CONTINENTAL FIELD—Oil and Gas in Mid-Continental Field. E. Haworth. (Eng. & Mg. Jl., Jan. 5, 1907.) Reviews development and market conditions in this district. 20c.

2234—PETROLEUM Developments in Louisiana and Texas. (Eng. & Mg. Jl., Jan. 5, 1907.) Reviews the commercial conditions of the Louisiana and Texas field, and discusses the present conditions there. 20c.

2235—PETROLEUM in Southwestern Fields. H. S. Reavis. (Mfgrs.' Rec., Jan. 3, 1907.) Detailed account of petroleum production in Texas and Louisiana, and traces also the growth of these fields during the last decade. 20c.

2236—PETROLEUM INDUSTRY during 1906. (Pet. Rev., Jan. 5, 1907.) Very short review of the petroleum industry in the United Kingdom for 1906. 40c.

2237—PETROLEUM PRODUCTION in the Appalachian and Lima Fields. H. C. George. (Eng. & Mg. Jl., Jan. 5, 1907.) An account of the production and development of various Eastern fields. 20c.

## PLATINUM

2238—RUSSIA—Among the Platinum Deposits of the Ural Range. L. Lodian. (Elec. Rev., Jan. 5, 1907.) Very interesting article on the platinum regions on Russia; also a discussion of the phenomenal rise in platinum value. 20c.

## QUICKSILVER

2239—CALIFORNIA — Quicksilver in California. C. G. Yale. (Mg. & Sci. Press, Jan. 5, 1907.) Review of the quicksilver industry of California, giving a brief account of the production and consumption of this metal. 20c.

## SALT

2240—OHIO—Salt Deposits and the Salt Industry in Ohio. J. A. Bownocker. (Geological Survey of Ohio, Bull. No. 8, June, 1906; 42 pp.) Monograph describing the deposits of salt in Ohio, with their locations, and a brief catalog of the salt-producing works.

## TIN

2241—LONDON TIN MARKET in 1906. (Eng. & Mg. Jl., Jan. 19, 1907.) A review by months of the year of 1906 in regard to the tin industry, giving prices and stocks on hand. 20c.

2242—QUEENSLAND — The Annan River Tinfield. W. E. Cameron. (Queensland Gov. Mg. Jl., Nov. 15, 1906; 7 pp.) Conclusion of article previously indexed, giving a sketch map of the district, and describing the methods of mining in the district. 60c.

## TUNGSTEN

2243—TUNGSTEN. W. Preus. (Revista Minera, Dec. 24, 1906.) A short article dealing with the uses of tungsten, its occurrence in mineral form, and its extraction. 40c.

## ZINC

2244—LONDON SPELTER MARKET in 1906. (Eng. & Mg. Jl., Dec. 19, 1906.) Outlines the course of the speiter market of London for 1906, analysing trade conditions and prices. 20c.

2245—METALLURGY OF ZINC, Progress in. W. R. Ingalis. (Eng. & Mg. Jl., Jan. 5, 1907.) A review of conditions now existing in the smelting of zinc ores, with comments upon new installations of furnaces at various places. 20c.

2246—MISSOURI—The Joplin District in 1906. J. A. Zook. (Eng. & Mg. Jl., Jan. 5, 1907.) Review of development work in this district in 1906. 20c.

2247—ORE TREATMENT at the Broken Hill Proprietary Mine. G. D. Delprat. (Proceedings, Australasian Inst. of Mg. Engrs., Sept., 1906; 37 pp.) An excellent article describing the present condition of ore dressing practice at Broken Hill, also the smelting and refining of the lead and zinc. Illustrated by numerous half-tones and working drawings.

2248—WISCONSIN—Zinc and Lead Deposits in Wisconsin. A. A. Hoskin. (Mg. Rep., Dec. 27, 1906.) Gives an account of the mineral occurrences in this field, with reference to the genesis of the zinc deposits; also a brief account of the present condition of mining. 20c.

2249—VIRGINIA—Zinc and Lead Mining in Virginia. J. A. Van Mater. (Eng. & Mg. Jl., Jan. 5, 1907.) Review of mining operations in this State during 1906. 20c.

2250—WISCONSIN—Zinc Mining in Wisconsin in 1906. E. W. Moore. (Eng. & Mg. Jl., Jan. 5, 1907.) Review of mining conditions in this State in 1906. 20c.

2251—ZINC BLENDE--Smelting Blende Containing Calcareous Gangue. L. Bischopinck. (Eng. & Mg. Jl., Dec. 29, 1906.) Abstract of article in *Metallurgie*, Nov. 8, 1906, describing an improved method of smelting zinc blende contained in a limestone gangue. 20c.

2252—ZINC RETORTS—Ein neues Verfahren zur Herstllung von Zinkretorten. P. Speier. (Oest. Zeit. f. Berg-u. Hüttenw., Jan. 5, 1907; 3 pp.) Contains a review of the advantages and disadvantages of the present methods of making zinc retorts, and outlines a new process for manufacturing the retorts out of dolomite or magnesite with a hydraulic press. 40c.

## ECONOMIC GEOLOGY—GENERAL

2253—ECONOMIC GEOLOGY and Mineral Deposits. F. C. Nicholas. (Mg. Wld., Dec. 29, 1906, Jan. 12 and 19, 1907.) Sixth, seventh and eighth instalments of this article, dealing with the occurrence of gypsum, chalk, feldspar, cement, stone, coal, etc. 60c.

2254—GENESIS OF ORE DEPOSITS—Fissures and Their Filling, Veins and Shoots. E. A. Ritter. (Ores & Metals, Jan. 5, 1907.) An account of the conditions of the earth which may give rise to the segregation of metalliferous deposits along fissures and veins. 20c.

2255—MAGMATIC WATERS. H. W. Hixon. (Mg. Jl., Jan. 5, 1907.) Gives some new contributions to the prevailing ideas on the action of magmatic waters in lavas. 40c.

2256—MEXICO—Geologic and Geographic Aspects of Mexico. R. T. Hill. (Mg. Wld., Jan. 19, 1907.) Fifth instalment of article previously indexed, describing the physical feature of the Orizabian volcanic chain and the southern Sierras. 20c.

2257—MINERALOGICAL NOTES. F. A. Canfield. (Amer. Jl. of Sci., Jan., 1907; 2½ pp.) Describes the crystallographic habits of three new varieties of minerals, viz., Willemite, Argyrodite, and Canfieldite. 60c.

2258—NEW MEXICO, ARIZONA AND UTAH—Report on the Geological Excursion through New Mexico, Arizona and Utah, Summer of 1906. D. W. Johnson. (Technology Quar., Dec., 1906; 8 pp.) Gives an account of a wagon-trip made by the author through New Mexico, Arizona and Utah, with a view to studying certain problems in physiographical geology. 80c.

2259—OHIO—Revised Nomenclature of the Ohio Geological Formations. C. S. Prosser. (Geol. Survey of Ohio, Bull. No. 7, Nov., 1905; 36 pp.) Review of the principal rock formations of Ohio, with a discussion of the new classification to be applied to them.

2260—ORE DEPOSITION—Origin of the Solutions that Deposit Ores. E. A. Ritter. (Ores & Metals, Jan. 20, 1907.) Notes on the function of magmatic and meteoric waters in causing ore deposition, and a few remarks upon the possibility of the production of ore deposits through the agency of hot gases. 20c.

2261—ORE DEPOSITION—Secondary Changes at Cherry Creek, Arizona. J. A. Reid. (Mg. & Sci. Press, Jan. 5, 1907.) Brief account of the various phases of ore deposition as outlined by development in this Arizona camp. 20c.

2262 — QUEENSLAND — Geological Sketch Map of Queensland, Showing Mineral Localities. Prepared under the supervision of B. Dunstan, Acting Govt. Geologist. (Publication 206 of the Geological Survey of Queensland.)

2263—SOUTH AFRICA—The Structural Geology of South Africa. Dr. Sandberg. (So. Afr. Mines, Dec. 22, 1906.) A few brief notes on the structural geology of South Africa derived from a study of the strata extending from Cape Colony to Southern Rhodesia. 20c.

## MINING—GENERAL

2264—ALASKA and Its Possibilities. J. T. Cornforth. (Mg. Rep., Jan. 10, 1907.) Paper read before the American Mining Congress, Oct., 1906, giving a short description of the principal minerals now being produced in Alaska. 20c.

2265—ALASKA—Mining Progress in Alaska during 1906. J. T. Cornforth. (Ores & Metals, Jan. 5, 1907.) Each mining district of Alaska is reviewed separately in this article, giving prospects for coming year. 20c.

2266—AUSTRALIA — The Eastern States of Australia. F. S. Mance. Eng. & Mg. Jl., Jan. 5, 1907.) Review of mining in the eastern states of Australia during 1906, with tables of production. 20c.

2267—CALIFORNIA—Chas. G. Yale. (Eng. & Mg. Jl., Jan. 5, 1907.) Review of mining in this State during 1906. 20c.

2268—CALIFORNIA—The Mineral Industry of California during 1906. L. E. Aubury. (Mg. & Sci. Press, Jan. 5, 1907.) General review of the various mining industries of California during 1906, and discussion of proposed new developments along various different lines. 20c.

2269—DIAMOND DRILLING—Methods and Cost of Making Diamond Drill and Wash Borings near New York City. F. Lavis. (Engineering-Contracting, Jan. 9, 1907.) Gives detailed set of figures of superintendence, labor and repairs for a diamond drilling crew in New York City. 20c.

2270—EXPLOSIVE—Care in Handling Dynamite. D. H. Stovall. (Ores & Metals, Jan. 20, 1907.) Reviews some of the characteristics of dynamite, pointing out the necessity of extreme care when handling this substance on account of its well-known freakishness in exploding. 20c.

2271—FRANCE—Les Recherches des Mines en France. (L'Echo des Mines, Dec. 24, 1906.) Conclusion of article, giving the results of exploration in the different provinces of France for the purpose of making new mineral discoveries. 40c.

2272—GASES—El Grisu en las Minas. E. Hauser. (Revista Minera, Dec. 16. 1906; 3½ pp.) Continuation of article previously indexed, discussing inflamable and explosive gases in mines. 40c.

2273—IDAHO—Robt. N. Bell. (Eng. & Mg. Jl., Jan. 5, 1907.) Review of mining conditions in this State during 1906. 20c.

2274—LONDON MINING MARKET—Edw. Walker. (Eng. & Mg. Jl., Jan. 12, 1907.) Review of the general condition of the London mining market, and brief discussion of the general features of the various mining stocks. 20c.

2275—MEXICO—C. A. Bohn. (Eng. & Mg. Jl., Jan. 5, 1907; 3 pp.) Review of mining in Mexico during 1906. 20c.

2276—MEXICO—Developments in the Equipping of Mexican Mines during 1906. A. C. Brady. (Ores & Metals, Jan. 5, 1907). Review of the remarkable progress made in Mexico during 1906 in the matter of railroad extensions and in mining; also a discussion of the influence upon smelting interests of American capital and competition. 20c.

2277—MINERAL PRODUCTION—Summary of the Mineral Production of the United States in 1905. (Advance chapter from Mineral Resources of the U. S., Calendar Year 1905; 30 pp.) Detailed statistics of the production of minerals in the U. S., classified by States.

2278 — MINERS' PENSIONS—French Miners' Pensions and State Intervention. (Engineering, Dec. 21, 1906.) Gives a summary of the present miners' pension law in France, and an interesting account of its operation. 40c.

2279—MINING CAMPS—The Right to Minerals on Railroad Lands. C. DeKalb. (Mg. & Sci. Press, Dec. 22, 1906.) Contains arguments in favor of having railroads sell mineral rights along with surface rights rather than continue the present practice of reserving mineral rights for themselves. 20c.

2280—MINING COSTS—Notes on Underground Mining Costs. H. Fraser Roche. (Jl. Chem., Met. & Mg. Soc'y of So. Afr., Nov. 1906.) Discussion by J. A. Wilkes and E. M. Weston of the above paper which was previously mentioned in the Index. 60c.

2281—MINING TITLES—La Question de los Titulos. (Revista Minera, Dec. 1, 1906.) Contains a summary of special regulations which apply to foreigners who hold certificates to manage mines in Spain granted by other countries. 40c.

2282—MONTANA—Review of Mining in Montana. B. E. St. Charles. (Eng. & Mg. Jl., Jan. 5, 1907.) Describes the present mining situation and gives the production of the various metals in 1906. 20c.

2283—NEW MEXICO—Active Year in New Mexico. F. J. Arkins. (Ores & Metals, Jan. 5, 1907.) Very brief review of progress in mining in New Mexico by districts. 20c.

2284—NEW MEXICO—Review of Mining in New Mexico. C. R. Keyes. (Eng. & Mg. Jl., Jan. 5, 1907.) Reviews the condition of present mining practice in New Mexico. 20c.

2285—OKLAHOMA—Manufactures and Mining in Oklahoma. (Mfgrs.' Rec., Jan. 3, 1907.) Gives a brief account of the minerals and mining in the territory, and prospects of future production of the various metals. 20c.

2286—ONTARIO—Thos. W. Gibson. (Eng. & Mg. Jl., Jan. 5, 1907). Review of mining in Ontario during 1906. 20c.

2287—PRODUCTION—Mineral and Metal Production in 1906. (Eng. & Mg. Jl., Jan. 5, 1907.) Summary of the production of minerals and metals in the U. S. in 1906. 20c.

2288—PRODUCTION of Metals and Minerals in 1906. (Eng. & Mg. Jl., Jan. 5, 1907; 4 pp.) A series of brief articles giving the production of antimony, tin, zinc oxide, quicksilver, sulphur, magnesite and phosphate rock. 20c.

2289—PROSPECTING with Churn Drills. F. S. Pheby. (Mg. & Sci. Press, Dec. 29, 1906.) Gives the results of drilling test holes with a churn drill in Pennsylvania, also costs of drilling. 20c.

2290—QUEENSLAND—Mines Inspection, Herberton, Chilligoe, Etheridge and Croydon Districts. (Queensland Gov. Mg. Jl., Nov., 1906; 6 pp.) Report by chief inspector on the mining operations in the above districts. 60c.

2291 SHAFT SINKING Through Water-Bearing Formations. E. Mackay Heriot. (Eng. & Mg. Jl., Dec. 29, 1906; 3½ pp.) Continuation of article previously indexed; this number deals with the iron lining and the handling of water by buckets. 20c.

2292—SHAFT SINKING with the Aid of Pumps through Heavily-watered Strata. D. Dean. (Mg. Engineering, Jan., 1907.) Continuation of article previously indexed. 20c.

2293—SOUTH AUSTRALIA—A Review of Mining Operations in the State of South Australia during the Year Ended June 30th, 1906. (Issued by T. Duffield, Sec'y for Mines, under the Authority of the Minister of Mines. Adelaide, 1906; C. E. Bristow, Govt. Printer; 29 pp.) Gives statistics of prodution, men employed and development work carried on in this state during the above period.

2294—UTAH—Developments of Mining in Utah during 1906. R. H. Bradford. (Ores & Metals, Jan. 5, 1907.) Short review of the progress made in development of mining in the principal copper and lead districts of Utah during 1906. 20c.

2295—UTAH—Review of Mining in Utah. L. H. Beason. (Eng. & Mg. Jl., Jan. 5, 1907.) Describes the progress of mining and smelting in Utah, with estimates of metal production. 20c.

2296—VENTILATION—The Cooling of Mines. B. A. Smith. (Proceedings, Australasian Inst. of Mg. Engrs., Sept., 1906; 5½ pp.) Theoretical discussion of the thermal effects which must be obtained in order properly to cool deep working.

2297—VIRGINIA—Review of Mining in Virginia. T. L. Watson. (Eng. & Mg. Jl., Jan. 5, 1907.) Gives an account of the development of the mining industry in Virginia during 1906. 20c.

2298—WASHINGTON—Condition of Mining in Washington during 1906. J. C. Rathbun. (Ores & Metals, Jan. 5, 1907.) The mining conditions of various districts of Washington are briefly outlined. 20c.

## ORE DRESSING

2299—CLASSIFIER—Description of King's Patent Classifier. (Monthly Jl., Chamber of Mines of W. Australia. Nov. 30, 1906; 2½ pp.) Description of a device for increasing the capacity of the classifier by attaching the screen so as to free the feed from a large proportion of the slime. 80c.

2300—CONCENTRATION—Sur La Préparation mechanique et l'Utilisation des Minerals complexes de Plomb et Zinc. A. Bordeaux. (Revue univ. des Mines, Nov., 1906; 49 pp.) A review of the present state of concentrating lead and zinc ores as practiced in France, Germany, British Columbia and the Joplin District of the United States. Illustrated.

2301—CONCENTRATION—The Deister Concentrator at the Baltic Mill. L. S. Austin. (Mg. & Sci. Press, Jan 5, 1907.) Gives an account of the working of this concentrating table, which has been found to do good work in concentrating a one per cent. copper ore. 20c.

2302—CRUSHING—Breaking Piece for a Swinging-jaw Rock-breaker. G. E. Brown. (Instn. of Mg. & Met., Bull. No. 28, Jan. 10, 1907.) A device for rock-breakers whereby the machine is allowed to clear itself rapidly after the breaking piece has yielded, leaving the crusher free for repairs.

## METALLURGY—GENERAL

2303—ALLOYS—A. H. Sexton. (Mechan. Engr., Dec. 29, 1906; 4½ pp.) Describes the microscopic structure of the bronzes, and gives the results of different heat treatments of copper-tin alloys. 40c.

2304—BESSEMER PROCESS—The Temperature Increment in the Bessemer Converter. J. W. Richards. (Electrochem & Met. Industry, Jan., 1907; 3 pp.) Continuation of the author's series of articles on "Metallurgical Calculations," discussing the heat evolved by the oxidation of the metals which are present in the converter bath. 40c.

2305—CHROMIUM—Sur la Reduction de l'Oxyde de Chrome par le Bore. J. Binet du Jassonneix. (L'Echo des Mines, Jan. 10, 1907.) A brief article dealing with the production of chromium in an electric furnace, using boron as the reducing agent. Describes the operation of the furnace used, and the method of analysing the products. 40c.

2306—CUTTING METALS—The Art of Cutting Metals. F. W. Taylor. (Proceedings, Amer. Soc'y Mechan. Engrs., Jan., 1907; 12½ pp;) Discussion by various members of the Society of the above paper which was previously mentioned in the Index.

2307—ELECTRIC FURNACE—Its Evolution, Theory and Practice. A. Stansfield. (Can. Engr., Jan., 1907; 4½ pp.) Continuation of lengthy serial previously indexed, this instalment dealing with the the use of the electric furnace for the production of ferro-alloys, calcium carbide, aluminium, and the smelting of zinc ores. 20c.

2308—ELECTROCHEMISTRY AND ELECTROMETALLURGY in 1906. C. F. Burgess. (Elec. Rev., Jan 12, 1907.) Discussion of the progress of electrochemistry, dealing especially with the application of electric furnaces to steel and zinc smelting; also gives some account of progress in producing minor chemical compounds in electro-plating. 20c.

2309—ELECTROMETALLURGY—Die Elektrometallurgie im Jahre 1905 und im ersten Halbjahr 1906. Franz Peters. (Glückauf, Dec. 15, 1906; 10 pp.) Continuation of lengthy serial previously indexed, reviewing the progress of electrometallurgy for 1905 and part of 1906. 40c.

2310—METALLURGICAL ACCOUNTS. P. Argall. (Mg. & Sci. Press, Dec. 22, 1906; 5 pp.) Conclusion of article previously indexed, this instalment dealing with the production and shipping records, distribution of stores and of labor, and gives many suggestions as to the method of keeping them. 20c.

2311—METALLURGICAL PROCESS—Graphic Evidence of Metallurgical Progress. A. E. Matthews. (Ores & Metals, Jan. 5, 1907; 4 pp.) Development in the art of extracting metals from ores by illustrations of antiquated appliances. 20c. is outlined in a very interesting manner

2312—SMELTER CHARGE HANDLING in the Southwest. R. B. Brinsmade. (Mines & Minerals, Jan., 1907; 3 pp.) Discusses various features of smelting operation such as ore storage, bedding, furnace feeding, etc., as practiced in three modern smelters in Arizona and Mexico. 20c.

2313—SMELTER FUMES—Studie über die Verdichtung des Hüttenrauches. K. Friedrich. (Metallurgie, Dec. 22 1906; 6½ pp.) Conclusion of article previously indexed, dealing in this instalment with the erection, equipment and operation of double and quadruple-chamber systems for condensing fumes. 40c.

2314—SMELTING PLANTS—Depreciation of Plants. H. Haas. (Eng. & Mg. Jl., Jan. 19, 1907.) A discussion of several new features of which account must be taken in figuring the depreciation of smelting plants. Further contribution to the discussion on this subject which has been appearing in our columns. 20c.

2315—SMELTING PLANTS—Depreciation of Smelting Plants. W. McA. Johnson. (Eng. & Mg. Jl., Dec. 29, 1906.) Discusses a new reason for depreciation of plants due to advance in the art of smelting and of metallury. 20c.

2316—SMELTING PRACTICE—Weitere Beiträge zur Berechnung des Schmelzbarkeitgrades tonerdehaltiger Silikate. E. Kochs. (Zeit. f. ange. Chemie, Dec. 28, 1906; 10½ pp.) A long discussion of the fusibility of basic slags with high aluminum contents, and a consideration of the possibility of determining fusing points from the analaysis. 40c.

## MINING AND METALLURGICAL MACHINERY

2317—AIR COMPRESSOR—Clearance in a Compressor and Its Relation to Volumetric Efficiency. D. W. Hering. (Compressed Air, Jan., 1907; 2½ pp.) Mathematical discussion of the theory of air compression and discussion of the clearance in a compressor, and its relation to the efficiency. 20c.

2318—CABLES—Récherchés expérimentales sur la Résistance et l'Elasticité des Cables d'Extraction. L. Donoël. (Revué univ. des Mines, Nov., 1906; 25 pp.) A very thorough article, giving the results of tests and studies upon the strength and properties of mining cables. Second part.

2319—COMPRESSED AIR POWER PLANT—The Hydraulic Compressed Air Plant at the Victoria Mine. D. E. Woodbridge. (Eng. & Mg. Jl., Jan 19, 1907; 5 pp.) Interesting and complete account of the design, construction and operation of this plant for compressing air without the use of moving machinery. 20c.

2320—ELECTRIC POWER—The Reduction of Mining Costs by Electric Operation. A. Gradenwitz. (Eng. Mag., Jan., 1907; 7 pp.) A description of an installation of accumulators at Gross-Rhüden, Germany, for the purpose of overcoming fluctuations in load, and account of tests of this plant, with discussions of results obtained. 40c.

2321—ELECTRIC POWER—The Roaring Fork Electric Light and Power Co. (Elec. Rev., Jan. 5, 1907; 3½ pp.) Description of the present power houses and their equipment, belonging to this company in Aspen, Colo. 20c.

2322—ELECTRICITY Applied to Mining. W. Robinson. (Iron & Coal Tr. Rev., Jan. 4, 1907.) The fourth and last of a series of lectures before the Nat. Assn. of Coll. Managers, dealing with the control and application of motors. 40c.

2323—FANS—Calculations for Mine Ventilating Fans. J. F. Max Patitz. (Eng. & Mg. Jl., Jan. 19, 1907.) Gives a complete mathematical discussion of the different components to be determined in designing mine fans. 20c.

2324—GAS ENGINES—Design, Construction and Application of Large Gas Engines in Europe. F. E. Junge. (Power, Jan., 1906; 3 pp.) Continuation of lengthy serial previously indexed. 20c.

2325—GAS POWER—On the Evolution of Gas Power. F. E. Junge. (Proceedings, Amer. Soc'y Mechan. Engrs., Jan., 1907; 15 pp.) Discussion by members of the Society of the above paper which was previously mentioned in the Index.