

THE VIRGILINA COPPER BELT

A District of Unusual Advantages, Whose Opportunities Are Neglected

BY EDWARD K. JUDD

With the present demand for copper, the Virgilina district deserves serious consideration as a potential source of the metal. Its ores are rich and abundant, admirably suited for concentration and some of them self fluxing, and they lie only 160 miles by rail from a copper smelter on Atlantic tidewater. Within recent years, over a

considerably extended these limits both longitudinally and laterally. The region has a rolling surface and is well timbered.

The geology and the ores of the district have been the subject of numerous reports, of which the most recent only are noted below.¹ In brief, the country rock,

mentioned fissures, the richest ore has been found. All the fissures dip steeply to the east, being nearly vertical.

Several varieties of copper minerals occur without any apparent dependence on the position or character of the vein. Bornite is much the commonest; copper glance, or chalcocite, is the next in im-



HOLLOWAY SHAFT



BORNITE ORE FROM DURGY MINE

dozen mines on the belt have maintained regular shipments of smelting ore, or concentrates; today only one mine is shipping and this one is the farthest of all from the railroad, while its ore is by no means above the average. The blame for this stagnation is about evenly divided between lack of capital and corporate mismanagement, while, in some few cases, professional incapacity has contributed.

LOCATION AND GEOLOGY

The Virgilina belt lies half in Virginia and half in North Carolina; the town Virgilina, which is on the Norfolk and Danville division of the Southern Railway, and is situated exactly on the boundary line between the two States, forms almost the exact geographical center of the belt. This, as now developed, has a width of 5 miles and a length of 20 miles; although recent exploration has

andesite, has been rendered schistose by dynamic metamorphism and has been extensively intruded by traps and porphyries, while, in other cases, the fissures have been filled with quartz. The prevalence of epidote and chlorite gives the andesite a dark, basic appearance, and bears evidence to the metamorphic nature of the rock, while the walls of many of the veins are beautifully smoothed. The parallelism of the vein system is a marked feature; to the south, the fissures strike N. 12 to 20 deg. E., but toward the northern end they hold more closely to the meridian. Veins striking as much as N. 12 deg. W. are also observed, and where one of these crosses one of the first

portance, while carbonates, both blue and green, occur on all the outcrops. In some of the veins, the black sulphide, covellite, is an important component. A recent development, of much possible importance, is the discovery, close to the surface, of the red oxide, and native copper. The latter is contained both in quartz veins, which, curiously, carry an occasional tuft of chrysotile asbestos, and in a basic intrusive. Calcite is a common associate in all the quartz veins of the belt, occasionally in sufficient proportion to aid greatly in smelting the ore. Then the sulphides, by permeating the fractured walls of a vein, frequently form a workable ore of which epidote is the principal gangue mineral.

NON-PRODUCING MINES

The positions of all the important mines in the Virgilina copper belt are sufficiently

¹Trans. Am. Inst. Min. Eng., Vol. XXX, p. 449—W. H. Weed. Bull. Geol. Soc. of America, Vol. 13, p. 353.—T. L. Watson. Economic Geology, Vol. I, No. 4, p. 309.—T. L. Watson and W. H. Weed.

shown by the accompanying map. The railroad branch is in working order, and over it are made the daily shipments from the Durgy mine, which will be described after we have outlined the character and

and heavy shipments of ore from this mine, carrying 3 to 4 per cent. copper in fines, 10½ to 11 per cent. in second-class ore, and 32 to 40 per cent. in first-class. The reason for the cessation of mining

shipped. The mine is only one mile, over a feasible route, to the railroad. The mine belongs to J. H. Morong, of Virgilina.

The Morong Mother Lode mine has two shafts, each 100 ft. deep. The ore is bornite in an epidote gangue, much like the Holloway ore. A concentrator for a dry treatment of the ore was begun here, but never completed.

The Seaboard mine has been rather extensively developed and its 100-ft. shaft is completely equipped. About 1000 tons of picked sulphide and carbonate ore are on the dump, which, if shipped—and the railroad is only two miles away—would provide funds for further production. Boilers, pumps, hoists, crushers, all of expensive designs and recent construction, and a raft of pipes and drill steel lie rusting on the ground, without so much as a coat of paint to protect polished journals and bearings. There is no reasonable excuse for this wastefulness. The mine is the property of Bailey & Co., of Boston.

The High Hill mine, at the extreme north of the district, has all the advantages but that of proximity to the railroad. A lavish expenditure has been consumed in the building of a concentrator and all the surface appurtenances of a mine, and, at the same time, the orebody has been thoroughly developed by a number of shafts, some of which are over 400 ft. deep, and an adit level, and good ore is certainly there. Internal dissensions, as well as the expense of shipping, are retarding progress at this mine. It belongs



SHAFT NO. 3 AT HIGHLAND MINE

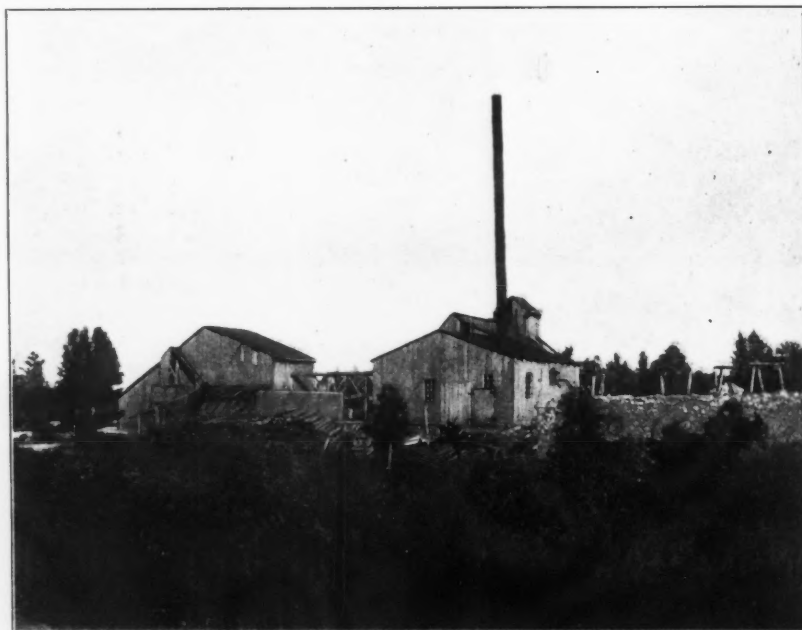
present condition of some of the non-active mines.

The Blue Wing lies close by the railroad branch. Its shaft is 422 ft. deep and is equipped with most of the necessary plant. The mine has been thoroughly developed, but little stoping has been done. The fissure carries a double vein, 4 ft. wide over all, its two stringers being separated by a uniform streak of country rock. The ore is bornite and carbonates, in a quartz and calcite gangue. About 1500 tons of hand-cobbed ore are on the dump, of which the finer part carries 6½ per cent. copper, and the coarse, 4½ per cent. The ore, now waiting for shipment, averages \$12.50 in silver and \$7.50 in gold. The outcrops of parallel and not distant veins are plainly visible. This mine ought to be worked. It is controlled by John T. Williams, of New York.

The Holloway has been the heaviest shipper, and it was for its benefit that the railroad was built. Mining ceased four years ago, not because ore failed, but pending change of ownership. The main turns of past years reveal long continued vein, which has been stoped for 1000 ft. along the strike and with a width of 100 ft. in places, has the course N. 12 deg. W., contrary to the usual occurrence. It is intersected by one or more normal fissures, but no development has yet been directed to these junctions. The ore is copper glance in quartz, with rather more than the usual proportion of calcite and epidote. Nothing remains on the dump but hand-cobbed waste. The smelter re-

here is not obvious. The property belongs to W. M. Pannemaker, of Virgilina.

The Copper King ore exhibits nearly all the minerals of the district. Bornite and



BLUE WING SHAFT

carbonates form the metallic portion, while calcite and epidote greatly exceed quartz in the gangue. At the bottom of the 100-ft. shaft which is in ore, a crosscut 30 ft. long has not reached either wall. The resources of this mine have scarcely been tested, but some good ore has been

to the Virginia Copper Company of New York.

THE DURGY MINE

It is a relief to turn from this depressing scene of inactivity to the vigorous progress now under way at the old Yancy, now called the Durgy mine. This

is owned by the Person Consolidated Copper and Gold Mines Company, whose post office is Durgy, N. C. The entire credit for the present favorable condition is due to F. Durgy and Mr. Clice, the managers at the mine. The property extends for 2½ miles along the strike of the vein, with a width of ½ mile, containing over 1500 acres. The most unfavorable feature of operation is the necessity of hauling by wagon 5 miles to the nearest railroad point. This is done by the company's own teams at a cost of about 60c. per ton.

The quartz vein, carrying both bornite and chalcocite, cuts at a high angle through slaty andesite, the cleavage of which also is steeply inclined. It ranges from 8 to 12 ft. wide, but the richest ore is found in the 2 ft. of vein matter nearest the footwall. Here it persists as an almost solid band of sulphides; elsewhere it is more streaked and disseminated. Numerous masses of country rock are met in the vein. A trap dike, 2 ft. thick, follows closely the course of the vein, here on one side and there on the other, and occasionally departing for some distance into the wall. Since the dike cuts the vein, it was obviously intruded after the vein was formed, and had no connection whatever with the origin of the ore.

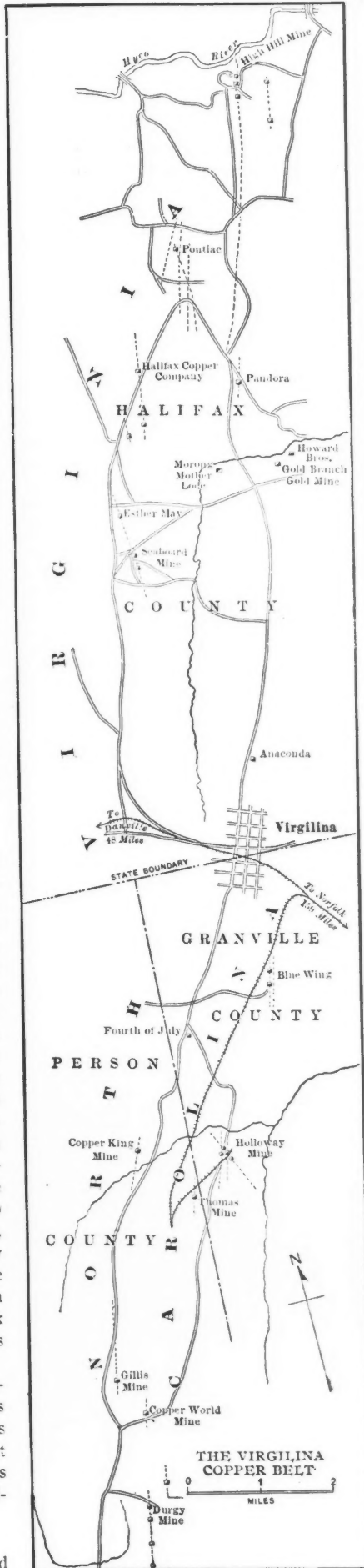
The main shaft has been sunk in the vein, with an inclination of 9 deg. from the vertical, to a depth of 400 ft., and drifts have been opened on three levels, the bottom one the most extensively. A cage, with rollers at top and bottom, runs on oak guides in the single hoisting compartment.

The ore is obtained by underhand stoping, which is confined to the payable portions of the vein. Full-sized air drills, mounted on columns, are used here. After the drift has been run, chutes are cut in the footwall, and a row of stulls is braced across the vein, and lagged. Stoping then continues upward from these, and a second row of timber is put in. As height is gained, the lagging next to the footwall is removed to allow the ore to fall to the bottom row, where it can be delivered to cars, but most of the lagging on the intermediate stagings is left in place. In this way a considerable quantity of unnecessary timber is used, which might be obviated by carrying a board chute up with the stoping. The cars are of steel, 18-in. gage, and hold 1 ton of ore. They are hoisted to a landing level 13 ft. above the ground, and proceed thence across a 200-ft. trestle, to the mill. By a track scale, the average weight of the carloads is ascertained.

Some hand-picked ore is shipped without milling; this has assayed as high as 29 per cent. copper, but the average is around 20 per cent., which is somewhat lower than the grade of concentrates shipped. The average grade of the milling ore is 2½ to 3 per cent. copper.

THE DURGY MILL

The mill was only recently completed



by the American Concentrating Company. It is operated by a 100-h.p. engine, while another 40-h.p. engine drives a dynamo for electric lighting and some small motors. The ore is easily concentrated, for jig tailings as coarse as ¼ in. are discharged with not enough copper in them to pay for crushing and re-treating. The concentrates average 30 per cent. copper and 20 oz. silver, while gold is allowed for at \$3.50 per ton.

The milling process is sufficiently indicated in the accompanying diagram. Water is freely used during all screening operations, to avoid sending slime to the jigs. The bucket elevators are improved by being incased in compartments of large dimensions, which reduce the likelihood of choking. The jig is of the New Century Submerged Sieve type, having a maximum capacity of 500 tons in 24 hours, and the tables are ordinary Wilfleys, improved by substituting for the toggle-joint support a rocker bearing, whereby the motion is freed from the vertical component, and is maintained horizontal at all times.

PROSPECTS OF THE DISTRICT

The westward course of empire seems to be the only explanation of the desuetude into which the Virgilina belt has fallen. A hundred camps in the Southwest are mining ore not half so rich, and are paying smelting charges in no way less onerous, while their output has to travel 2000 miles to market. The Virgilina mines have, almost without exception, fallen into the hands of companies devoid of mining sagacity, without the funds to prosecute work, and with no interest in the welfare of the district. They have in many cases stopped working just as success seemed assured.

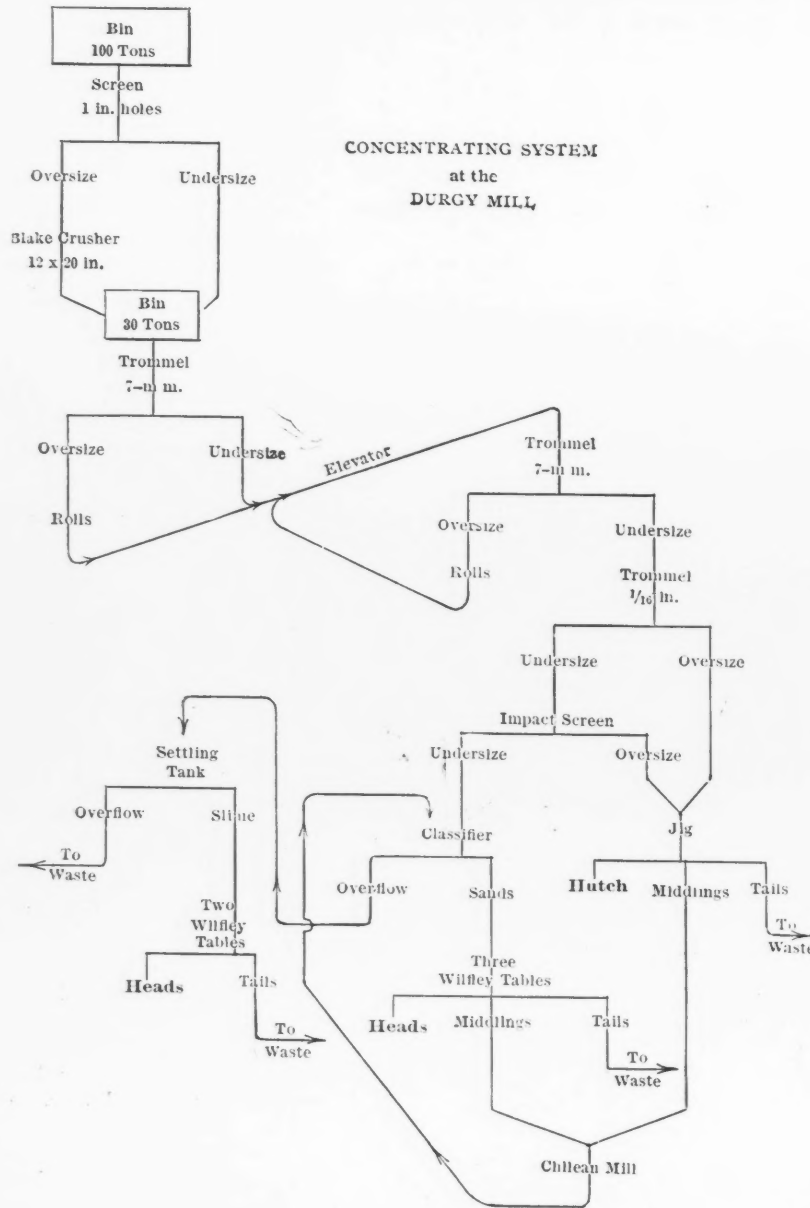
Undoubtedly the disposal of the ore has been one deterrent factor. The nearest smelters are those at Norfolk, Va., owned by W. E. C. Eustis, of Boston, which have a combined capacity of 350 tons per day. The freight rate from Virgilina to Norfolk is \$1.35 per ton. For a long time these ores were smelted here, together with the clinker residue of Newfoundland pyrite, which had been burned for sulphuric acid, but the miners hold some resentment against this smelter, probably because it has allowed little or nothing for gold and silver. They are now consigning their ores to the New Jersey plants of the American Smelting and Refining Company, and the Nichols Chemical Company. Although calcite is abundant in some veins, taking the district as a whole, the ores are highly silicious, and this undoubtedly explains the high smelting charge, though the miners, not appreciating this point, feel unjustly treated. They have even considered the erection of a jointly owned smelter on the field itself, or at Danville; this would be an ill-advised step, until the mines have given evidence of more regular productiv-

ity, and even then, more perfect concentration of the ore would solve the problem just as satisfactorily, in another way. Heretofore hand cobbing is all the preparation that the ore has received. Copper properties never had a better opportunity than the present one for profitable operation, and the Virgilina operators, with all their

Magnetic Separation in Wisconsin

A test was made at the Rowley roaster, May 29-31, 1906, which is of considerable interest, inasmuch as it demonstrated that zinc blende ore carrying over 45 per cent. of iron pyrites could be brought up to a fairly high grade. In connection with this

feeder. The whole amount of tailing for the 48 hours was weighed and samples taken from pile with tube sampler. The weight of finished heads was ascertained and ore was sampled from bin with tube sampler. The total amount of oversize for the 48 hours was weighed and pile sampled with tube sampler. All samples were coned and quartered sufficiently to reduce them to laboratory size.



ASSAYS*

Product.	% Zinc.	% Iron.	% Lead.	% Limo.
Roasted ore	53.95	3.15	0.37	4.17
Mill concentrate...	24.45	27.95	0.20	3.32
Over-size...	9.50	.....	.....	.....
Tailings.....	3.15	.....	.....	.....

CALCULATIONS

Mill concentrates; Net ore in feed box, 350 lb. Number of boxes fed in 48 hours, 138; total ore fed, 48,300 lb.=24.15 tons. Moisture, 2¼ per cent.; total ore fed (dry), 47,213 lb.; total zinc in concentrates, 11,544 lb.; per cent. of FeS₂, 59.95 Tailings: 56 barrows net, 16,594 lb.; total zinc, 533 lb.

Over-size: 29 boxes net, 2422 lb.; total zinc, 230 lb.
Finished heads: Total weight finished heads, 16,879 lb.; total zinc content, 9064 lb.

Operating costs: 2769 lb. coal per 24 hours, 1.38 tons. Coal per ton, including \$0.15 for unloading, \$3.35. Cost of firing kiln for 24 hours, \$4.62. Two roastermen at \$2.50, \$5. Operating 15 h. p. plant on 3½ lb. coal per h. p. per hour, per 24 hours, \$2.11. Total cost per 24 hours, \$15.08.

Estimated: Cost per ton of concentrates treated, \$1.25. Mill concentrates treated per 24 hours, 12.07 tons. Percentage of FeS₂ in mill concentrate, 59.95. Zinc fed to kiln, 48 hours, 11,544 lb. Zinc in finished heads, 9045 lb. Zinc in over-size, 230 lb. Zinc in tails, 522 lb.

Result: 12.07 tons of mill concentrates running 59.95 per cent. iron pyrites were treated in 24 hours at a cost of \$1.25 per ton. The concentrates contained 3.15 per cent. of iron and the tailings therefrom contained 3.15 per cent. zinc.

According to a Reuter despatch, the currency ordinance has been passed in the Straits Settlements, and henceforth gold will be legal tender in the colony. The new dollar weighs 416 grains with 0.800 fineness. Dollar notes will be issued to relieve the pressure upon silver. The readjustment of the Straits Settlements currency, made necessary by the rise in the price of silver, has been secured by a slight debasement of the dollar. The fineness of the new dollar is to be 0.800 instead of 0.900, and it is worth at the present price of silver 2s., 11/16d. on this basis. It thus becomes a token coin. The measure is expected to be somewhat distasteful to the natives, but they have lately shown growing readiness to handle notes, the circulation of which has increased to a gratifying extent.

advantages, are certainly not making proper use of them.

At the Broken Hill Proprietary mine, N. S. W., the miners, backed by the Australian Miners' Association, have started an agitation for an increase of wages. There is a disposition on the part of managers to adopt a sliding scale based on the price of lead, if the men will agree to take lower wages than prices decline. The present rates are: Underground men, 9s. per day; truckers, 7s. 6d.; surface hands, 7s. 6d. Men on contract work make about 11s. per shift.

test it should be remarked that the Rowley roaster is one of the most simple, in points of construction, in the district. The test was made in order to ascertain the merits of so simple a plant. The results were as follows:

The test was made for 48 hours actual running time, starting May 29 at 12:10 A. M., and ending May 31 at 1:15 A. M., the delays amounting to one hour and five minutes. The test was started and stopped with a full kiln. Boxes of known weight of mill concentrates were fed into the roaster, the number of boxes being tallied by the engineer in charge and the

THE WALL CONCENTRATING MILL

A Unique Dressing Works at Bingham, Utah

BY CLAUDE T. RICE

This mill is located about in the center of the straggling town of Bingham. It is a custom mill run by Col. E. A. Wall, the man who first recognized the value of the disseminated copper ore in Bingham cañon and developed the Utah Copper Company's orebody. The mill is run to accommodate the small producers in Bingham cañon and also as an experimental plant to demonstrate the worth of Colonel Wall's new devices for ore dressing. One finds many novel machines in his mill. Many of them have not yet proved valuable, but his jig, at least, is beginning to make a name for itself. Colonel Wall jokingly refers to the plant as his "Jim Crow mill." Besides his own inventions,

sign posted up inviting visitors to come in and look around. Anyone is at liberty to take samples of any and all products.

GENERAL ARRANGEMENT

The ore dressed in this mill contains galena and pyrite. It is hauled in wagons from different mines and at the mill is dumped into a 200-ton bin at the top of the building. The mill is erected on a hill-side and has three main terraces, viz.: the breaker floor, the roll floor, and the table and jig floor. On the breaker floor are the Blake breaker, the sizing screen, and the roughing jig.

The ore as received from the mines is wet and frequently it is necessary to have a man in the bin to wash it out with a

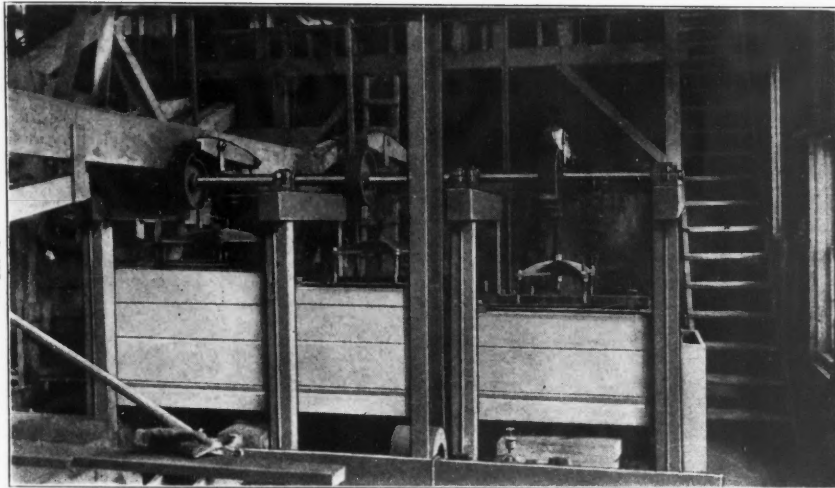
which there are two Wall jigs and one Harz jig, fitted with a Wall lever motion to move the plunger. These jigs produce a lead product and tails which go to the creek.

The undersize from the 30-mesh screen goes to four tables, viz.: two Wilfleys and two Walls. The heads and middlings from both these tables go to the concentrate trough, while the tails go to the creek.

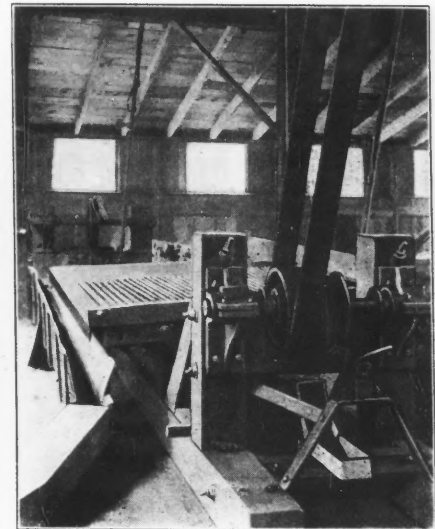
The tailings from the Wall tables and the Wall jigs run about 0.3 per cent. lead. The foreman of the mill says that the saving of lead is about 88 per cent., while Colonel Wall says that it is about 93 per cent. Some of the pyrite is thrown into the tails, because the concentrate of the ore of which most is treated fetches the better price the higher it is in lead.

THE WALL ROLLS

The first novel thing in the mill is the



WALL JIG



WALL TABLE

it contains two or three of his foreman's, F. H. Bemis.

The Wall jig has been used at the Cactus mill, Utah, replacing the Hancock jig which was tried there. A Wall jig has also been put in the Daly-Judge mill, at Park City. Colonel Wall's table has not as yet been tried elsewhere than at his own mill, but apparently it is doing good work there.

Colonel Wall jigs his ore without close sizing. He has made a good saving on unsized ore running from five mesh to 200 mesh, but because of the gentler and shorter stroke required with the fine ore, and the consequent reduction in capacity a rough sizing is given the oversize, above five mesh being treated on one jig, and the product from five mesh to 30 mesh on other jigs. The sizes below 30 mesh are treated upon Wilfley and Wall tables, working side by side, so they afford a good comparison.

Many men developing new machinery are secretive, but at this mill there is a

hose, or else to shovel and push it out. From the bin the ore passes over a grizzly having 1-in. openings. The oversize goes to a 9x15-in. Blake breaker which crushes it to about $\frac{3}{8}$ -in. size. The product from the breaker, together with the undersize of the grizzly, goes to a set of Wall corrugated rolls. This feeds a cross-belt elevator which delivers to a trommel having a five-mesh (No. 14 wire) screen. The oversize from the trommel goes to a three-compartment Wall jig. The tailings from this jig go to the creek, while the concentrates go to the bin.

The undersize from the trommel goes to a shaking screen, the invention of Mr. Bemis. In this are a 10-mesh (No. 20 wire), a 20-mesh (No. 26 wire), and a 30-mesh screen. These screens above the 30-mesh are put in only to relieve the 30-mesh; otherwise, because of the small area of the screen surface, the 30-mesh would be overburdened. The sizes above the 30-mesh screen go by means of a launder to three-compartment jigs, of

Wall rolls. These are 16 in. in diameter and have a 16-in. face. The roll faces have spiral corrugations about 2 in. deep, the corrugations meshing together. Colonel Wall claims that this gives the rolls a larger capacity and reduces the percentage of slimes. These rolls were once tried at the old Boston & Montana concentrator at Butte and at the Washoe mill, Anaconda, and did indeed give an increased capacity, but they wore out too fast and there was trouble with the boxes, owing to the side thrust. Colonel Wall claims that he now makes the rolls strong enough to resist the strain. At his mill they have been run several months and have given no trouble. These rolls are driven at a peripheral speed of 375 ft. per minute. They are driven by a belt which drives a set of gears which drive the rolls.

Colonel Wall has another type of roll which he is going to try on the low-grade copper ore from his Starless mines. It consists of a lower roll rotating in sta-

tionary boxes, on which rests another roll mounted in movable bearings running in vertical guides. The top rolls are held down by their weight and also by heavy springs. The rolls are belt driven and are fed by an inclined chute leading down to them.

CROSS-BELT ELEVATORS

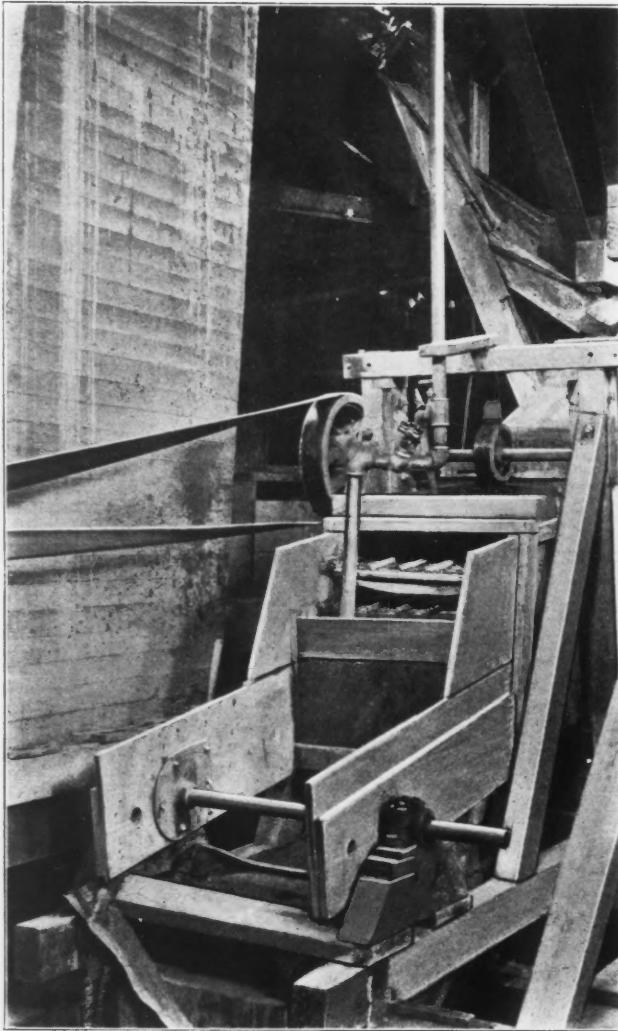
At the Wall mill, the belt elevator taking the ore and water from the rolls is run crossed.¹ This perhaps is the only crossed-belt elevator now in the United States. At first this way of running a belt elevator looks absurd, but it has certain

place the discharge spout lower and so have a better chance to discharge the wet material than in a straight-belt elevator. When the elevator is very high there is less tendency for a loose belt to flap and thus wear itself out. It is possible to put in a trap where the belts cross, which will catch practically all the slobberings that fall down and keep them from getting between the belt and the lower pulley. A jet of water is played on the buckets as they dump, so as to wash out cleanly the ore which settles in the bottom of the bucket.

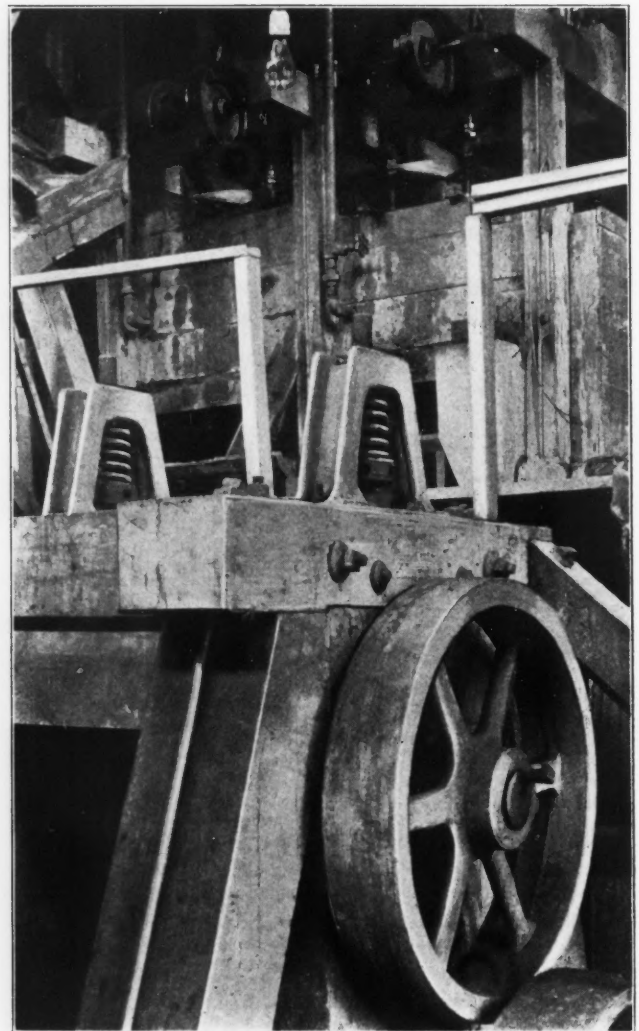
compressing two springs. When the cam releases the tappet the springs send the frame-work up quickly and it hits a bumper. The upward bump has a tendency to keep the springs from blinding. This screen seems to do good work, for it does not blind up. It is the invention of F. H. Bemis and is patented.

THE WALL JIG

The Wall jig is highly commended by all the Utah millmen who have investigated it. It is one of the moving screen type of jigs. It consists of three different screens actuated by three dif-



BEMIS SCREEN



WALL ROLL

merits. For one thing, it enables the ore to be discharged on the same side as it is fed, which sometimes is desirable. Moreover, with a crossed-belt elevator the lower pulley is running in the opposite direction to the upper one, and consequently grit, etc., which fall, are thrown off the wheel instead of being carried along between the wheel and the belt and so cutting out the belt. Furthermore, in a crossed-belt elevator it is possible to

¹According to Frank Janney, superintendent of the mill of the Utah Copper Company, crossed-belt elevators have been used successfully at various mills in the Bingham district for the last 15 years.

One of these crossed-belt elevators has raised, before wearing out the belt, 17,000 tons of crude ore besides the oversize back-feed, which probably brought the total amount up to 22,000 or 23,000 tons. This was an 11-in. seven-ply ordinary rubber driving-belt.

THE BEMIS SHAKING SCREEN

Another novel feature of the Wall mill is the shaking screen, which consists of any number of screens placed vertically one above the other at a slight angle, in a frame-work running in guides. This frame is forced down by a rotating cam

ferent cams which operate in three different hatches. Of course more compartments can be used if desired. By means of a rotating cam and lever the screen tray is lifted up slowly and then dropped quickly, giving a weak suction and a strong pulsion to the material. The fine material discharges into a hatch having a V-shaped bottom, while the coarse stuff discharges automatically through a device at the end of each screen. The bridge piece which regulates the depth of screen bed is adjustable so that the depth of bed can be maintained at any

thickness desired. As this slot for drawing off the material is as wide as the screen, a very even bed is obtained on the screens. Moreover, as this is self-maintaining, but very little attention is required. In order to keep even conditions in the hutch, the hutch product is discharged with considerable water. In case water is scarce, this water can be returned and used over again. The screen discharges into a trough placed in the hutch box and is carried to a spout which discharges on the outside so that the product from the screen can be seen and the depth of bed regulated.

In the latest type of this jig, Colonel Wall has adopted the cam and tappet motion used on his table instead of the cam and lever motion. The tappet allows an easier adjustment of the stroke than the lever, but in either case the length of stroke can be regulated while the jig is running, and there is no danger of its changing, as is generally the case in the ordinary eccentric motion of the Harz jig.

As has been previously mentioned, Colonel Wall's car. jig and does jig unsized stuff and makes a good saving of mineral. He claims as the good points in his jig, the following: (1) The fact that the moving screen requires less repair than the maintenance of the plunger in the Harz jig; (2) the ability to adjust the throw while in motion and the permanence of this adjustment; (3) the uniform depth of bed obtained by his discharging device; (4) the even effect of the current over the entire screen area, which cannot be obtained with a Harz jig; (5) the fact that each of his compartments is independent and has the ability to discharge itself, a feature the Hancock jig does not possess; (6) the ability to jig unsized material.

THE WALL TABLE

The Wall table consists of a table surface placed on a truss-work which rests upon four supporting hinges placed upon two beams. Fastened to these beams are two uprights which carry the cam shaft and also serve as the bumper. The Wall table is simply an improved Gilpin county bumper, but instead of bumping in compression, like its prototype, the bumping is done in tension, so that there is no tendency to buckle the surface of the table.

The bumping mechanism of the Wall table consists of a rod threaded at each end. On the table side of this rod, resting against the box in which the rod moves, is a spiral spring, put into tension by a nut. Mounted on the upright is a cam engaging a tappet which is held up against a nut by a spiral spring abutting against a bumping collar welded upon the rod. The rotating cam engages the tappet, moves over the table toward the left and compresses the spring. The tappet is released and the table is sent back by the spring until the bumper

strikes the box in which the rod moves, giving the table a bump. The violence of this bump is determined by the amount of original compression in the spring and also upon the length of stroke given the table. The length of stroke can be regulated by moving a nut. The compression on the spring is also regulated by moving a nut. Either of these adjustments can be made easily while the table is in operation.

The surface of the table is 8 ft. long by 5 ft. wide and is rectangular in shape. The feed end consists of a series of rifles, parallel with the length of the table. A space of 2 ft. 4 in. at the discharge end is surfaced with corrugated rubber, of which the corrugations also run parallel with the length of the table. The rifles are $\frac{3}{4}$ in. wide and $\frac{3}{4}$ in. apart. The corrugations in the rubber are about $\frac{1}{8}$ in. deep. The ore is stratified in these troughs by the bump, and is also sent by its inertia toward the discharge end. It is gradually forced to climb higher and higher, allowing the lighter upper strata to wash off from the underlying strata until finally it reaches the corrugated-rubber surface. The ore travels this surface and the remaining gangue is washed out by the feed water, each corrugation filling with concentrate. The overlying concentrate washes down the slope until finally all the corrugations down a certain distance are filled with heavy concentrates. They then begin to fill with lighter concentrate or middling and so on. The concentrates are conveyed across this corrugated surface to the discharge end, while the tails wash down the slope.

The table can be run at any speed from one stroke per minute up to such a speed that there is only a momentary pause between strokes, and the bump is always uniform, for its intensity depends not on the speed but upon the spring. No high speed of stroke is necessary, as in the Wilfley table. The Wall table is run at about 165 strokes a minute and is given about $\frac{5}{8}$ in. throw.

Owing to the fact that the concentrates on the Wall table travel faster than on the Wilfley, the Wall table has a higher capacity. The tables have not been run long enough to know whether they will stand up to their work without many repairs or not. They are doing good work at Col. Wall's mill, only the slight traces of lead being visible on panning the tails. They are working alongside Wilfley tables and apparently doing as good work as the Wilfley, if not better.

COST OF MILLING

The power plant at Col. Wall's mill consists of a 60-h.p. Fraser & Chalmers boiler and a 40-h.p. engine. The mill averages 41 to 46 tons of ore in 8 hours. It takes $\frac{3}{4}$ of a ton of coal and the following men to run the mill. One man in bin (when treating wet ores), \$2.50; one engineer, \$3.25; one feeder, \$2.75; one wheeler, \$3.; one jigman, \$3.50; and one

foreman, \$5.50. The cost figures up about 50c. per ton, exclusive of repairs, etc. This is quite creditable for a small custom mill. The price charged for custom work is \$1.50 per ton, although in the same advertisement Col. Wall announces that it costs him only 50c. per ton.

Mine Accidents on the Witwatersrand

BY T. LANE CARTER

Another awful mine accident on the Witwatersrand has to be noted. Oct. 20, as the cage on the Simmer East mine was being lowered with 23 Chinamen, the rope broke. The Simmer East is a property controlled by the Consolidated Goldfields, and is run by Chinese labor. The cage which broke was a double decker. It had descended about 700 ft. when there was an ominous creaking of the rope. The cage swerved, struck the sides of the shaft, and the rope suddenly broke, when the cage fell to the bottom of the shaft, a distance of 1200 ft. Most of the shift were on the surface, waiting to go below, but the calamity has naturally caused a cessation of work on the mine. When the rescue party reached the bottom of the shaft they found a shocking sight awaiting them. The poor Chinamen were dashed into a jelly. It was impossible to distinguish one coolie from the other, and they all were buried in one grave as a mass of crushed humanity.

There is a safety-catch commission investigating appliances and schemes for the prevention of these shaft accidents, and it is to be hoped that as a result of their labors some practical devices will be forthcoming. This is the second time since the War that men have been killed by the breaking of the cage rope. In 1904 over 40 Kafirs were killed by the breaking of the flat rope at the Robinson Deep mine. The rope used at the Simmer East was a round rope.

Besides these two rope disasters there have been two other calamities since the War. In November, 1905, a white miner and 67 Kafirs were killed at the Driefontein Deep, owing to the collapse of the main shaft; and on the South Rose Deep, on Feb. 9 of this year, the flooding of the shaft resulted in the death of 53 Kafirs.

In a paper on "The Genesis of Ore Deposits" in *Annales des Mines des Belgique*, XI, Liv. 3, L. Demaret concludes as follows: "As a rule, the outcrops of metalliferous deposits are richer than the deeper parts. It is surely so with deposits subject to superficial decomposition, like gold and silver. Consequently, deposits with outcrops that have been mined out must be regarded as dubious. Good metalliferous deposits are rare, though some exist which have been missed for centuries, and it may be taken for granted that there are others yet to be found."

Diamond Drills vs. Churn Drills

BY JAMES HUMES.*

There is a great "porphyry dike," so called by the local mining men near Rimini, Mont., which for some time has been in the hands of some of the big mining operators of Butte, i. e., over 1000 acres of it is so held; and the immediate management is in the hands of an expert mining engineer, Colin McIntosh.

The company was desirous of prospecting as much of this dike as possible during the short summer that obtains in these mountains, and inasmuch as the mining done on this property heretofore was widely scattered, it was necessary to employ some rapid means of prospecting the large area, and, as we all know that there is no method whereby a hole can be put into the earth faster than with a churn drill, the company bought six machines of the best make on the market, and the churn-drill company sent out an expert to see to the proper handling of the machines, so that there was no hitch in the operation of the drills. Indeed, they do the work rapidly and cheaply when conditions are favorable.

The purpose for which those drills were bought was to secure an average of the low-grade ore of the porphyry, which contains free gold and is so very low in value that it requires the nicest discrimination in the sampling of the drill results.

The plan to be pursued with the churn drills was to drill a hole on each of the four corners of a 100-ft. square. This plan was carried out until something like 30 holes had been drilled, averaging about 50 ft. each.

Before many holes had been drilled the management made the discovery that the samples could not be depended on. Then they doubled back on all of the holes already drilled, i. e., they drilled a second hole as close to the first one as possible. The samples from any pair of holes would not agree. They could not for the following reasons:

The churn drill employed embodied one of the principal features of the diamond drill, viz.: hollow rods for the passage of water. In the diamond drill the water is forced down to the bit through the inside of the rods, while in the churn drill it is forced down on the outside and the plunging of the rods acts like a pump, forcing the water and cuttings through two small holes at the upper end of the bit, and on up through the rods to the sample bucket on top. This is a case of where the wrong application of a good principle is detrimental to correct results.

The plunging of the rods up and down, and the attendant vibration, helped along

by the water that is poured down outside of the rods, will cause any of our soft formations to cave, and this debris is ground up in the bottom of the hole, and forced out through the rods with the cuttings from the bottom, and all goes into the sample bucket and it would be impossible to "salt" sample in any better way.

Mr. McIntosh tried many ingenious schemes to overcome those difficulties, but no man could succeed in getting correct results from soft friable formations with the application of the churn-drill methods. One of the schemes tried was to plug the water holes in the bit, then drill for four or five feet almost without water, just enough to keep the bit from sticking, then withdraw the tools, send down a barrel with a corkscrew point to it, by turning which the barrel would be filled with the cuttings. But this scheme also had its disadvantages, as I observed on the last day that the churn drills were operated.

The drill man had made his run of 5 ft. and was about ready to withdraw the tools when down went the bit into a cavity, and he lost all of the cuttings. There was not one hole drilled without cutting into several cavities. So it will be easily understood that results from the above two methods could not be relied upon.

A few days previous to the above incident, Mr. McIntosh had sent for me to see what could be done under the above conditions with a diamond drill. The result was that a Sullivan "H" diamond drill was put to work on the job, and we found that it was an easy thing for a diamond drill with first-class runners; with poor runners the diamond drill was no better than the churn drill. The good men produced 90 per cent. of the core. As for the cuttings we never saw any; the rock was so full of cavities that the water did not come to the top of the holes.

The great drawback to the more extensive use of the diamond drill is the lack of first-class operators, and the high cost of carbon (now \$85 per karat).

I have spent nearly 40 years in and about mines, and have found that one can take men of ordinary intelligence and make first-class enginemen, pumpmen, rock-drill runners, carpenters, etc., but when one tries to make a first-class diamond-drill prospector, he finds in nine cases out of ten that he has made a failure.

Even admitting the above great drawback to the general use of the diamond drill, I am bold enough to state that it is one of the most economical factors that can be employed in mining operations, and when its possibilities are better known, it will be more extensively used. This brings to mind an incident in the Mollie Gibson mine at Aspen, Colo., where I was operating a drill. The manager, W. J. Cox, and the superintendent, Joe Scott (who

are now at the Camp Bird mine), came to where I was drilling. Mr. Cox said, "Jim, what is the matter? It is nearly a year since you have found any ore." I had to admit that such was the case. "Well," he said, "if you don't show us where to get the ore, at least you let us know where we need not go for it." The point is obvious.

The high price of carbon and the lack of good men to operate the machines are the chief reasons why some mining men are turning their attention to the use of the churn drill, but the churn drill will never take the place of the diamond drill in mine practice.

Mine Labor in the Transvaal

SPECIAL CORRESPONDENCE

The continued depression in the Transvaal has resulted in the closing down of more mines in the development stage. The directors of these companies argue that it is unwise to continue sinking their deep shafts with the future as obscure as it is just now. Should the Chinese be repatriated, it will be almost impossible to keep the present producing mines going at their full capacity. There will be no labor to spare for developing the deeper deeps.

What about labor? This cold-blooded question freezes up many an enthusiastic promoter. A man comes to your office, takes a seat and gives you glowing accounts of a new proposition he wants to float. After hearing about the high assays, the natural advantages, etc., you ask the question where the labor is to come from to work this new proposition. The promoter then carries his mine to a more sympathetic hearer.

Even now some of the producing mines are having great difficulty in keeping all their stamps running, on account of the scarcity of unskilled labor. The last batch of Chinamen has arrived from China, so that no more labor is obtainable from that source for the present. The half-caste laborers, the "Cape boys," are a recalcitrant lot of workmen, and are far from satisfactory. Desperate efforts are being made to obtain more Kafirs, but without much success.

In the Rhenish-Westphalian coal field the deepest shaft is that of the Werne colliery, which is 850 m. deep. Great depths have also been reached by the following collieries: General Blumenthal (841 m.), Ewald (742 m.), Hanse (720 m.), and Schlägel und Eisen (700 m.). The deepest shaft in Germany is at Morgenstern colliery, Zwickau, Saxony (1028 m.), and in Belgium, and probably in Europe, the Produits colliery at Flénu (1161 m.), with workings extending to 1196 meters.

* Basin, Mont.

Use of Wood in Matte Smelting, together with Results of a New Hot-blast Stove

BY S. E. BREThERTON.*

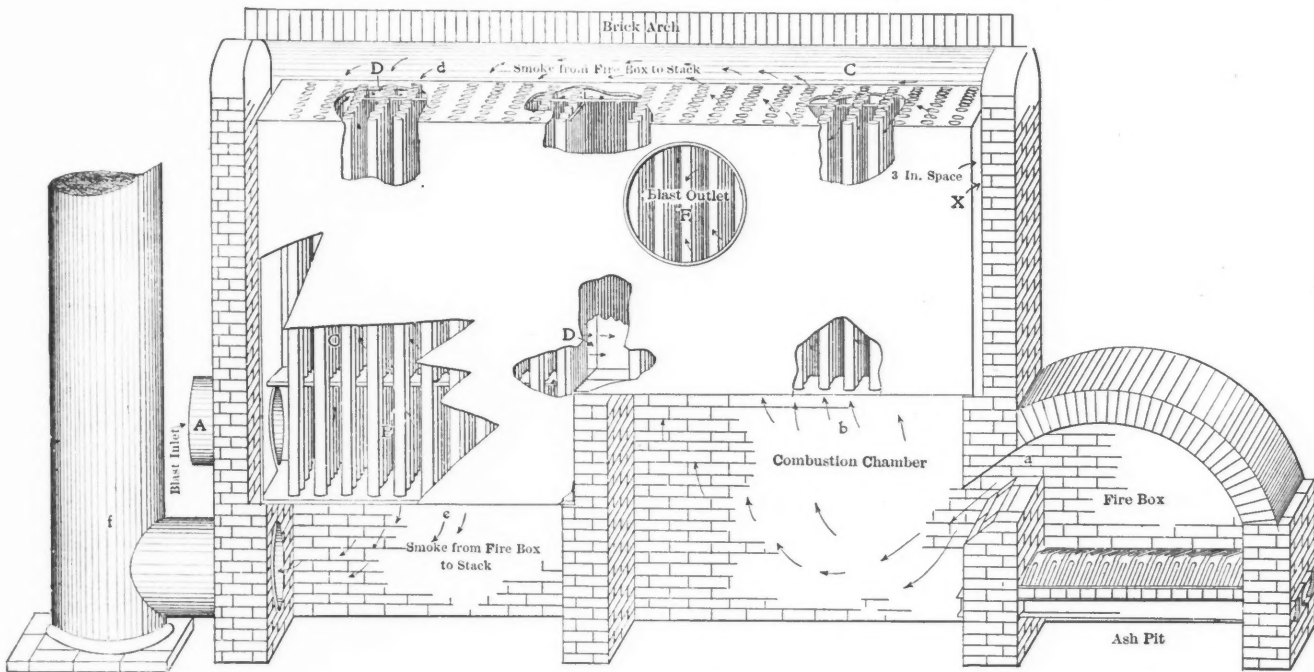
Last winter, because of the bad condition of the wagon roads, we were forced either to shut down our smelting works or reduce our coke consumption by the use of wood. By good luck we were able to get a supply of what is called "Digger Pine" green, and also green live oak which carried down well into the furnace, permitting us to reduce our coke to about one-half the usual quantity, and enabling us to run two weeks longer with the five days' supply of coke on hand. Unknown to me someone telephoned the results to the local papers, giving me

with the same results, but after reducing my coke and replacing it with double the weight of wood it is only a question of a few hours until the crucible of the furnace becomes too cold to allow the matte and slag to flow freely; so that for the last few months we have used no wood in the furnace unless we wished to obtain a *higher concentration* by carrying more over-fire, which results we can quickly obtain by throwing in a few sticks of wood on top of the coke under each charge of ore.

Recently we have obtained highly satisfactory results by the introduction of a hot-blast stove as per the accompanying engraving, to replace the old "U"-pipe stove which we had been operating ever since I took charge of these works. The "U"-pipe stove cost three times as much as the one we have just installed, had

Profits of the Standard Oil Company

In the petition in equity against the Standard Oil Company, of New Jersey, filed by the Government in the Circuit Court at St. Louis, Nov. 15, it is alleged that by reason of its monopoly the Standard Oil Company has made enormous and unreasonable profits on the actual value of its property; that the trustees' valuation of all the property and stocks placed in their hands in 1882 was \$55,710,698.24, and that the additional property purchased or acquired by the issue of trust certificates was \$13,310,100; so that the total value of all property controlled by the Standard Oil Company, of New Jersey, except such as may have been purchased from earnings, is \$69,020,798.24, accord-



THE BREThERTON HOT-BLAST STOVE

more notoriety at the time than I cared for, as I had not given the use of wood a fair test.

It may now be stated that the use of wood is limited. If green live oak is employed in short blocks, considerable coke can be replaced with it, using nearly 2 lb. of wood to 1 lb. of coke and not using too much blast pressure. The wood has a tendency to hold the charge open so that the blast drives too much heat to the top of the furnace.

Since my last winter's successful experience I have not been so fortunate with the use of wood, due in the first place to the fact that we are forcing more blast through the furnace, and secondly to the fact that we have not been able to secure wood of a suitable character. I have tried soaking it and dipping it in mud

only one-half the heating surface and required nine to ten cords of wood per 24 hours, whereas the new stove, with double the capacity of the old one, requires only six cords per 24 hours. Since starting up the new stove we have already been able to save \$90 per day on coke with one furnace in blast, in addition to \$15 per day in the cost of wood consumed under the stove, also increasing the capacity of the blast furnace.

Coke costs us \$20 per ton. On October 24 the office reported the following showing for the day:

- \$14 less wood used at the new stove;
- \$150 less coke;
- \$10 less lime rock.

This shows a total of \$174 saved in 24 hours over the old "U"-pipe stove. The reduction in lime is due to better oxidation, throwing more iron into the slag and making a better grade of matte.

ing to its own valuation. That upon this capital the Standard has from 1882 to 1895, inclusive, paid \$512,940,084.50 of dividends and has created a large surplus. The Standard has not published any statements since 1896, but from 1882 to 1896 its surplus, according to its own statements, was \$79,536,025.14; and it is alleged that its property at the present time exceeds the value of \$200,000,000. That its annual dividends during the last nine years have run from 33 to 48 per cent. per annum in addition to this large surplus.

It is possible that in the future, cutting edges of tantalum may be used instead of black diamonds for drilling deep boreholes; and, if so, the cost of boring may possibly be reduced, as the up-keep in diamonds for this class of work is now very costly.

*General superintendent, Great Western Gold Company, Ingot, California.

THE ANTIMONY INDUSTRY

Why the Price of Antimony is High—The Valuation of Antimony Ores— Methods of Smelting—The Position of Antimonial Lead

BY F. T. HAVARD*

The extraordinary rise in the price of antimony has been variously attributed in reports of dealers, importers, smelters and consumers to increased demand in the machine industries, to the partial replacement of tin, now scarce and expensive, by antimony in alloys, babbitt and bearing metal, to a change in the quality of the ore coming on the market from high grade to low grade, as workings in the mines reached greater depths, to the general increase in prices of all metals as compared with the constant value of gold, to speculative and to other causes. These assigned causes, though containing many elements of truth, are not sufficient to account for the very unusual rate at which the price of the metal has risen from its former normal rate of about £40 to £110 and £120 per ton. This sudden rise is due more probably to a drying up of some former sources of metal supply; which indeed has come to pass in the following way:

If we study the table of antimony ore producers given in "The Mineral Industry" for 1905, we find that the greater quantity is supplied by mines in France and Italy. This ore is treated at the works of various metallurgical companies in the two countries. Of these companies the most prosperous and wealthiest is the Société Anonyme Franco-Italienne, whose head office is at Genoa. Now, whereas formerly both the Italian and the French smelteries belonging to this company produced regulus alone from the treatment of its ores, at the present time its Italian works make no metal, but only pigments, and the French smeltery makes both metal and pigments, but is increasing its paint production at the probable expense of the regulus output.

NEW USES FOR ANTIMONY

Both the Italian and the French governments are encouraging the use of antimony pigments, which have the advantage over white lead of being innocuous and over zinc paint of being permanent and sun proof, so that, favored with the growing demand in England for these pigments and with the protection of the Continental governments, the Société Anonyme Franco-Italienne is not likely to change the policy it adopted several years ago of replacing its production of metal by that of oxides, sulphides and other salts. It is probable that the example of the French company has been followed by other works.

*Manager of smelting works, Copiapo Mining Company, Ltd., Chile.

If we examine the other attributed reasons for the present condition of the market, we find the soundest is that of the increased demand in the machine and industrial world, where antimony, as above stated, is obtaining a wide application in the manufacture of bearing metal and other alloys and is replacing soft lead for acid-proof linings and other purposes. Further, the sulphide is being used in greater quantities than ever in the rubber industry for the purposes of vulcanization.

INCREASED DEMAND FOR HARD LEAD

It was, however, just at the time when the French and Italian regulus production was being withdrawn, that the first tightening of the market was felt. This showed itself, first of all, in an increased demand for hard lead with a corresponding rise in its price and was afterward followed by the rise in the price of regulus. At the beginning of 1905 antimonial lead was selling at a slight advance on the price of soft lead; in May, 1905, dealers offered for 20 per cent. hard lead, £1 per ton over the price of soft lead. On applying, however, to consumers it was found that the demand was much greater than the supply so that in June £2 10s. to £3 over-price was obtained. In October this over-price increased to £4, although antimony was quoted at between £50 and £60, while in December £4 10s. was obtained and prices have increased since then in almost direct ratio to the increase in the price of regulus.

VALUE OF ANTIMONY ORE

Discussing now the question of the scarcity of ore and particularly of high-grade ore and the suggested consequent diminution of the supply of antimony, we find that the argument does not bear examination, because although the ore on the market is of low grade, it is coming forward in much larger quantities now than at any other time; so that the actual quantity of antimony going to metallurgical works is increased rather than diminished. As to the question of speculation, buying in and "cornering" of the supply, it is true that dealers and brokers have attempted to coerce the market with some degree of success. It is reported, for instance, that one French dealer in Lyons bought in large quantities in the early part of the year, and he is supposed to have realized at a great advantage to himself. We may, however, assume that any stocks now held by dealers have been bought in at such a price as precludes selling out at less than £80 or £90 per ton. So that unless fresh and large sources of supply

should drown the market with ore, the prices will probably be maintained for some time to come.

With regard to the price paid per unit of antimony in ore:

In 1904, 4@5s. per unit was expected for 50 per cent. sulphide ore, when regulus was worth £25@£35.

In 1905, 6@8s., when regulus was being sold at £35@£60.

In 1906 prices have ranged from 8 to 15s., and in some cases above 15s., when the price of regulus rose from £60@£120. In fact, in May, dealers were still offering ores to smelters on the old formula: $0.9 T (P - 330) = V$, c.i.f., in which T represents the content of antimony in percentage, P the market price of the regulus, and V the value in francs c.i.f. Havre, Marseilles, Antwerp or Hamburg. Of course the price for low-grade, mixed and refractory ores was considerably less per unit of antimony.

CLASSES OF ORE

For the purposes of discussing the prices paid for antimony-carrying materials, and also with a view to describing the various processes used for extracting the metal, I shall classify the different kinds of ore now appearing on the market under the following heads:

(a) Auriferous, with 40 to 70 per cent. of antimony in the form of sulphide, several ounces of gold, together with, in some cases, payable silver. The chief sources of these ores for European markets are Australia, France, Italy and Hungary. The value per unit of antimony is 13@17s.; gold is generally paid for at 75s. per oz.; sometimes, however, no pay is given for the precious metals.

(b) The same class of auriferous ore, but with less than 40 per cent. of antimony; sometimes with payable silver. At the present time this is worth from 8@13s. per unit of antimony. Pay is given for precious metals as under (a).

(c) Antimony ore, both sulphide and oxide, free from precious metals, with from 40 to 70 per cent. antimony. Sources, Austria-Hungary, Australia, Iberian peninsula.

(d) The same class of ore with under 40 per cent. antimony, from the same sources.

(e) Mixed copper, antimony and zinc ores, nearly always carrying some lead and silver, in which antimony is paid for at prices varying from the price of lead to 7s. per unit.

(f) Lead concentrate and high-class lead ore, with 40 to 60 per cent. lead, 3 to 10 per cent. antimony and generally carrying some silver. Antimony is generally sold at lead price by the mines, and also sometimes by dealers on the consideration that they receive the resulting hard lead at an advantage on the market price.

Of these ores the antimony smelters using what is known as the English process can treat only (a) and (c); pigment

makers and smelters using the French process (a), (b), (c) and (d); only general metallurgical works will touch (e); while (f) is eagerly sought by lead smelters. The ores (b) and (d) are relatively cheaper than any other class.

To summarize the processes now in use for the recovery of the metal, they may be classified under the names of (1) liquation process; (2) crucible process; (3) open-hearth process; (4) the English process; (5) the French process.

I. THE LIQUATION PROCESS

This is used now only in remote and primitive places. The sulphide is placed in a crucible of flower-pot shape, having a hole at the bottom. Under this is placed another small crucible. The first crucible is heated by a charcoal or coke fire placed around it; the fused antimony sulphide runs through the hole and collects in the lower pot. Most of the gold and silver remains in the sinter, which averages about 8 to 10 per cent. antimony. Only rich sulphide ores are amenable to this process. The crude product is shipped to European smelteries to be refined.

2. THE CRUCIBLE PROCESS

The ore is generally placed in crucibles of small dimensions, with a suitable reducing agent, such as metallic iron for sulphides and carbon for oxides of antimony. The crucibles are placed in a reverberatory furnace and exposed to heat until the reduction of the ore to the metallic state has been effected. Metallic antimony forms at the bottom of the crucible; floating upon it is a used mass of sulphide of iron in the more general case of treatment of sulphide ores, and slag formed by the fusion of the gangue. The antimony is obtained in a crude state by pouring the slag and iron sulphide off the top and casting the metal into molds.

This process is clumsy and wasteful. Any gold and silver content of the ore is divided between the sulphide of iron and the crude antimony regulus, and in most cases no return is given for it by the buyers of these two products. It is costly, owing to the rapid deterioration and final destruction of the crucibles employed; and also because of the loss of metal as fume in the early stages of the process, because of the large relative amount of labor necessarily employed, because of the quantity of plant required to produce a ton of the metal, and because of the fact that the final product is very impure and contains so much iron that the process of cleaning and refining is tedious and expensive.

3. THE OPEN-HEARTH PROCESS

This is an improvement on the crucible method, and enables larger quantities to be treated by the same reduction process. The ore, mixed with reducing agents, and possibly with a flux for the gangue, is smelted by a reverberatory flame on an open hearth. The slag is drawn off the top of the bath, and the antimony metal tapped from the furnace.

The loss of metal owing to volatilization during the heating and working of the charge is so considerable that the process can scarcely be called more successful than the crucible method, while the resulting regulus is but little, if at all, purer.

4. THE ENGLISH METHOD

This consists in dropping the preheated charge of antimony ore from such a height through a hopper into a fused bath of iron sulphide and iron of very high temperature, that it splashes through the bath. Thus the particles of ore are distributed and exposed to the fierce attack of the hot bath, whereby rapid decomposition of the ore ensues. Attempts are made to minimize loss by closing the flue dampers when charging, by preheating both reducing agent and ore, so that the reaction may take place in the shortest possible time by securing a covering of iron sulphide on the ore when decomposition is taking place, and by working the charge rapidly. After the partial decomposition of the ore, the bath consists of slag and sulphide of iron, together with considerable antimony sulphide mixed with it; underneath this is whatever antimony has separated out.

To free the iron sulphide of contained antimony, more iron is now added. By this means the antimony is parted from the sulphur which combines with the iron, and sinks to the bottom as metal. This crude antimony metal is tapped from the bottom of the furnace, while the slag and such excess of iron sulphide as is not required for the next process is drawn off from the top. The remaining iron sulphide is again heated, and the furnace is ready to receive the next charge. This is the best of the three last mentioned processes. It works quickly and cheaply, but it yields, however, an impure regulus, which necessitates tedious resmeltings in crucibles or hearths. The gold and silver content of the regulus is high. Some of the precious metals are lost in the slag and iron sulphide drawn off from the bath; but the greater part of these concentrate in the iron sulphide bath which is sold eventually to silver-lead smelters, when a return is obtained for the precious metals. If the regulus is refined electrolytically, the antimony is recovered free from precious metals. For information on this process I refer readers to "The Mineral Industry" of 1905.

Notwithstanding its defects, the companies using the English process do very profitable work. They estimate their working costs, including loss, at from 200 to 250 shillings per ton of pure regulus produced.

5. THE FRENCH PROCESS

This is a volatilization process. In it the heat used to accomplish the volatilization of the antimony, which is deposited in the form of oxide, reduces the oxide to metal in an open-hearth reverberatory furnace with a refractory basic lining, and

in some cases also generates the power necessary to drive the plant. The process is simple and complete in two simultaneously working operations; namely, volatilization of the antimony sulphide in a shaft furnace and reduction of the oxide in an open hearth. The gold and silver content of ore is collected in a cinder at the bottom of the shaft furnace. Loss of metal is controlled by sufficient equipment for collecting the fume. The resulting regulus is quite pure and is sold in the market as "French star." The reduction of the oxide, which is mixed with charcoal and soda, is effected by the reducing atmosphere of the furnace. Some slag forms above the bath of regulus. This is either reduced again or is sold to alloy makers. Most kinds of antimony ores are amenable to this process. The working costs amount to about 200 francs per ton of clean regulus produced from ore containing 50 per cent. antimony.

OTHER PROCESSES

In addition to these processes, various wet and dry methods of winning antimony in the form of paints or regulus have been proposed. Of these, the method of A. S. Pleus, United States patent No. 704,367, for making white antimony oxide is instructive and interesting.

With regard to the treatment of ores under (f), considerable progress has been made in the desilverization of hard-lead bullion and in the manufacture of alloys rapidly and cheaply from lead concentrates carrying antimony. Without going into detail it may be stated that the principle made use of is that adopted in refining base lead, namely, the greater affinity of antimony over other metals for oxygen. In treating these and other kinds of mixed ores, every metallurgist works out his own salvation; local conditions determine the modifications necessary to insure progress and success and must of course be carefully studied if that salvation is to be permanently secured.

Recently a large portion of the Södvaranger iron deposits, in Norway, was sold to a Swedish-Norwegian syndicate. The Södvaranger ore contains only 35 to 38 per cent. of iron, but this percentage will be increased to 65 per cent. by means of magnetic concentration. The ore will then be exported to Germany, where it will be briquetted. The Gröndal process of magnetic separation will be used.

A good deal of prospecting for tin is going on in northwestern Australia. Very few lodes have been located, the bulk of the operations being confined to treating alluvial, which rarely goes to more than 15 ft. in depth. At Moolyella, which is the largest of the tin fields, about 400 men are working on alluvial, and for the most part doing fairly well. Almost all the tin from these fields is sold in Singapore.

HIGH STAMP DUTY IN GOLD MILLING

Advantages of Tube Mills—Increased Profit on the Rand

BY A. McARTHUR JOHNSTON*

One of the most vital problems the consulting engineer and metallurgist has to face is to know when the ultimate payable point has been reached, that is to say, when an increase in the extraction no longer pays the cost of extracting. The use of tube mills at the Robinson Deep, one of the group of mines of the Consolidated Goldfields of South Africa, has shown that the mine has benefitted in a considerable improvement in tonnage crushed and in the more than justified greater extraction obtained. In this case the problem to be solved was an improvement in extraction, compatible with an increased tonnage, mainly because this is one of the higher-grade mines. At the Knights Deep mine belonging to the same group, the tube mill has been used on the other hand almost entirely as an auxiliary to the battery, the point aimed at by H. H. Webb, the consulting engineer to the group, and W. A. Caldecott, the consulting metallurgist, being to make 100 stamps plus two tube mills crush the same tonnage as 150 stamps would.

COMPARISON OF TWO PLANTS.

The Knights Deep battery at present consists of 100 stamps standing back to back with the 100 stamps of the Simmer East mine, and as in this article it may be of interest to compare the results of the working of these two plants—the one working with tube mills and the other without—let us note wherein the milling differs. The height of drop in each mill is $7\frac{1}{2}$ inches, the number of drops per minute averages 96 and the height of discharge is approximately 3 inches. The average working weight of the stamp in the Simmer East mill is about 1250 lb., and in the Knights Deep considerably more (ranging from this up to 1450 lb.), since about half the stamps in the latter mill are weighted up in various ways, such as by having heavier heads affixed or by putting extra tappets on the stems. The screens used in the Simmer East mill are 1,000 light and in the Knights Deep +200.

Thus the only two essentials changed are the stamps and the screenings. The two mills, being under the same manager and both working on pyritic banket ore, afford an excellent example of the difference these two elements make in stamp duty. The duty in each case for the last three months is instructive, being as follows:

Months.	Tons per Stamp per Day.	
	Knights Deep.	Simmer East.
October.....	7.09	5.72
November.....	7.68	5.68
December.....	7.89	5.76

To make the comparison more striking, the mills doing the next highest duty along the reef during December were the Crown Reef with 5.99 tons, the Meyer & Charlton with 5.97 tons, the Ferreira with 5.88 tons and the Glen Deep with 5.75 tons per stamp per day. It is, however, invidious to draw the comparison too closely, as the Chamber of Mines returns do not afford us the necessary information regarding the weight of the stamps nor the screens in use.

In July, 1905, the Knights Deep was crushing with 150 stamps for 27.12 days, and milled 22,500 tons, while December's record shows a tonnage of 22,373 with 100 stamps for 28.34 days. Thus the declared aim of the consulting engineer has been practically fulfilled. Mr. Macmillan, the battery manager declared he had no hesitation in affirming that as soon as he had sufficient power to enable him to weight all his stamps to 1450 lb., a duty of eight tons could be easily accomplished.

SYSTEM OF MILLING AT THE KNIGHTS DEEP

The ore leaving the battery is separated by spitzkastens into a coarse or more pyritic portion, and a finer portion which runs directly to the cyanide plant. The former portion, at least 50 per cent. of the whole, is then passed through tube mills, the proportion of water to solids being as one to one. There are three tube mills erected, one being always kept as a standby for use when one of the others requires relining. The life of the sillex liner is from 50 to 55 days. The old liners are taken out and where possible are broken down into 2-in. cubes and used in place of pebbles. When leaving the tube mills, water is added to the pulp to assist it in flowing more freely and more evenly over the shaking plates. Up to the present, these shaking amalgamating tables have been experimented on and modified in various ways so as to find out how they can best be worked and how to stand the strain so that a minimum of care and maintenance can be attained.

Of the mill gold returned, 84 per cent. approximately, is at present caught on the battery plates and the remaining 16 per cent. on the shaking amalgamated tables. Averaging the outputs of June, July and August, 1905 (no tube mills), we find the percentage of the total gold extracted to be 66.6 over the plates, the remaining 33.3 per cent. being derived from the cy-

anide treatment of concentrates, sands and slimes. The declarations of October, November and December, on the other hand (with tube mills), show the percentage recovered in the mill to be 62.5, the other 37.5 per cent. coming from the cyanided sands and slimes. Thus at the present time the mill returns show an increase of over 40 per cent. in tons crushed with a proportionately slightly decreased extraction and a correspondingly smaller cost of power and labor.

The crushed and recrushed product now enters the cyanide department and the following is the classification of this product, a comparison with the Simmer East product being given.

	Knights Deep.	Simmer East.
Left on 60 screen.....	16 per cent.	27 per cent.
Slimes.....	27 per cent.	29 per cent.

USE OF TUBE MILLS INCREASES PROFIT.

This affords rather an interesting result. The Knights Deep product has less coarse particles and less slimes. As the coarse particles have been shown in the past to contain proportionately the most gold after treatment, this is an end worth aiming at, the ore being thus in the best available state for sands extraction purposes. One result worth noticing is that the solution used for this product takes more washing out than when coarser sand particles are present in the tank. However, in spite of this, one direct advantage has been obtained, viz., the doing away with the long costly treatment of concentrates, while, what is more to the point, the sand particles, being more amenable for treatment, yield a slightly increased percentage of their gold during a shorter period of treatment. This entails in the first instance some reduction in the original estimate of the plant and secondly less expense in treatment.

To sum up, therefore, we have now got beyond the experimental stage and can affirm when comparing the results obtained at this mine that the use of 200 screens tube mills + sand + slimes gives a slightly better extraction than the use of 1000 screens + concentrates + sands + slimes, while the tonnage has been increased at the present time up to 40 per cent. and in the immediate future an increase of 50 per cent. will be attained. With regard to the profits these will increase proportionately with the tonnage and in addition there will be decreased working costs on account of the tube mills being merely an auxiliary to the battery.

A specimen of auriferous quartz was recently received in London, which came from the New Chum Railway mine, Bendigo, Victoria, Australia, at a depth of 4224 ft., this being the greatest depth yet reached in any gold mine in the world.

French antimony miners propose to use small portable furnaces for treating their ores, moving them from place to place as the deposits become exhausted.

*Mining editor, *Rand Daily Mail*, Johannesburg, S. A.

MINING AT DIAMONDFIELD, NEV.

SPECIAL CORRESPONDENCE

On the Great Bend Mining Company's ground at Diamondfield, Nev., there are two veins. These have been developed by much trenching on the surface, which, although a good and cheap way of prospecting, proved costly for the company that did it, because so much time was

strongly oxidized, but once in a while some telluride ore is found in the upper levels.

Along the 125-ft. level there is a fairly continuous pay streak about 2 ft. wide. The ore from this is sorted up to a grade of about \$65 per ton for shipment. The



THE GREAT BEND MINE

devoted to this work that there was none left to do any cross-cutting from the shaft before the option expired. When the present company took the mine, it began underground development work.

In this property there are two veins, viz., the north and the south. The south is the richer one; there are three leases on it, covering about 800 ft. on the vein.

This vein is nearly vertical and strikes east and west. It is from 3 to 5 ft. wide and has a quartzose gangue. This mine is remarkable in being one of the few in the Goldfield district in which tellurides are found. A telluride of iron occurs here, and with it the ore is high in gold.

About 300 ft. north of the south vein there is an east and west vein which dips about 60 deg. to the south. It is developed by a two-compartment inclined shaft, 210 ft. deep, sunk in the footwall of the vein. This vein has been found to be wide wherever it has been cross-cut. From the 200-ft. level a crosscut has been driven through the vein.

The ore on the 200-ft. level is a fine-grained sulphide scattered through decomposed andesite country rock which has been silicified in some places, but the silicification is not so strong as in the upper levels. Near the hanging wall there is a streak 4.5 ft. wide, which is said to assay \$15 to \$40 per ton. There is a seam of talc mud, about 18 in. wide, which assays \$18 per ton. The remainder of the vein assays from \$4 to \$12. Above the 200-ft. there are levels at 125 ft. and 60 ft. The ore above the water level is

vein as a whole averages about the same as on the level below. On the 60-ft. level the vein has the same general characteristics as on the 125-ft. level.

The Black Butte mine is situated near Diamondfield and is the farthest extension of pay ore in that direction from



THE DAISY WORKINGS IN FOREGROUND

Goldfield. The vein runs northeast and southwest and dips to the northwest. It outcrops on the south side of Black Butte and has been opened up by trenches and pits for 800 ft. along its strike. The top part of the vein is opened up through a cross-cut drift from the south side of Black Butte. This top part is almost flat for 168 ft., dipping only about 5 deg., but

then it steepens to 45 deg. A winze 58 ft. deep from the drift follows this vein down. At its bottom the vein dips 67 deg. to northwest. The highly inclined part of the vein is also opened up by a vertical shaft. On the 110-ft. level from this shaft the vein has been opened up for 200 ft. along its strike. The vein averages about 6 ft. in width, 3 ft. of the ore assaying \$12 to \$14 per ton. Some of the ore goes as high as \$150 per ton.

On the north side of the mountain from the Quartzite claim belonging to the same company (the Diamondfield-Black Butte Consolidated Mining Company) lessees have shipped \$300,000 of ore. This is a parallel vein and is larger than the Black Butte. Rich chambers of ore, 14 to 15 ft. wide, occur in it, while there is a lot of mill ore assaying \$10 to \$15 per ton.

Gold Stealing in Western Australia

The commission appointed in Western Australia to investigate and report to the Government on the alleged prevalence of gold stealing is now sitting. Much interesting evidence has been obtained, and the way the Kalgoorlie detectives have done their work under most difficult circumstances, does them great credit. A great many unauthorized dealings in gold have been brought to light and most people are amazed at the large amount these dealings reveal. The *modus operandi* of some persons appears to be holding and pretended working of useless mines, thus accounting for the sales of gold to the banks. The inquiry will do much good,

and will lead to more rigorous system of inspection in the future. The Government will probably form a special staff of detectives for that purpose.

The jade industry of Burma is to be stimulated by the building of a government road from Manyasrik to Mamon, the center of the jade mines.

COAL MINING IN THE FAIRMONT FIELD, WEST VIRGINIA

An Example of the Most Modern American Practice in Coal Mining

BY F. W. PARSONS

As an example of the rapid development, close organization and the unswerving, resolute observance of fixed mining principles, the Fairmont coalfield, controlled by the Fairmont Coal Company, is in a class by itself. Mushroom growth is generally unstable, but in the rapid development of this great field, there was no guessing nor uncertain action in the building and perfecting of a controlling organization.

The men who control the destiny of the company have grown up in the field, and continue to pick their lieutenants from those proved here in the ranks. This principle has provided officials who are thoroughly in touch with the men, and also have a clear understanding of local conditions.

By this policy, especially, the many serious problems of labor and competition have been successfully overcome. The Fairmont company has adhered to one unwritten rule that has strengthened it immeasurably among its men; this rule is to support firmly those loyal to it; but on the other hand, it punishes disloyalty with equal vigor.

HISTORY

The first operations in the Fairmont field were begun 52 years ago by James Otis Watson, the pioneer operator of the State. Before his modest beginning, it was generally known that a considerable deposit of coal underlaid the district, but little effort had been made to develop it.

The Baltimore & Ohio Railroad was completed to Fairmont in 1852, causing more activity in operations for the development of the field. Two years after the railroad entered the region, the first shipment of coal was made by Pierpont & Watson (this firm consisting of ex-Governor Francis H. Pierpont and James Otis Watson). The first efforts to market the coal were met with aggressive opposition on the part of operators in the older fields, and only after much perseverance was a foothold established, so that the coal could be profitably marketed.

In 1874 a company was organized by J. O. Watson to open and operate the Gaston mines. This property is still active, and promises a substantial output for many years to come. In 1886 the Montana Coal and Coke Company was organized, and the extensive plant at Montana was built. The Montana plant was the first mine in the field to be equipped with modern mining machinery.

Following these operations, the West Fairmont Coal and Coke Company was

incorporated in 1890, this latter concern acquiring the shaft and the New England mines. The Montana company next purchased the Briar Hill property, and it was here that C. W. Watson, who is now president of the Fairmont company, received his first experience in constructing and operating a coal plant.

From this time onward, the process of development and consolidation was actively pursued until, in 1900, when about a dozen mines along the West Fork and the Monongahela rivers were controlled and operated by the consolidated interests. Early in 1901 the Clark coal properties were purchased, and in June of that year, on the day of its final organization, the Fairmont Coal Company acquired the valuable interests of Senator Camden, consisting of 3000 acres of surface, and a perpetual lease upon an additional 25,000 acres of coal, also in this district near Monongah.

The company, as it then stood, controlled the output of the entire field, and operated 50 mines, besides owning several towns and managing a company store at each property. The next step was to effect a more efficient sales department, which work was carried on so aggressively, and with so much success that a market was created for upward of 10,000,000 tons of coal per year. Especial attention was paid to supplying the Lake trade, and with this end in view, the company built large docks and store-houses, and purchased vessels to carry coal to the great Lake ports. Agencies were established in Chicago, New York, Philadelphia, Washington, Baltimore, Boston and other large cities. The main executive offices of the company were moved to Baltimore, while the operating end was established at Fairmont, a town of about 12,000 people, located in the heart of the district. The prosperity of this town and vicinity can easily be conceived when it is remembered that the Fairmont company alone pays out more than \$250,000 each month.

OTHER INTERESTS OF THE FAIRMONT COAL COMPANY

After the Fairmont district had been carefully bought up, the interests behind the company began looking to other fields for new mines. In quick succession, the Consolidation Coal Company in the Georges Creek field, the Clarksburg Fuel Company at Clarksburg, W. Va., the Pittsburg & Fairmont Coal Company near Fairmont, and the Somerset Coal Company in Pennsylvania were all acquired.

The acreage now controlled by these

combined interests may be summarized as follows: Consolidation Coal Company, 48,072 acres; Fairmont Coal Company, 56,207 acres; Clarksburg Fuel Company, 5593 acres; Somerset Coal Company, 31,715 acres; Pittsburg & Fairmont Fuel Company, 19,000, total, 160,587 acres.

SYSTEM OF ORGANIZATION

It is doubtful if any large mining company can boast a more perfectly organized system for directing and handling such large properties. As before mentioned the president and other executives have their offices in Baltimore, while at Fairmont are the offices of the general manager, general superintendent, chief engineer, and chief chemist. The mines are divided into divisions with from four to eight mines under one division superintendent. The usual mine superintendent and foremen are stationed at each mine. Careful daily reports are furnished the main offices in Fairmont each day. From these daily figures a monthly report is made, showing the detailed cost of every item of operation at each mine. In this way the cost of coal production per ton can be estimated for each operation, and the mines are graded every month according to the tonnage cost incurred. This method is an incentive that keeps each superintendent striving to have his mines rank high in the monthly list.

THE ENGINEERING DEPARTMENT

It is impossible to describe in detail in this article the system of engineering here carried on. The subject would be one worthy of separate and special treatment. Few mining concerns pursue such thorough and accurate methods. First of all, the entire system of mine, surface, and boundary surveys is based on a careful scheme of triangulation, itself started from a system of precise base-lines. Rooms are driven on centers, and entries graded. There are large region maps as well as individual mine maps. The method of making heavy tracings, which are photographed and printed, enables the department to furnish the officials with small compact mine prints which can be carried in the pocket at all times. All the mines in the region are based on a system of adjusted levels, there being a substantial stone monument planted below frost line, and covered, near the mouth of every mine.

MINING TOWNS IN THE REGION

The more recent camps in the Fairmont fields are built according to modern ideas. The town of Gypsy, situated on the main line of the Monongahela River Railroad, 22 miles from Fairmont, is probably the most ideal mining town along the river. The location selected for this townsite has many natural advantages. The houses are supplied with inside closets, bath rooms and sewerage; good well water is in abundance. The hotel for unmarried men is also supplied with inside closets and bath rooms. These sanitary conditions

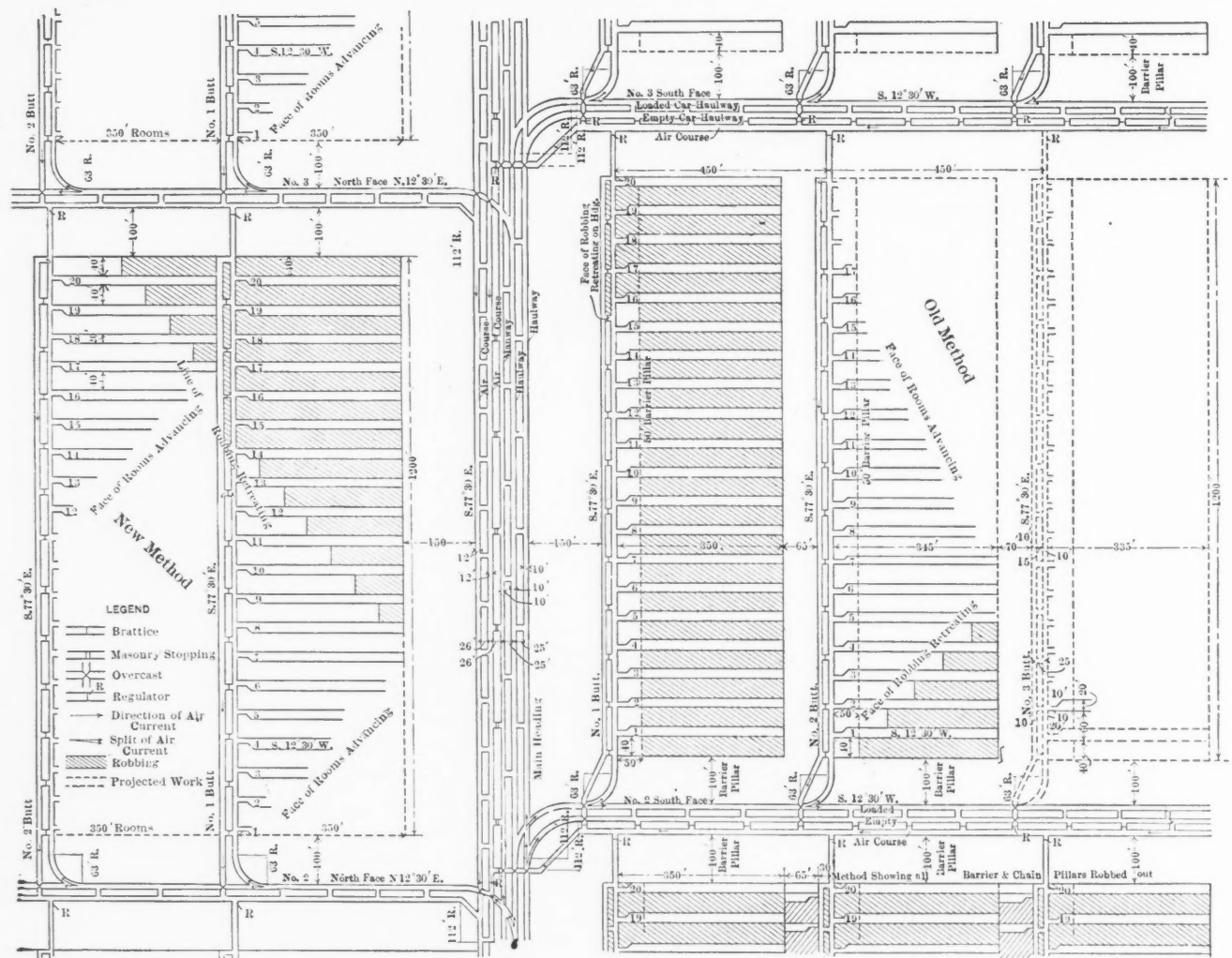
the accompanying drawing is shown the latest method adopted by the Fairmont Coal Company, together with a plan of the system previously worked.

In no other feature of development-work has there been such a complete change as in the number of main headings used as intake and return airways. Where it was formerly the custom to use one main haulway and a parallel air-course, it is now the practice to drive from four to six such entries. In the plan here

main entries at right angles. Butt-entries are turned from these face-entries, and rooms driven from the butt-entries. Each panel contains two sets of butt-entries, with 20 rooms on each set. The air traveling on each face-entry is split into the butt-entry, and after traveling to the face, returns out of the butt through an overcast. Much care is observed in starting the butt-entry. A specified curve, with a 63-ft. radius, is used in turning off each of these butt-entries.

soon as the room reached its limit. The development of the rooms was only carried on fast enough to keep in advance of the robbing. The robbing of the chain and barrier pillars was begun at the face of the heading, and was the last operation carried on.

In the present system each panel is as nearly isolated from the advance workings as is practicable, only a narrow entry with a regulator in it (see drawing), is driven through to the face-entry above. This



PRESENT AND FORMER METHODS USED IN WORKING THE MINES OF THE FAIRMONT COAL COMPANY

shown, the two right entries are used for haulways, the middle entry for a manway, and the two left entries are utilized to carry the return air. Masonry stoppings separate the three right-hand entries, which are used as intakes, from the two left return airways. The three intake entries are 10 ft. wide, while the return airways are driven 12 ft. wide. The pillars between them are 25 and 26 ft., respectively. These main entries are protected on each side by a 150-ft. pillar.

The panel system as here worked conforms as nearly to modern ideas of development as our present knowledge of coal-mining will allow. Each cross-entry, or face-entry, as it is called, is turned off the

One of the most unique and satisfactory departures from the old style of working is shown in the new method. This consists in first driving butt-headings to their limit; second, driving last rooms first; third, beginning robbing at corner of panel shown, and carry straight line of break across entire panel, driving rooms of next butt-heading through the chain pillar above to meet the line of robbing; fourth, developing rooms only fast enough to keep in advance of the robbing.

In the old method, after room No. 1 was driven to the limit, a 40-ft. slab on the right rib was taken down to the 50-ft. barrier pillar at the heading, and thereafter, the pillars of each room were robbed as

system of working requires the driving of a small amount of additional narrow work at the beginning, but more than pays for this extra expense in the safe, uniform and thorough method of getting out all the coal. The length of rooms and all dimensions will be found on the drawing here reproduced.

In a series of articles published in *Gluckauf*, Dr. Jüngst has shown that during the past 10 years the living conditions of the Westphalian miners have improved in a marked degree, and that there is no ground for the assumption that the existence of the Coal Syndicate has not been beneficial to the workmen.

A MODERN COAL TIPPLE.

Describing the Equipment and Methods of Sizing the Coal

BY FREEMAN R. WILLSON

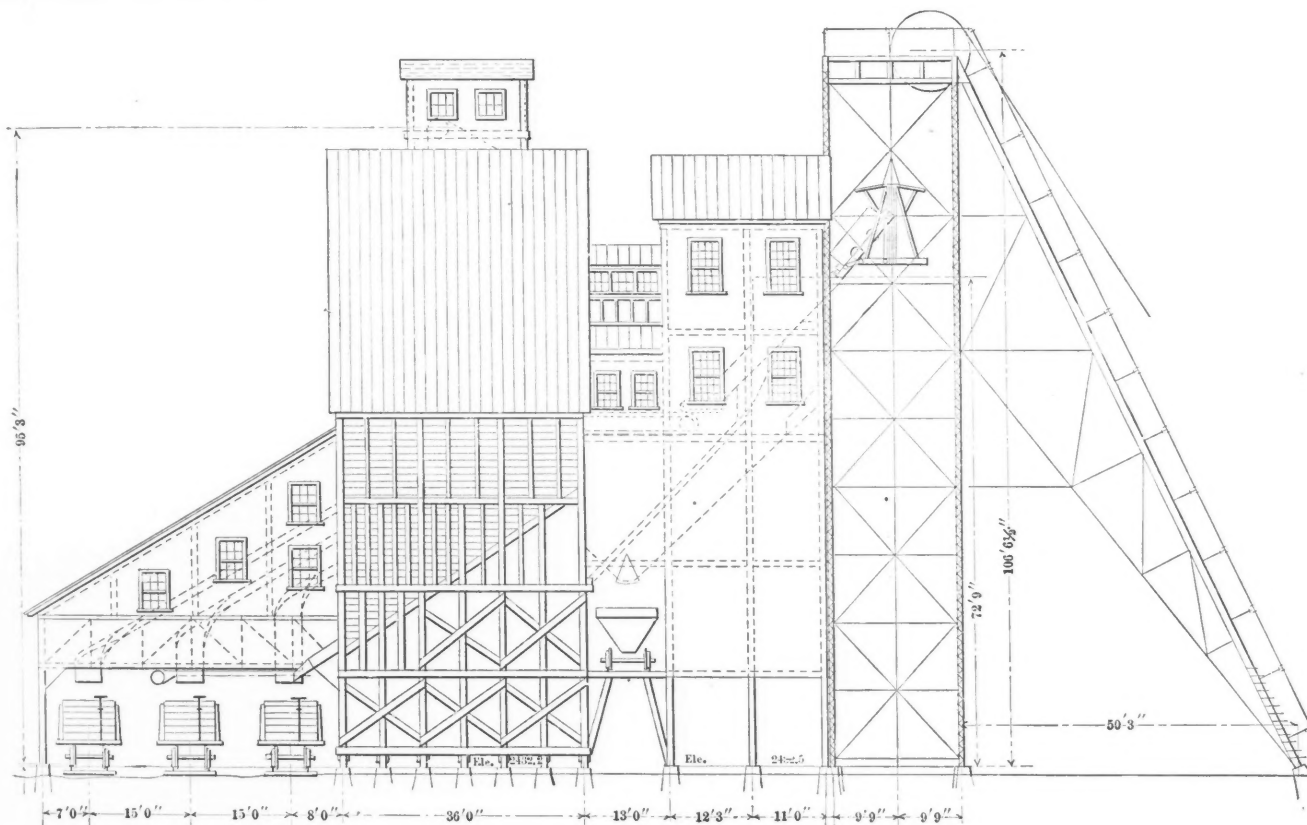
At the new Boissevain mine of the Pocahontas Collieries Company, there has recently been erected one of the most complete and best arranged coal tipples in America. The arrangement of the structure was principally suggested by William Leckie, general superintendent of the Pocahontas company, while the design and

METHOD OF OPERATION

The hopper is divided into two parts, one side for run-of-mine coal and the other for lump coal. Each side has a 10-ft. screening surface, composed of 1/2 in. x 1 in. perforated plate for run-of-mine and 1 in. x 2 in. perforated plate for lump. From the hopper, the coal is fed

of coal per hour. Near the foot of the elevator, and discharging into same, a disintegrator or crusher is located, which breaks all the bone picked out of the coal, and all the run-of-mine coal which can be discharged into it from the run-of-mine screen whenever desired. The run-of-mine chute is fitted with a gate, at head of screening surface, and with suitable chutes leading to the crusher.

The lump and nut spiral chutes are each fitted with a screening surface 4 ft. long, and a small hopper for slack coal which feeds a belt conveyor discharging into the elevator. Coming from the 1000-ton slack, pea, and steam coal bin is another belt



SIDE ELEVATION OF POCAHONTAS COAL COMPANY'S TIPPLE

construction were carried out by engineers of the Jeffrey Manufacturing Company.

HIGHT AND CAPACITY

The tipple was designed for a shaft mine with a capacity of 3000 tons of coal in 10 hours. It is a wooden structure, with exception of the steel head frame, and is 105 ft. high. The shaft is 180 ft. deep and has two compartments. This makes a total hight of 285 ft. from bottom of shaft to top of steel head frame. At a hight of 72 ft. above the ground level is located the steel receiving hopper into which the three-ton mine cars discharge, by means of self-dumping cages. This hopper is supported on a head frame by means of two trunnion shafts, and from the tipple by hangers; suspended in this manner the tipple is not subjected to any shock while the cars are being dumped.

to the picking tables—of the double-beaded flight type—5 ft. wide by 35 ft. long, with ends 8 in. high. Alongside of the tables the refuse and bone bins are located.

From the picking tables the coal passes over the run-of-mine, lump and nut screens and is discharged into the cars over spiral chutes. Each of these screens is equipped with a stop gate so that an empty railroad car can be shifted into place without stopping the tipple. The screening surface is made up of malleable-iron screen bars about 4 ft. 1 in. long by 1 3/4 in. wide at upper end and 1 1/2 in. wide at lower end, making them self cleaning. The bars are also of such a hight to allow the coal to drop 4 in. every 4 ft.

ELEVATOR AND CONVEYORS

The tipple is fitted with a bucket elevator of the Century type. The elevator is 100 ft. high and has a capacity of 180 tons

conveyor which discharges into the elevator. This conveyor gathers all the slack that passes through the short screens, with which the steam and pea coal chutes are fitted, while loading railroad cars with those grades. Below the lump and nut screen is a slack hopper which also discharges into the elevator.

The elevator gathers all the coal from these various points and discharges same onto a chute and screen, in the 1000-ton bin, fitted with the above mentioned bars and a "Cross Patented Flanged Lip Screen" which separates the coal into pea, steam and slack grades. The bin, as indicated, has three compartments, one to hold 800 tons of slack coal and the other two to hold 100 tons each of steam and pea coals. These pea and nut coal compartments are each fitted with a spiral telegraph to prevent the breaking of the coal.

The slack compartment has two larry tracks below it and is fitted on the bottom with six slide valves so that six laries can be loaded at one time. The larry tracks are supported on a wooden trestle 16 ft. above the ground level; one track switches off to the refuse bins in the tiple so as to empty these, when filled with waste.

POWER FOR DRIVING MACHINERY

Two 10-h.p., one 75-h.p., and one 45-h.p., inclosed-type motors operate the whole plant. Some 250,000 ft. of lumber, board measure, was used in the construction of the tiple and large bin. The tiple is supported on concrete foundations, the posts being bolted to same to admit of the use of wrought-iron tie rods,

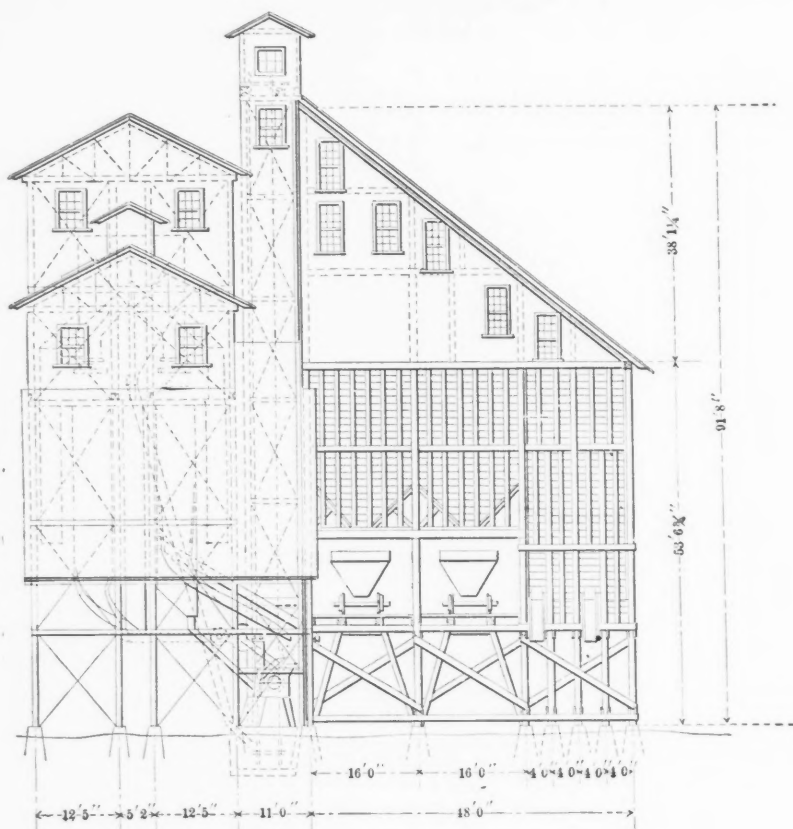
coke, of which an excellent grade is produced. It is doubtful if any coal company today has made better provisions for the economical handling and sizing of a large output than is afforded by the system in the tiple here described.

Boys in Pennsylvania Coal Mines

SPECIAL CORRESPONDENCE

Chief Inspector Roderick, of the Pennsylvania Bureau of Mines, has gone on record, in strong language, in favor of a reduction of the age limit in the anthracite mines, and his views have aroused some comment. The age limit was increased at the

in this respect. They should be amended along reasonable lines. In the anthracite region, as before stated, they bear unjustly upon the widows and the heads of large families, and in the bituminous region they work an injury to the boys, not preventing them from going to work at too early an age. The bituminous workers contend, however, that the employment age should not be raised, for the reason that there is no employment for the boys in that region, except inside the mines. In my opinion there is no reason whatever for making any distinction between the ages of the boys inside and outside the mines. The dangers that menace the boys in and about the anthracite breakers are perhaps more serious than those that menace the boys working inside the mines. If the boys tending the doors in the mines would stay at their work, they would be practically safe from danger; but when there is a slackness in the work they frequently run away from the doors; and when they hear the cars coming, in their haste to return to their post of duty, they are so late in opening the doors that the cars come upon them before they can get out of the way, and the result is often injury or loss of life to themselves and the drivers. . . . While the department earnestly advocates the employment age of 14 years for boys inside the mines, it is also of the opinion that the employment age of drivers should be 16 years, and runners 17 years; miners' laborers in the anthracite region and loaders in the bituminous region, 18 years; and miners in both regions, 21 years. It would tend to the safety, health and strength of the boys, if they were allowed to begin work at the age of 12 years, as door tenders, and, after remaining for two years in that position, they could be employed as drivers. The two years' experience would familiarize them with the work of drivers and runners, and they would also in that time have naturally become stronger, physically, for the more strenuous work of miner and laborer."



END ELEVATION OF POCAHONTAS COAL COMPANY TIPPLE

thereby leaving the tiple comparatively open underneath. Large skylights and ventilators were placed in the roof. The three tracks in the car shed where the coal cars are filled with lump, nut, and run-of-mine coal are spanned by five 45-ft. wooden trusses supporting a roof.

The steel head frame and back leg is made of heavy structural shapes and supported independently of the tiple so as to relieve the latter from all vibrations.

The sectional drawings here produced show in detail the arrangement of the tiple, giving over-all dimensions and illustrating the design. The coal produced at this mine is comparatively clean and does not have to be washed. The slack coal which results from mining and handling is all utilized to manufacture

last session of the legislature from 14 to 16 years for boys working inside, and from 12 to 14 years for boys working in the breakers. Chief Roderick favors a reduction of four years for boys who are employed as doortenders in the mines, and reductions in the case of other boys. In his statement he says: "Under the present anthracite law great injustice, in many instances, is done to heads of large families, and more particularly, to poor widows, by reason of their boys being prohibited from entering the mines until they are 16 years of age. They are, by this extreme enactment, deprived of a natural and much needed support. I am not, however, in accord with the bituminous law, that makes the employment age 12 years. Both laws are radically wrong

The Société des Mines de Ghergur, of Paris, is preparing to work the calamine deposits of Ain Rhuah, Ref Semmah, and Gebel Anini, in Ghergur, Algeria. The amount of mineral developed is estimated at 150,000 tons, and annual production 12,000 to 15,000 is estimated.

The Argentine and Chilean governments are reported to have made a grant for a railway which will cross the Andes at the point designated La Cubre, situated at an altitude of 3950 m., a little to the south of Aconcagua, the highest mountain of South America (6900 m.). This line will unite the Inca Bridge terminus of the Argentine Railway with the Salto del Soldado.

COLLIERY NOTES

Details in the Operation and Development of Anthracite and Bituminous Mines

Leaving a thin layer of firm coal is often an effective protection against roof-falls.

In estimating the capacity of a jig, a fairly accurate result can be obtained by considering that a jig will treat one ton of coal for each inch in width per 10 hours.

One of the most modern of anthracite coal breakers was recently built in Canada. This breaker cost complete \$119,175.58. The capacity of the breaker is 2000 tons per day, and requires the employment of 76 men.

The fumes of certain powders on exploding are said to have an injurious effect on the users. Workmen having cuts on their hands should be most careful when handling the cartridges, and should wash their hands before eating food.

Foundation walls should be at least 8 in. thicker than the wall next above them, for a depth of 12 ft. below grade; and there should be a 4-in. increase in thickness for every additional 10 ft. in depth. It is never well to build a stone wall less than 16 in. thick, as a thinner wall than this does not bond well.

Few mine managers realize the great loss in power due to the friction of wearing parts; it may be fairly estimated that one-half the power expended in the average case is consumed in overcoming the friction of lubricated surfaces, and a reduction of as much as 25 per cent. in the work lost by friction can sometimes be made if a better lubricant is used.

It is interesting to know that the larger steamships recently built have an indicated horse-power of from 60,000 to 65,000, which means a consumption of nearly 500 tons of steam per hour. In attaining this result, as much as 1200 tons of coal are used in one day. Considering that it requires five days to cross the Atlantic, it will be evident that the trip will require 6000 tons of coal.

One of the most peculiar coal deposits in the world is at Hongay, Tonkin, China. This deposit consists of one solid block of coal, about 200 ft. high. To get at the mineral, which lies on the side of a hill, it is necessary to remove a layer of schist on the surface. The coal is of an excellent quality, and the workings produce about 1000 tons per day. Besides this, there are other deposits both on the surface and underground, which have not as yet been touched. The staff of the mine consists of 50 Europeans and 3500 natives.

Since it is now known that an excessive supply of coal dust in a mine often results in serious explosions, it is most advisable in planning the surface arrange-

ment of a colliery to see that the intake air-way is located at a sufficient distance from the tippie or any dumping point so that no coal dust resulting from surface operations will be drawn back into the mine by the intake current. The floating coal caused by the domestic screen in the tippie is known to settle anywhere within 300 ft. of the initial dumping point.

Theorists claim that in fighting a mine fire, the return airway should be shut off first. This statement is disputed by some superintendents who have successfully overcome mine fires by damming off the intake side first. There is little doubt but that both methods have been used to advantage, and as to which system is most suitable, can only be determined by a consideration of the conditions to be met. If feeders of gas are present in the burning area, it is probably best to shut off the intake at once and lessen the oxygen supply.

When peat is placed on a fire it burns with a short blue flame which afterward turns to an intense yellow glow, giving off a strong heat. The fire may easily be controlled by adjusting the draft. After being lighted, a peat fire will not go out until every atom is consumed, which is due to the fact that little oxygen is necessary to sustain combustion. A stove or furnace designed for burning coal should be supplied with finer grates, or the original grates covered with clinkers or fine netting when it is desired to use peat as a fuel.

Experience has shown that by using water in bore-holes, the speed of drilling is materially increased. This practice is nearly always followed in drilling downhill holes; but when the slant is upward, the problem becomes more difficult. Various devices have been substituted, with more or less success. The principle of them all is to use water injection through a hollow bit. This scheme not only removes the débris, but keeps the bit cool and in temper. One authority claims that the use of water increased the rate of driving 20 ft. during the first month.

In firing a furnace it is necessary to have the charge of a proper thickness. If the fireman permits the fire to become too thick, the layer of coal offers considerable resistance to the passage of the air. This lessens the draft and decreases the combustion, which action diminishes the steam production and causes a serious loss of pressure. If, on the other hand, the fire is too thin, the influx of air becomes excessive and carries into the chimney a quantity of heat from which

the boiler reaps no profit. Furthermore, the excessive quantity of air cools the fire, and as a result a considerable amount of carbon monoxide will escape unburned.

In carrying steam long distances, the pipes should not only be covered with a non-conducting composition and so placed on supports or rollers that they can easily move, but also should be fitted with stuffing-box expansion joints at intervals of about 130 ft. Another successful idea used in horizontal piping is to have the pipes clamped half-way between two expansion joints, which allows expansion to take place equally in both directions. When on an incline, the pipes are clamped nearer the lower end. In getting rid of condensed water, steam traps have not been found as effective in removing the complaint as the ordinary "steam loop." At one colliery a length of 700 ft. of piping showed an expansion of 11 inches.

A proper lubricant for mine use should be uniform in quality. It should not gum nor leave any sediment when used. From many tests that have been made, it is found that a lubricant to be entirely satisfactory must contain purely animal matter, and be free from all destructive acids; this will insure good results, and carefully preserve the machinery bearings. It has also proved that a good lubricant should have a comparatively low melting point, so that it will quickly cool and preserve a bearing, which from carelessness or the improper placing of cups would otherwise burn out and be practically destroyed by the use of mineral greases with high melting point. Good authorities claim that a satisfactory lubricant should have a melting point of not more than 175 deg. Fahrenheit.

During recent years there has been a considerable advance in the use of turbine pumps. One of the advantages possessed by the turbine is that it will pass without trouble any coarse material which may enter the water passage through the impeller. Another favorable condition is that the velocity of the water in the suction and the discharge is constant and consequently no shock is felt in the pipe. One of the highest turbine lifts in America is at Butte, Mont., where 1000 gal. of water are lifted against a head of 1350 ft., the lift being accomplished in 12 stages. One large anthracite coal-mining company, having to handle acid water, built a turbine consisting of seven parts copper, and one part tin; this turbine after working two years showed practically no deterioration.

Metallics

Liquefied hydrogen sulphide, as a solvent, has somewhat similar properties to those of carbon bisulphide, alcohol, ether, and benzene. It does not dissolve salts of strong bases, but some metallic compounds are dissolved in it.

Fluorine and chlorine do not combine directly. Liquid chlorine dissolves fluorine, but when the chlorine is frozen, the fluorine is evolved. In presence of water, fluorine oxidizes chlorine, with production of hypochlorous acid.

The tantalum wire used in commerce is drawn through diamond points to an extreme state of fineness. This is, perhaps, one of the most remarkable characteristics of the metal, more especially when its hardness is considered.

In Verespatak (Transylvania) the mill operators (there are about 300 primitive little mills in the valley) still use hard stone instead of iron shoes for stamps. The Transylvania miners in general are ultra-conservative in their ideas.

"Hydraulic metal" is an alloy which is claimed to resist the action of acid mine water better than either red brass, muntz metal, copper-tin bronze, or manganese bronze. It is composed of 83 per cent. copper, 6 per cent. zinc, 10.8 per cent. tin, and 0.1 per cent. lead. It is remelted once before using.

The first water-pressure blowing engine was erected at Schemnitz, Hungary, at the Leopoldini shaft in 1749. The designer was chief master-mechanic, Höll, who applied in it the principles introduced previously (1705) in the Newcomen fire engine. Winterzschmidt, in Germany, and Westgarth, in England, constructed also water-pressure blowing engines about the middle of the eighteenth century.

The utilization of the zinc resources of the Far West was early considered. In 1885 Eugene and Alfred Cowles patented an electric furnace for the reduction of zinc ore, and we believe they had in mind the treatment of mixed ore from New Mexico. H. C. Rudge built Belgian furnaces at Denver, Colo., in 1888 and actually smelted a small quantity of ore from Leadville; but because of ignorance the venture proved a failure.

Under the broad term "blower" may be classed four types of machines, differing widely in their construction and operation. (1) The peripheral-discharge fan wheel with inclosing case. (2) The propeller or disk wheel, discharging its air in lines practically parallel to its axis. (3) The so called rotary blower with close fitting revolving propellers, and (4) the blowing engine, acting upon the principle of the plunger pump, and capable of producing pressures several pounds to the square inch.

"Manganese resistance metal" is an al-

loy of 85 per cent. copper, 12 per cent. manganese, and 3 per cent. iron, which is used as resistance material in place of German silver. Its electrical conductivity is only 3 to 4.5 per cent. of that of copper. "Manganin" is also used as resistance material. It is composed of 82.12 per cent. copper, 2.29 per cent. nickel, 0.57 per cent. iron, and 15.02 per cent. manganese. The nickel increases the melting point, permitting a higher heat without danger of fusing, and also decreases the temperature coefficient of the electrical resistance.

When cold, tantalum strongly resists chemical reagents; it is not attacked by boiling hydrochloric acid, aqua regia, nitric acid, or sulphuric acid; it is also indifferent to alkaline solutions; and it is dissolved solely by hydrofluoric acid. Thin wires of tantalum burn with low intensity, and without any noticeable flame, when ignited in air. Tantalum combines with carbon very easily, forming several carbides, which as far as present known are all of metallic appearance, and are very hard and brittle; but does not seem to amalgamate with mercury. It can, however, be alloyed with most other metals.

"Acid-resisting metal" is said to be the best strong metal for resisting the action of acid, "chemical" lead and the lead alloys being too soft for many purposes. It is composed of 82 per cent. copper, 2 per cent. zinc, 8 per cent. tin, and 8 per cent. lead. Phosphorus is added in the form of phosphor-tin, $\frac{1}{8}$ of a pound of 5 per cent. phosphor-tin being used for every 100 lb. of the alloy. Any excess of phosphor-tin over this amount will result in blow holes. The phosphor-tin is added last, and the metal is cast at the lowest temperature at which it will run. This metal will resist the action of nitric acid.

As an example of the early employment of a mining geologist as a professional man, it may be remarked that the Royal Hungarian Mine Management at Schemnitz has been employing one for about 25 years back. The geological collection made by him is a model one, and very instructive for the students of the subject. The trouble in that district is that the mines, being now worked out, have a grand past, but a poor future; therefore the work and collection of the mining geologist is more of academic than of practical value. Nevertheless, mining experts can draw benefit from it, inasmuch as they may find, in prospecting, similar formations of country rock and ore deposits.

It may not be generally known how Peter von Rittinger, the great inventor of the spitzkasten and Stossherd (percussion table), got the idea of both of these machines. The former was invented by him in the first half of the last century. As an inspector of stamp mills, his attention had been called by a mill foreman to a box wherein the ore settled. Then

he started to experiment, putting glass sides on the embryo spitzkasten, through which he studied the separation of the pulp, and determined the shape of spitzkasten as at present in use. The percussion table was made after the idea of the hand vanner (Sichertrog). These facts were narrated to the writer by an old boss carpenter, who was an apprentice in Rittinger's employment.

After the inauguration of zinc-ore production in British Columbia, there was a period of inactivity, which is not surprising, inasmuch as in the United States the market for the impure ores had not yet become well established. American smelters were beginning, however, to feel the pinch in the conditions under which they were operating, and in the summer of 1901, the Lanyon Zinc Company, of Iola, Kan., which had received interesting samples of ore from British Columbia, sent Thomas Jones thither to investigate the conditions and purchase ores for its account. Jones bought ore in 1902-1904, chiefly in 1903, purchasing about 4000 tons in all. In 1903 and 1904 buyers for other smelters appeared in the market, but up to 1905 the shipments of ore were not large.

In the attempt to force air at a given velocity through a given pipe, it is the province of the fan wheel, if employed therefor, to create within the fan case a total pressure above the atmosphere which shall be sufficient to produce the velocity and also overcome the resistance of the case and the pipe. If, however, the pipe be removed and the fan be allowed to discharge the air through a short and properly shaped outlet, the pressure necessary will, with an efficient fan, be substantially that required to produce the velocity. From the same formulæ, properly transposed, the pressure due to any given velocity or necessary to its creation may be determined. The pressure thus determined is properly that which it is the purpose of the fan, employed as a device for moving air, to create.

The average price of prime Western at New York in 1905 was 5.882c. per lb., against 5.1c. in 1904. The annual averages for the last 10 years have been as follows: 1896, 3.940; 1897, 4.120; 1898, 4.570; 1899, 5.750; 1900, 4.390; 1901, 4.070; 1902, 4.840; 1903, 5.400; 1904, 5.100; 1905, 5.882; average for 10 years, 4.806. It will be observed from these figures that the average for 1905 was the highest in 10 years, but indeed it was more than that; it was the highest average for any year since 1877, i.e., it was the highest in 30 years. Statistical tables are likely to be misinterpreted by those who are ignorant of the conditions which are reflected in them, but anyone is justified in drawing the conclusion that during the next 10 years the average price for spelter is more likely to be under the average for 1905 than above it.

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*Illustrated

The Iron Trade

The course of the iron trade in November has followed that of the previous month, but with rather an intensified activity. In raw material there has been rather a runaway market, pig iron for December delivery having recorded prices of \$25 at furnace, and \$27 delivered. The rush has not been relieved by considerable importations of foreign pig, which has found a market in the foundries on the seaboard.

In finished material the leading interests have succeeded in preventing any sharp advance in prices; but they have not prevented the payment of premiums to secure deliveries, which really amount to an advance in prices. The mills generally are supplied with work well into 1907, and are not anxious for new orders. It is not improbable that December will see the easing off which is quite usual toward the end of the year.

Colliery Explosions and Barometric Pressure

The article by Mr. Parsons, in a recent issue of the JOURNAL, together with that of Mr. Walker in the last issue, pointing out that meteorological conditions, especially the barometric pressure, may have an important effect on the liability to gas explosion in collieries deserves the most careful consideration. They make no pretense to saying the last word on the subject, but present data merely with the view of calling attention to the possibility that the state of the atmosphere may be a factor in determining the safety of a colliery. Mr. Parsons offers evidence which certainly tends to support the hypothesis that at periods of low barometer a coal mine may be more subject to the discharge of explosive gas than at other times, and by a curious coincidence, shortly after his article was written, the disastrous explosion occurred at Wingate, England, which led Mr. Walker to advance a similar suggestion.

Of course, no safe conclusion as to this subject can be drawn until all the available evidence has been carefully examined. Unfortunately a great deal of important evidence cannot be obtained, for various reasons. In this connection, it will be highly useful if every colliery engineer and operator who has notes of experience or has ideas bearing upon this subject

will communicate them for publication in the JOURNAL, where they will be open to the discussion of the profession. We have reason to believe that the commission of the United States Geological Survey, which is engaged in the study of the coals of the United States, and is aiming to extend its researches into the field of coal mining, will investigate the hypothesis which we have advanced. It is eminently suitable that a Government commission, which can secure the official co-operation of the Weather Bureau, should undertake such an investigation. If it should really prove that there is a connection between colliery explosions and the barometric pressure, it is unnecessary to point out the immense importance that such a discovery would have to the coal-mining industry.

The Course of Silver

In previous months of this year we have noted the steady advance in the price of silver. This movement apparently culminated in November. On Nov. 1 silver sold at 70½c. in New York, and it advanced gradually until on Nov. 17 it attained the maximum at 71¾c. in New York and 33½d. in London. From that point it receded, with one or two rather sensational drops, to 69½c. at the close of the month. The price on Nov. 17 was the highest recorded for 13 years. The fall in the second half of the month was due, in part, to the cessation of buying by the United States Mint; in part to the collapse of a bull speculation in London. At the present time there seems no reason to expect any considerable further recession from the higher level of prices which has been the rule in 1906.

The high price has been the cause of some difficulties in countries which employ silver largely in their currency. In Mexico, for instance, the inducement to export silver pesos has been so great that, to prevent a currency shortage, the government has imposed an export duty of 10 per cent., as explained on another page. Similar action has been taken in Peru and Chile, where also the stability of exchange had been seriously effected. The chief factor in the high price this year has been the large demand from the East, which furnishes, as it has for many years past, the chief market for silver. By far the greater part of this demand is

met by purchases in the London market. The exports from Great Britain to the East for two years past have been as follows:

	1905.	1906.	Changes.
British India..	£5,400,012	£13,560,127	I. £8,160,115
Straits.....	400	1,750	I. 1,350
China.....	891,827	435,957	D. 455,870
Japan.....	15,000	.....	D. 15,000
Total.....	£6,307,239	£13,997,834	I. £7,690,595
App. ounces....	55,125,000	109,838,000	I. 54,713,000

The increase in value this year was 121.9 per cent.; in quantity, 99.3 per cent., the difference being due to the higher average price of silver this year.

The shipments to the East from the United States are mainly made through London. For the 10 months ending with October the total silver exports were, \$43,955,134—approximately 73,810,000 oz.—in 1905, and \$48,998,899—approximately 74,058,000 oz.—in 1906; an increase of \$5,043,765, or 11.5 per cent., in value, and of 248,000 oz., or 0.3 per cent., in quantities. We have not the distribution of the exports for the month of October; for the nine months ending with September the shipments direct to the East were as follows:

	1905.	1906.	Changes.
China.....	\$3,676,420	\$ 707,379	D. \$2,969,041
Japan.....	1,143,470	1,564,802	I. 421,332
Total.....	\$4,819,890	\$2,272,181	D. \$2,547,709
App. ounces....	8,131,000	3,454,000	D. 4,677,000

These exports are insignificant compared to the London shipments. The quantity shipped to China shows a heavy decrease as does that from London. This is only balanced to a small extent by the Japanese takings of silver from this country, which are understood to be almost entirely for use in Korea and Manchuria. There has been, however, an increase this year in silver shipments from Australia to China, though the exact figures are not obtainable.

The net result of the Eastern trade, therefore, is that India, as a result of three prosperous years, has increased its purchases of silver 150 per cent., while China has been a lighter buyer than for several years. The Straits Settlements, under their new currency system, have ceased to be a factor in the silver market.

While the exports from the United States show, as above stated, an apparent increase, a much larger proportion of the shipments have been re-exports of foreign silver this year than in 1905, the figures for 10 months being as follows:

	1905.	1906.	Changes.
Exports.....	\$43,955,134	\$48,998,899	I. \$5,043,765
Imports.....	26,939,551	36,810,362	I. 9,870,811
Net exports..	\$17,015,583	\$12,188,537	D. \$4,827,046

The net exports, which represent exports of silver produced in this country, showed a decrease in value of 28.4 per cent. This has been offset, in part, by the purchase of 5,500,000 oz. by the Mint for subsidiary coinage. There has been, moreover, a strong and steady demand this year for silver for use in the arts; this being one result of our great prosperity and the wide-spread increase in purchasing power which results therefrom, and makes itself manifest everywhere in the buying of luxuries and ornament.

The Metal Markets in November

November was characterized by continued strength in the markets for all the metals. Copper opened the month at 22¼ to 22½c. for Lake, and 21 5/16 to 22c. for electrolytic. At the close the quotations were 22¾ to 22½c. for Lake, and 21¾ to 22¾c. for electrolytic. Sales of comparatively small quantities were made at somewhat higher figures, but our quotations, as always, represent the prices at which the great bulk of the transactions are made. The special feature of the month was the sale of 20,000,000 lb. by the Calumet & Hecla for delivery during the first three months of 1907. All of the large producers are well sold ahead, but some further than others, although very little business has been done for delivery beyond March. The outlook is that the price for copper will go still higher.

The price for spelter at the beginning of the month was about 6.25c. New York. It rose slowly but steadily during the month, closing at about 6.45c. The market for zinc ore at Joplin also rose, but there is still a good margin between the price of spelter and the price for zinc in the ore in favor of the smelters.

The price for lead remained unchanged during the month, as fixed by the trust, which controls the wholesale market in this metal. Small lots of outside metal have sold at an advance over the contract price, as at several periods during the current year.

The market for antimony continued very strong, without material change in the quotations. An illuminating article on the situation in the antimony industry is published elsewhere in this issue.

The market for tin has been lifeless, and fluctuations in the price have been within a very narrow range.

The most spectacular feature of the month was the rise in the value of platinum from \$33 per oz. to \$38, for which no special reason is assigned, other than the continuance of the causes which have forced upward the price of this metal during the last year.

A Metallurgical Waste

For many years a small amount of cobalt oxide for the supply of the domestic market has been produced at Camden, N. J., the raw material being chiefly nickel-cobalt matte from Missouri, but now in the treatment of the argentiferous cobalt-arsenic ore from Cobalt, Ontario, we are deliberately wasting more cobalt than we have produced. According to a statement of the Ontario Bureau of Mines, the output of the Cobalt district during the nine months ended Sept. 30, 1906, comprised 138 tons of cobalt, this figure being, however, only an approximation, inasmuch as the buyers of the ore allow nothing for that element.

This ore is shipped to New Jersey for smelting, chiefly to the works of the American Smelting and Refining Company, at Perth Amboy. Its treatment is an interesting metallurgical problem, which has not yet been solved successfully. So far but little progress has been made in the matter. At present the practice is to mix the ore with other ores of ordinary classes, and put the whole through the lead-smelting furnace in the usual manner. The cobalt content of the ore is lost. Some attempts have been made by the International Nickel Company to save the cobalt at its works at Copper Cliff, Canada, but so far as we are aware a commercial process has not yet been developed there.

THERE is little new to record in the coal trade. In the West it has continued to be largely dependent upon transportation conditions, and these have gone from bad to worse. Lake shippers are approaching the close of navigation with contracts still unfilled, and a part of the supply of the Northwest this winter will have to be carried by rail, which will give Illinois and Iowa mines an advantage over shippers farther East. In several of the larger cities the transportation troubles are beginning to show in short and irregular supplies of coal, a serious matter to manufacturers.

John Price Wetherill

If ever man there was who rounded out an active and a useful life, held in love and reverence by his kin, in admiration by his kind, that man was John Price Wetherill. Self-reliant and strong, yet gentle as a woman, brilliant in achievement, modest in demeanor, *preux chevalier* was he; great of heart and generous in mind, fitted, if anyone, to write *sans reproche* for his motto.

He was born in Belleville, N. Y., in 1844,

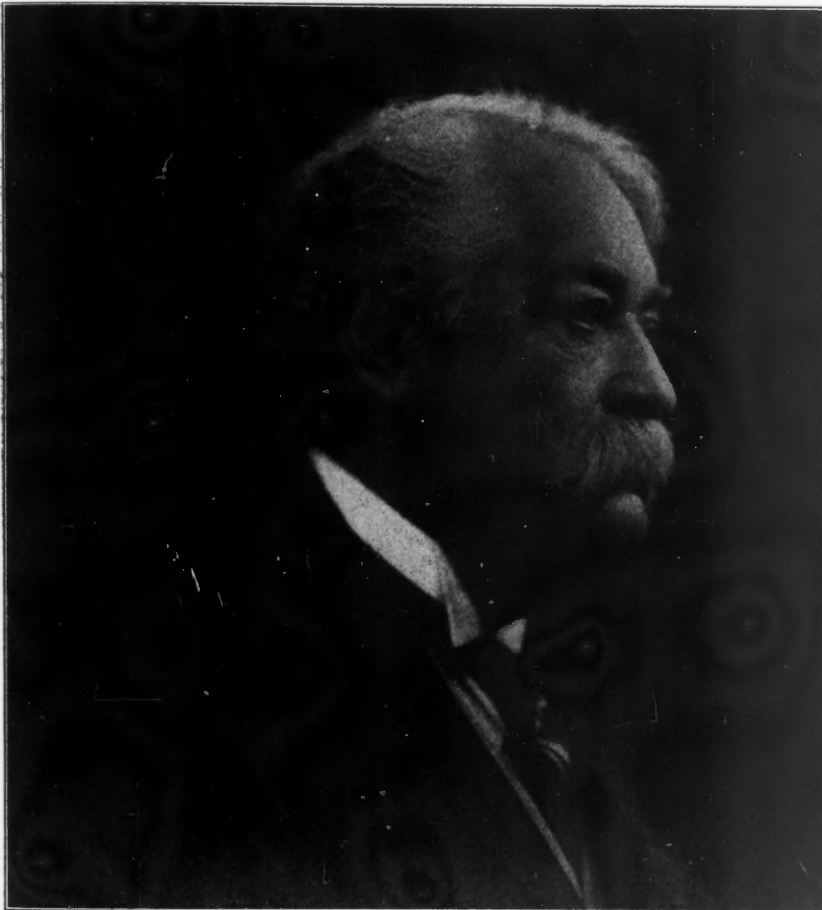
as a profession; and after acting for a brief space in a consulting capacity, with an office at Mahanoy City in the coal regions of Pennsylvania, became resident engineer of the Reading Coal and Iron Company, first at Tremont in Schuylkill county, and subsequently in Pottsville, in charge of all the collieries of the Reading company.

In 1881 he left that service and became one of the founders and incorporators of the Lehigh Zinc and Iron Company, at South Bethlehem. His com-

vestigation and tireless research, Wetherill himself was not an electrical engineer, and that he should have thus perfected an invention which has since been so generally adopted in the mechanical separation of ores speaks volumes for his genius. He devised many other improvements, but they were not of such far-reaching importance.

In 1897 when, after many years of bitter litigation, the ownership of all the deposits of franklinite ore in New Jersey was consolidated through transfer to the present New Jersey Zinc Company, in which the Lehigh Zinc and Iron Company also was merged, Mr. Wetherill relinquished the active supervision and control which he had theretofore exercised, and became the consulting engineer, as well as one of the directors of the New Jersey Zinc Company. He was since then less active than in his younger days. Being not only a man of tireless energy in technical achievement, but also a sportsman and an artist, he found many things to which he could turn his hand to the delight of his associates. He founded the Pohoqualine Fishing Association, near Stroudsburg, Penn., of which he became the president. Let those who met him on the stream relate what manner of man he was. He painted many very beautiful water color pictures, sketched from nature, and his home in Philadelphia, as well as the houses of some of his friends, now bear witness to his artistic conceptions, and his quite unusual talent. When he laid down his brush about a year ago, his friends knew that he could not remain with them very much longer.

Although his equipoise, his chivalry and his sweet disposition had kept from his lips the taste of life's fitful fever, yet on the sun-kissed slope of Laurel Hill Cemetery he sleeps well. Entombed in our thoughts as in the roses, enshrined as in the violets that framed his grave, his memory to those who loved him—and those who knew him best loved him most—will remain an example and an inspiration. H.



JOHN PRICE WETHERILL

and descended from a family distinguished for generations in the social and industrial life of Pennsylvania. His father, at the breaking out of the Civil War, relinquished an important enterprise, the management and ownership of the zinc works at South Bethlehem (the place was then called Wetherill), in which he had been a pioneer and inventor, to join the Northern forces. Price himself had been educated professionally, and graduated as a mining engineer from the Polytechnic College in Philadelphia. He had been named for West Point, but was displaced by political influences, because his father had cast in his lot with the North. He had married early in life, and being thrown on his own resources, the oldest of a family of four, took up engineering

pany had just purchased the Lehigh Zinc Works, which his father had founded. He himself became the general manager of the plants and properties of the corporation, and from that time onward his field widened constantly, and he soon rose to be the best equipped manager and expert in the zinc industry of the Eastern States.

It was at Bethlehem that he devised a process for the economical separation and reduction of the famous franklinite ores, which process, like his father's invention of the Wetherill grate for making oxide of zinc, was revolutionary in its character, and of vast benefit and value in the exploitation of the remarkable zinc deposits in New Jersey. It was a process of magnetic separation, the result of years of in-

An Opinion on Cobalt

SPECIAL CORRESPONDENCE

Prof. W. A. Parks, of Toronto University, lecturing on Cobalt recently before the Empire Club, of Toronto, said that on a conservative estimate 30 Cobalt mining companies might be classed as producers. These were capitalized at \$40,000,000. A number of close corporations might be listed at \$10,000,000. The non-producing companies, some of which were legitimate prospecting concerns, would bring the total capitalization up to \$80,000,000. Ten years would exhaust the veins now known and to return the capital \$100,000,000 must be mined. Up to date \$4,500,000 of silver, nickel and cobalt had been mined.

Daniel Guggenheim on the Mining Speculation

Daniel Guggenheim, of the American Smelting and Refining Company, and American Smelters Securities Company, in a recent interview made the following remarks:

The flimsy character of the majority of the mining stocks that are now finding a ready market cannot be too emphatically stated. The public hears of the development of great values in a mine which the careful investigations of mining experts have proved beyond guesswork, and overnight a market is created for shares in any company that can be incorporated to cover property adjacent or even in the same district. Even where there are undoubtedly surface indications of ore values, it should be borne in mind that one in 300 is a conservative estimate of the proportion of prospects that eventually fulfil their promise. In the Cobalt field, where the purchase by our interests of a large

In buying into a mining property, the investor should ascertain the absolute cost of producing copper at that mine, and base his purchase solely on that.

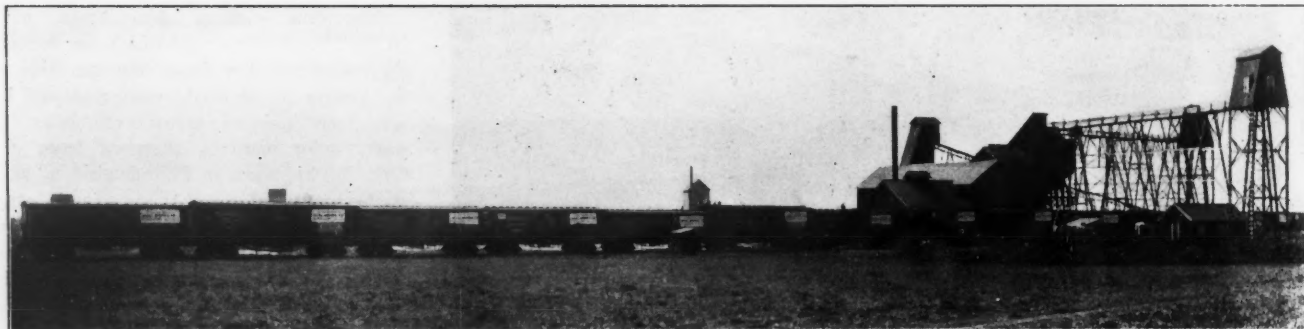
A Large Shipment of Zinc Ore

One of the largest single shipments of zinc ore from the Joplin district, possibly the largest, was made recently from the land of the Rex Mining and Smelting Company, of Joplin, Mo. This shipment constituted a trainload, the train consisting of 21 cars, and the weight of the ore loaded amounting to 672 tons. This ore was produced by the Ideal Mining Company from the 50-ft. level of its mine, and was the output of that company since Aug. 9, 1906, when its mill was first put into operation. The shipment was made to the Mineral Point Zinc Company, of De Pue, Ill. It was sold on a basis price of \$45.50 per ton of ore assaying 60 per cent. zinc. Actually, the ore assayed, on car-load samples, 61, 62, 63 and 63.7 per cent.

the advantages of modern construction are therefore clearly shown by the results obtained by the Texas Almaden Mining Company.

Another feature that is considered an important factor in securing good results is the "housing," which is built of expanded metal lathe and plaster. Over each condenser an 18-inch ventilator has been placed, whereby it has been found possible to keep the condensers at a steady temperature, even during the extreme weather that sometimes occurs in this district during the summer months. At present the plant is idle, pending the completion of certain development work in the mine.

The Chisos Mining Company has let a contract for a 10-ton Scott furnace, and already has part of the material for it on the ground. This company has heretofore been hauling its ore to the works of the Colquitt-Tignor Company, a distance of about six miles. The Colquitt-Tignor mine has not been in operation for about



A LARGE SHIPMENT OF ZINC ORE

share in a mine at a price which puts the valuation of the property at \$25,000,000 has stimulated an immense popular speculation, the name of Guggenheim has been harnessed in market gossip to properties without number with which we have not, and shall not have, any connection.

The 299 failures are forgotten in the one success, and that one is made the bait with which the public is tempted to 300 more ventures. A great scientifically conducted mining enterprise is able, through the work of its engineers and geologists, if not to deal in certainties, at least to limit the chances of failure to the terms of the human equation.

The rising price of the metal and the consequent increase in the earnings of the established copper properties, has helped along the flotation of an enormous crop of copper "prospects," in which the securities of developed mines with records as dividend payers have been buried out of sight. The fluctuations in the price of the metal are entirely left out of consideration, and it is forgotten that a property which can show earnings on 22c. copper might easily be a loser with the metal at 13c., the average price for the last 10 years.

zinc. The accompanying illustration shows only a part of the train.

Quicksilver in Texas

SPECIAL CORRESPONDENCE

The Texas Almaden Mining Company, of Dallas, Texas, operating at Big Bend, Brewster county, completed a 20-ton Scott furnace the latter part of last April. This furnace has been pronounced the most complete and up-to-date furnace of its kind ever erected. It is made a turn-out of 60 flasks of quicksilver in less than 30 days after it was first charged with ore. The excellent results have been attributed to the fact that the first four condensers were lined with dry-pressed machine-made brick of a very fine quality, the bricks being laid with a very close mortar joint, thereby presenting an absolutely smooth surface, which did not admit of the quicksilver penetrating the joints and the soot clinging to the walls. The time required to "coat" new condensers is ordinarily rather long; one 50-ton furnace that came under my observation turned out less than one flask of quicksilver in 60 days, running on a fair grade of ore;

two years, but there is talk of a party taking a lease on it and re-opening it. The Terlingua Mining Company and the Lone Star Mining Company have both closed down. The large producer of the district is the Marfa & Mariposa Company.

H. J. Krebs, of Wilmington, Del., has patented a process (U. S. No. 830,601, Sept. 11, 1906) for the recovery of copper from scrap brass. The brass is melted in a cupola furnace, its zinc component being volatilized and oxidized, while copper is tapped off from the bottom of the furnace. The zinc oxide is collected by filtration through bags, and is treated with an acid solution for the production of a zinc salt.

The De Bavay experimental plant at the Junction North mine, Broken Hill, has been improved. The same results that were obtained with five tables, one above the other, are now being secured with the use of four tables, the bottom machines having been discarded as unnecessary. Mr. De Bavay is now conducting experiments with a view to securing the same result by passing the material over three tables only.

The Smokehouse Shaft, Butte, Mont.

BY E. HIGGINS, JR.*

Considerable interest is attached to the reopening of the old shaft on the Smokehouse claim, not only on the part of visitors, but also of old residents of Butte. The first thing that impresses itself on

nected to a 36-in. drum. The old gallows frame was partly rebuilt and a 600-gal. tank put in commission. It was soon discovered that the load was too much for the motor and the capacity of the tank was cut down to 400 gal. With this arrangement the work has been progressing nicely and the shaft is now being unwatered at the rate of 4000 gal. per hour. At this writing the water has been

to furnish air to drills and a permanent station pump.

Arrangements are being made to extend the tracks of the city electric railway to a convenient point near the gallows frame, so that cars can be run in to receive ore and waste material from the bins. The waste material will be hauled to the outskirts of the city and disposed of.

There are three known veins on the Smokehouse claim having an easterly and westerly strike; also one with a northerly and southerly strike which was exposed during recent excavation work about 150 ft. west of the shaft. It is the intention of the company to explore thoroughly all of the veins of the claim from the 500-ft. level.

Politics in the Anthracite Region

SPECIAL CORRESPONDENCE

There is a revolt among the mine workers of the anthracite region, as the result of which President Dettery, of the ninth district, and all his colleagues have withdrawn. They stated that they will not be candidates for reelection and promise some interesting disclosures at the coming convention. This is known as the Hazleton district and affairs there have always been unsatisfactory to the leaders. At one time the membership was 14,000 while now it is less than 4000. The situation is complicated by the fact that Dettery is a member and secretary of the Anthracite Conciliation Board, and his withdrawal will mean a vacancy on



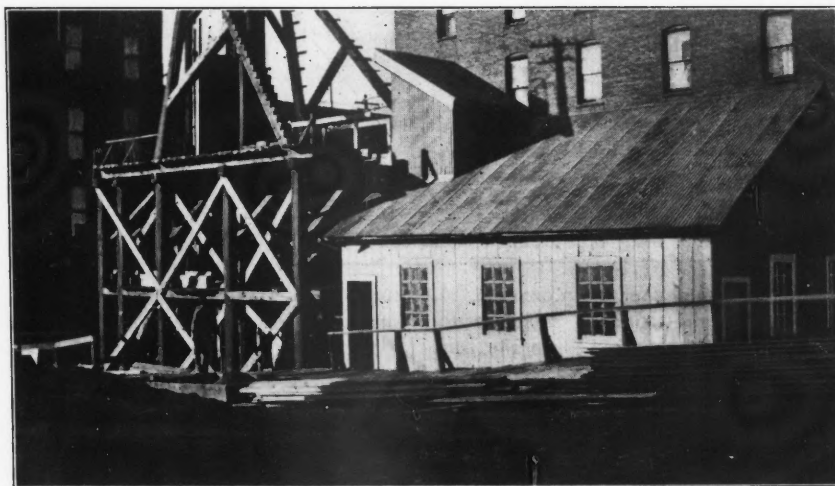
SMOKEHOUSE SHAFT. HOTEL THORNTON IN BACKGROUND

the mind of the casual observer is the fact that the shaft is in the very heart of the city, on a lot 130x30 ft., with comparatively high buildings on all sides. If the observer be one familiar with mining, he will wonder where the room is for the installation of a hoisting and pumping plant, air compressors, ore bins, tipple, etc. He will also wonder what is to become of the waste material which must necessarily be hoisted from the shaft in the course of the development of the mine.

The Smokehouse claim, the surface of which embraces part of the principal business section of Butte, contains 19.5 acres of ground, and is now included in the holdings of the Davis-Daly Estates Copper Company. In December, 1899, a shaft to develop the veins of the claim, was started on the southwest corner of Broadway and Wyoming streets, directly opposite the Thornton Hotel. Owing to some disagreement of the operators this shaft was abandoned in the winter of 1901, at which time it had reached a depth of 520 ft., some little work having been done on the 200-ft. and 400-ft. levels.

When the Davis-Daly company began operations in August of the present year the shaft was filled with water to within 20 ft. of the surface. Owing to a lack of space for the installation of a pumping plant, it was decided to unwater the shaft by means of a tank, the hoisting power to be electricity. Accordingly, a 70-h.p. direct current motor was set up and con-

lowered to the 300-ft. level and it is expected that the shaft will be dry within the next week. The exact cost of hoisting the water cannot be closely figured at present, as the machinery has not been running steadily for a sufficient length of



PART OF HEADFRAME AND POWER-HOUSE

time. It is expected, however, that the cost will be about 20 per cent. less than what it would be if steam power were used.

As soon as the water is out of the shaft it is the intention of the company to install a 125-h.p. Nordberg alternating-current motor and hoist. There is also in transit a 170-h.p. cross-compound, two-stage air compressor, with inter-cooler. This compressor will deliver 980 cu.ft. of air per min., and will be used

the board. All the officers are incensed at John Mitchell and claim that he is to blame in connection with the recent political work of the union. Mitchell assisted Nicholls, who was elected congressman in the first district on the Democratic ticket, but did not help Dettery who was a candidate for congress on the socialist ticket in another district. Secretary Gallagher of the district has received a position in the State Department of Mines.

*Mining engineer, Butte, Montana.

The Consolidated Mining and Smelting Company of Canada

The operations of this important Canadian company during the six months ending June 30, 1906, resulted in a profit of \$325,854, exclusive of \$45,905 written off as depreciation upon plant and equipment. From this profit a special reserve of \$20,000 was provided, and two dividends amounting to \$234,940 were distributed, while a balance of \$70,915 was carried forward.

The gross value of the metals produced in the company's smelting works to date is over \$22,000,000, and during the last half-year the value was over \$3,000,000, of which \$1,622,450 came from the company's own mines. The Center Star and War Eagle mines were, as usual, the largest producers of ore. Together they yielded

extent. During the past half-year, 8753 ft. of driving was carried out in the two first named mines, and over 6900 ft. in the St. Eugene.

The most important development was in the 1300-ft. level in the Centre Star mine where a rich streak of ore was met with. A fair tonnage of ore was found in the War Eagle mine on the fourth, fifth, and sixth levels, and good ore is being mined on the eleventh level at a depth of 1582 ft. An important strike was also made in the St. Eugene, where a new cross shoot, called the Fourth Avenue, was found connecting the main and south veins. High-grade ore was found in one of the claims on the company's Richmond-Eureka mine, at Sandon, B. C., and the superintendent expects to be able to send shipments to Trail shortly.

The company's new construction work at the smelter was delayed by difficulty in

idated Company will operate that property under a lease. Reports by Professor Brock, of the Canadian Geological Survey, indicate that there are about 100,000 tons of ore which can be profitably mined, and it is believed that development work may materially increase this tonnage. In consideration of this lease, the Consolidated Company has guaranteed an overdraft of the Snowshoe of \$78,000. The proceeds from ore shipments will be applied by the Snowshoe Gold and Copper Mines, Limited, to this overdraft, so that it should be entirely repaid in about one year.

Negotiations for the purchase of the Iron Mask Mine, Rossland, were concluded. This property adjoins the War Eagle on the east and the Center Star on the north. The Iron Mask mine shipped 19,405 tons of ore at a gross assay value of over \$25 per ton (nearly \$500,000), and has 11,850 tons of probable ore containing \$20.46 gross assay value (\$242,451). The War Eagle east drifts will be connected with the old Iron Mask workings. There was expensive litigation between the Center Star and Iron Mask, which was concluded in 1901 by a somewhat indefinite agreement. The purchase of the Iron Mask removes all chance of future difficulties between the properties.

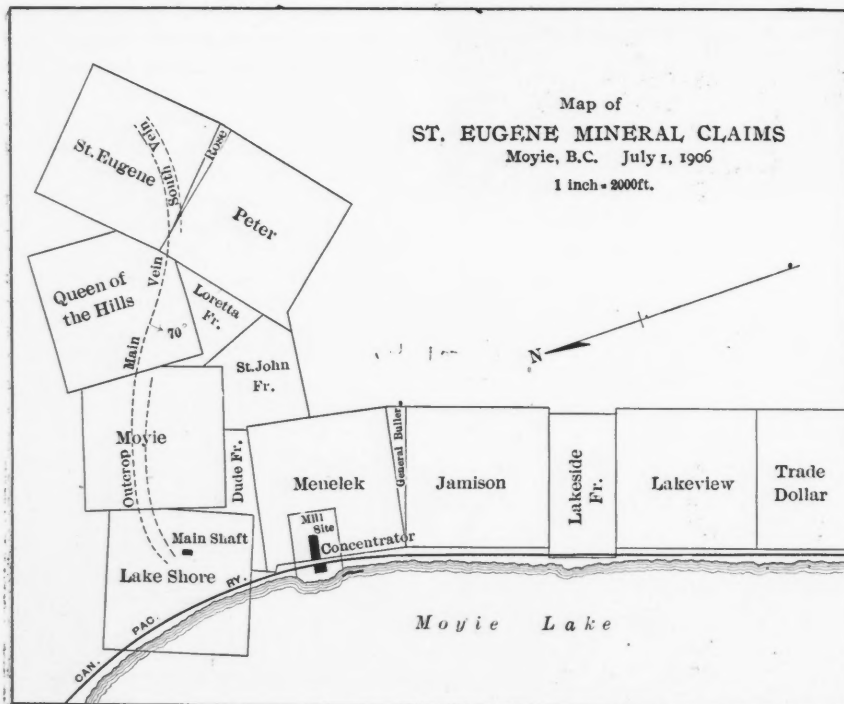
R. H. Stewart has succeeded James Cronin, of Spokane, as general manager of the company's mines; but Mr. Cronin continues to act as a director of the company. Jules Labarthe and William Chambers continue to act as managers of the Trail smelter, and S. G. Blaylock is metallurgist.

Gold Production in Mexico

SPECIAL CORRESPONDENCE

The district of El Oro, in the State of Mexico, continues to aid the Mexican government in the maintenance of its gold standard by the steady production of that precious metal. A large portion of it from the three large companies in that district is refined at the plant of the National Metal Company, in Mexico City, and delivered directly to the government mint 999.9 fine.

Of the mines in El Oro district the Esperanza easily takes the lead, with a net profit of \$400,000 Mexican per month, and a large calculated ore reserve. It is one of the large gold mines of the world, though the area controlled is small compared to some of its neighbors. The production from Dos Estrellas, which has been paying regular dividends of \$40 per share, or a total of \$120,000 Mexican monthly, is of no small consideration. But this is somewhat exceeded by that of El Oro Mining and Railway Company, whose report at the recent general meeting in London showed the annual profit from the mines for the year ending in June, 1906, of \$1,774,000 Mexican money.



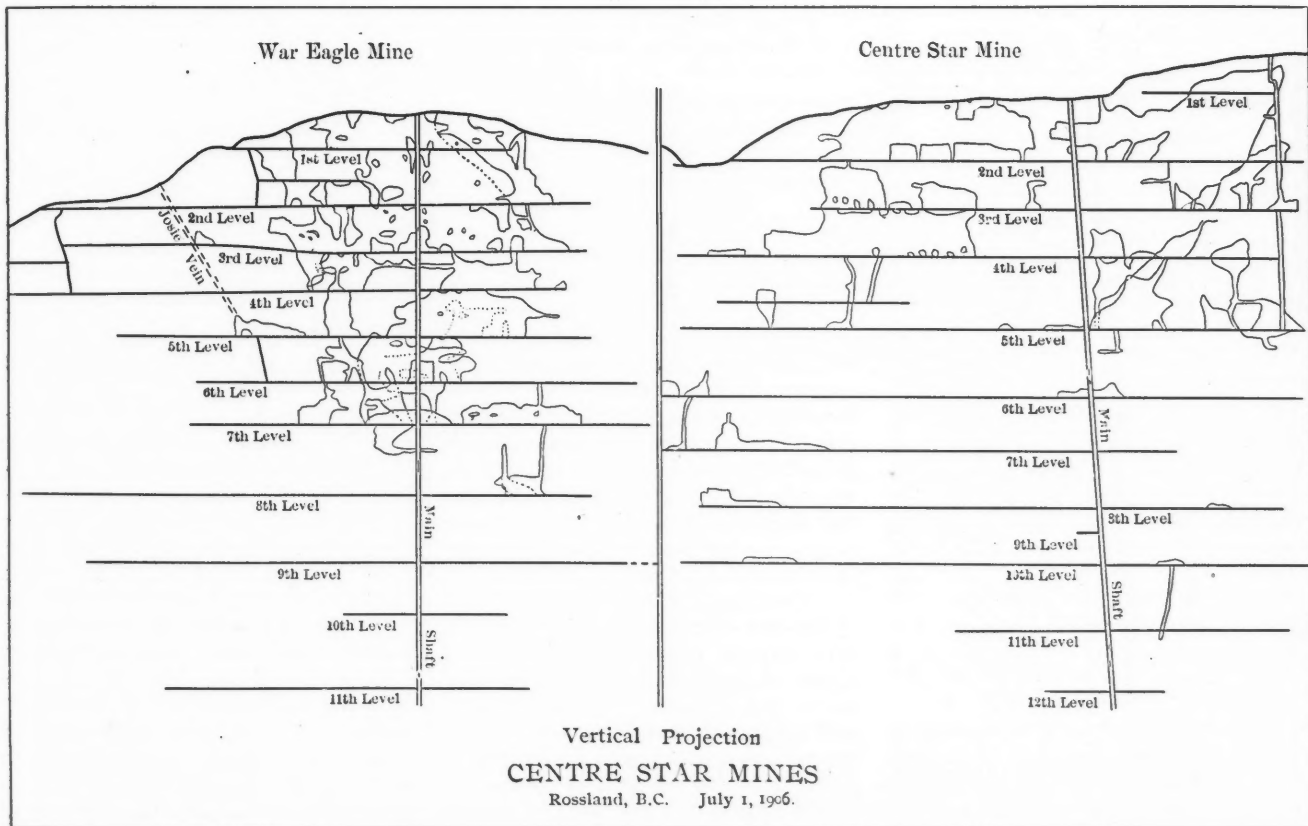
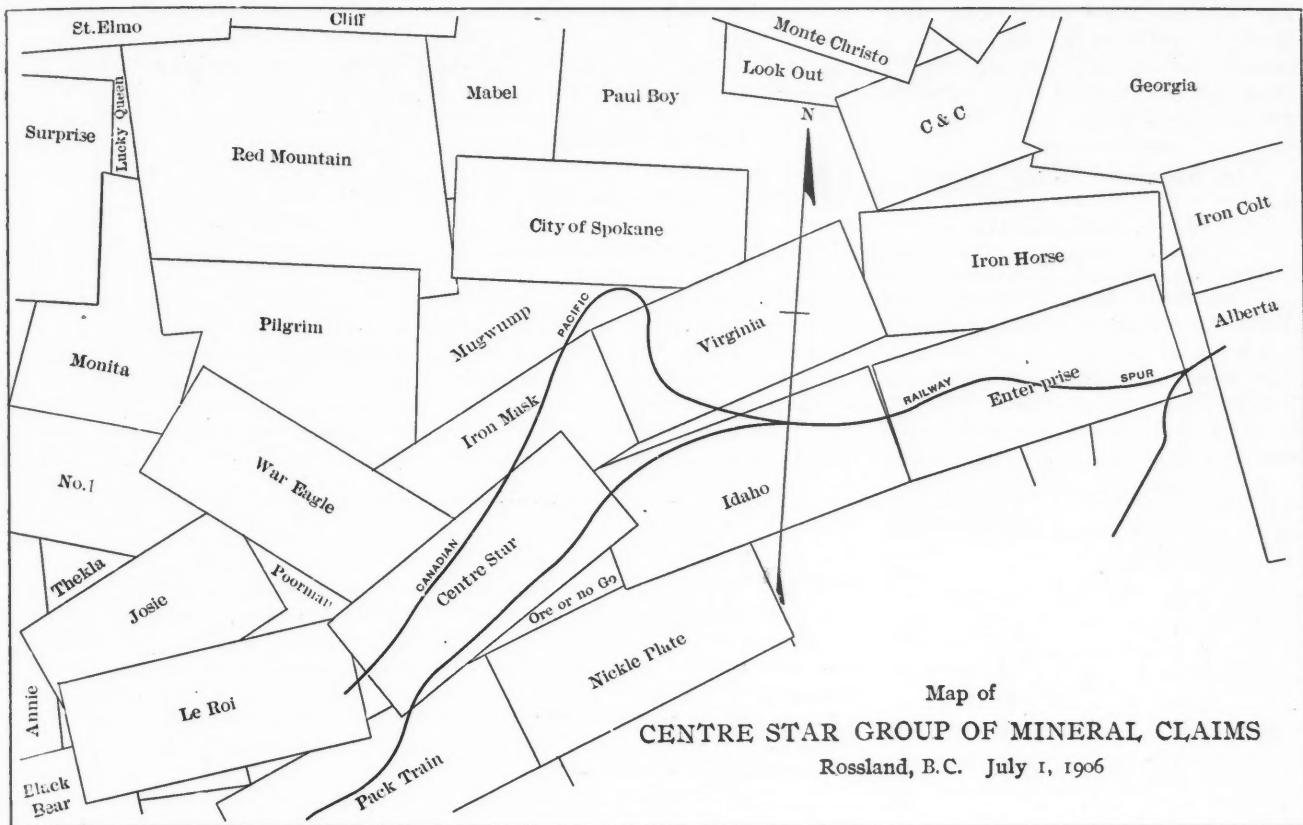
81,267 tons containing 30,669 oz. gold, 26,938 oz. silver and 976,528 lb. copper, of the total value of \$823,790. Since the commencement of operations in 1894 these mines have produced 842,684 tons of ore valued at \$12,831,033.

The St. Eugene mine in the half-year produced 84,066 tons of ore containing 418,084 oz. of silver, and 17,288,649 lb. of lead of the total value of \$798,660. To date, this mine has yielded the owners \$4,489,343. The company's smelter at Trail, B. C., treated 157,640 tons of ore during the period under review, for a return of 64,590 oz. of gold, 1,074,255 oz. silver, 15,133,683 lb. lead, and 2,399,161 lb. of copper of a total value of \$2,994,927.

The underground development and narrow work in the Center Star and War Eagle mines now measure over 14 miles; while the underground workings in the St. Eugene mine are nearly eight miles in

securing skilled labor; but during the half-year the electrolytic refinery capacity was increased from 50 to 75 tons of pig lead per day, and a new electric crane, and a plant for dealing with silver slime was completed. Two copper furnaces, 22 ft. long by 42 in. at the tuyeres, each having a capacity of 400 tons daily were blown in, and a plant for treating the lead sulphide ore by the Huntingdon-Heberlein process was installed. This plant has already resulted in reducing the costs in reducing the St. Eugene lead product, copper matte and other sulphide ore. The company has secured the Canadian patent rights for the process. The above improvements were carried out at a total cost of \$130,979.

In order to secure a regular supply of desirable smelting ore, an agreement was made with The Snowshoe Gold and Copper Mines, Limited, by which the Consol-



The company has set the excellent example of appreciation by voting its manager a bonus of \$15,000 Mexican and its assistant manager \$7500.

The property of the Chihuahua Mining

Company, of El Oro, controlled by Houston, Texas, capital, where a new equipment of machinery has been installed, is showing up some excellent streaks in the vein of from 6 to 14 in. in

width and running high in gold. John H. Kirby and associates, also of Houston, and stockholders in the Chihuahua Company, have bought the old machinery of the latter for work on adjoining property.

The Mexican Mines of El Oro, after about a year's work, are making a splendid showing, and it is understood a stamp mill and cyanide plant are to be erected without delay.

The Mexican Silver Dollar

SPECIAL CORRESPONDENCE

When the Mexican Government last year established the gold standard and ceased the coinage of the silver dollar—legally known as the peso—it was supposed that there might be some difficulty in maintaining its parity with the gold dollar of 75 centigrams of pure gold, which was at that time adopted as the theoret-

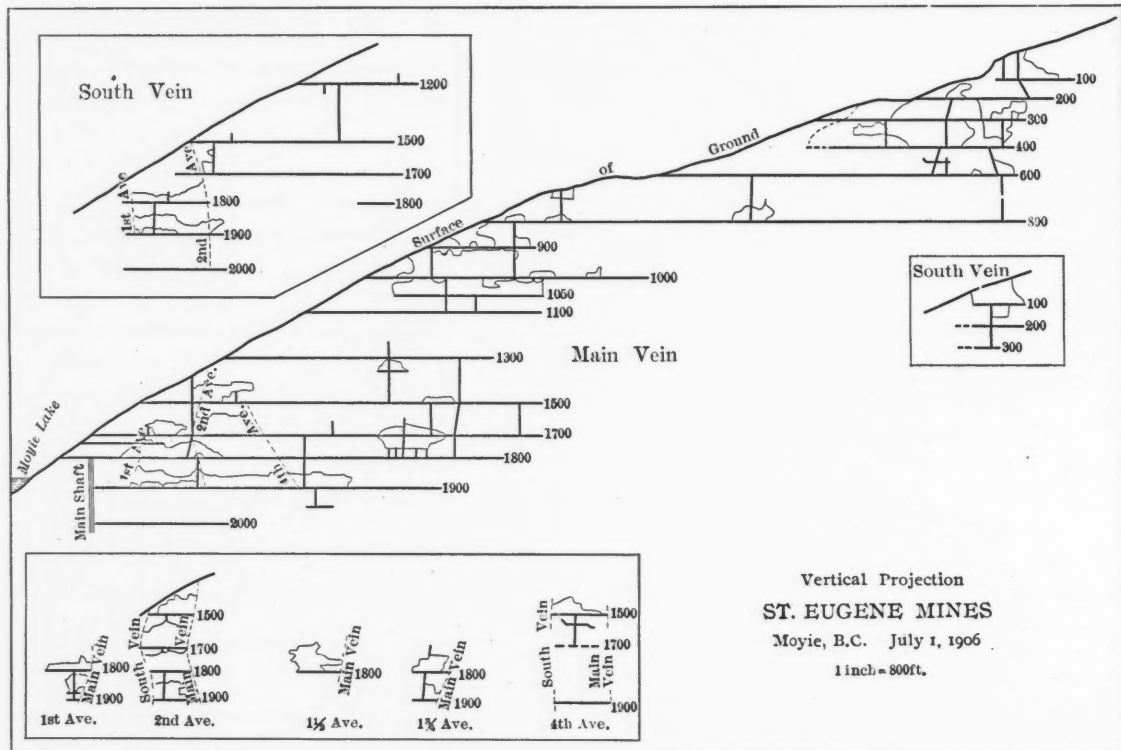
in the money market by placing an export duty of 10 per cent. on the silver dollar. As the principal object, however, of the Mexican Government is to prevent a contraction of the currency and not to deprive individuals or corporations from any gain there may be in such exportation of the dollar, the duty is not imposed if the exporter, within a reasonably short space of time, deposits with the Exchange and Currency Commission for each dollar exported 75 centigrams of pure gold in bullion not from Mexican mines, or in foreign gold coin. The bill presented to and passed by the Federal Congress, Nov. 15, 1906, reads as follows:

“Sole Article”—The exportation of Mexican silver money, made in quantities of

porters of the Mexican silver, and previous to the official assay, shall issue a certificate acknowledging receipt of the same, and shall pay them the value of the same in gold money, if it be coined, and, if not, in certificates of deposit, the emission of which is authorized by the said decree of Dec. 22, 1906.

“The conditions of this law may be suspended at any time by a decree of the Executive of the Union.”

The Government has already coined \$50,000,000 in gold pieces since the establishment of a gold basis, but as it is not the object of the monetary reform to exchange one system of money or one metal for another, and as the exportation of silver even under the new law will be very



ical unit of the Mexican monetary system, though the smallest gold coin was the \$5 piece, containing 3.75 grams of pure gold, with a total weight of 4.166 $\frac{2}{3}$ grams, of 900 fine gold and 100 copper. It was not supposed that the silver dollar would soon, if ever, be worth more than its face value in gold; but the recent rapid rise in the price of silver has brought that condition about, causing so large a gain to the holder of the Mexican silver dollars, now at a premium of 10 per cent., that not only banks and bankers, but also commercial houses and private companies have found it so much to their advantage to meet their foreign obligations by the direct exportation of the silver dollars that the outflow approached that point where it threatened a serious contraction of the circulating medium, and a possible monetary crisis. It has, therefore, been deemed necessary by the Government to check this exportation and avoid any danger of a stringency

more than 10 pesos, will, from the promulgation of this law, be subject to a duty of 10 per cent. upon the legal value of the money exported, unless there be shown to the export custom house, at the latest, within 30 days after the date of exportation, a certificate from the Exchange and Currency Commission that there has been delivered to the latter for coinage, gold in bars, not of native production, or in foreign moneys, which shall fulfil the conditions laid down by Article 2 of the decree of Dec. 22, 1905, for a value equivalent to the sum exported, at the rate of 75 centigrams of pure gold per peso.

“The space of 30 days shall be granted to exporters, on the giving of surety satisfactory to the office, which shall be collected if, on the expiration of the time, the corresponding proof shall not have been presented.

“The Exchange and Currency Commission, on receipt of the gold from the ex-

heavy, the shortage of silver in circulation is to be overcome by pushing the coinage of pieces of a lesser denomination than the dollar. In this Mexico is being aided by a contract with the United States Government mints. The present Mexican silver dollar, which, however, is no longer coined, weighs 27.073 grams, with 902.7 parts fine silver and 97.3 parts copper, and is unlimited legal tender; whereas two 50-centavo silver pieces weigh only 25 grams, with 800 parts fine silver and 200 parts copper. The subsidiary coins are legal tender only up to \$20. It is rumored that the Mexican Government will, on the first of the year, again begin the coinage of a silver dollar of the same weight as the present one, but only 800 fine silver, thus lowering its intrinsic value; and that the Exchange and Currency Commission has been for some time quietly, so as not to affect the market, and for this purpose, buying about 30,000 oz. of fine silver per week

CORRESPONDENCE

Discussions by Our Readers of Various Topics of Interest

The Anchor Tin Mine

I read with much interest the communication of James B. Lewis, manager of the Anchor tin mine, in Tasmania which was published in the JOURNAL of June 30, 1906. However, modesty forbade him to say that there are few more capable managers to be found than himself. He has done wonders with the Anchor mine. If I were to name anyone else who also helped to bring the Anchor around the corner, it would be Lindsay Clarke, now of the Briseis mine.

The Anchor mine is opened on a deposit of very low-grade tinstone, requiring the most careful management to get any profit out of it. There are large quantities of the tinstone and with the present high price for tin, together with the able management of Mr. Lewis, the prospects that the mine will be made a profitable venture is now confidently viewed.

T. H. STANLEY.

Attorney for the Anchor Mining Company, Ltd.

Cambooya, Queensland, Oct. 12, 1906.

Use of Neutralizers in the Cyanide Process

The note published in the JOURNAL of Oct. 27, on the substitution of burnt lime for caustic soda at the cyanide plant of the Consolidated Mercur Gold Mining Company, of Utah, leads me to write of an experience with a British Columbian ore, which emphasizes the importance of taking nothing for granted in relation to these neutralizers. At Mercur, caustic soda was originally used at the Golden Gate mill because lime did not have the effect of saving an equal amount of cyanide, as was demonstrated by thorough tests, and the fact that the reverse is now true (perhaps due to the greatly reduced proportion of base ores treated, or other changes in character of ore) also points to the necessity of verifying one's conclusions from time to time.

The ore in British Columbia carried minerals of iron, copper (unoxidized) and arsenic, and was strongly acid. With caustic-soda neutralization an extraction above 90 per cent. of the contained gold was readily obtained, while the use of lime in any way or proportion that ingenuity could devise resulted in a drop to 70, and even 60 and 50 per cent. No explanation

is here offered to account for this remarkable difference, but the account is presented as evidence that no cyanide test is conclusive without trying both neutralizers.

WILLIAM MAGENAU.

Gomez Palacio, Durango, Mex., Nov. 5, 1906.

Electric vs. Air Drills

Following the discussion in the JOURNAL on this subject, I have noted that while many data concerning air drills have been given, little has been said concerning actual working of electric drills, other than the Temple drill, which is in reality a compromise or combination drill, probably superior to either for certain classes of work, even considering that the electric drill proper has been perfected.

I do not believe this discussion to be complete until more has been said concerning what electric drills have done under working conditions in mines. I therefore beg the privilege of a few words.

I have recently had the opportunity of following the Box electric drill through a trial under very hard working conditions, covering nearly 10 months, and can give the following as results:

The drills (three in number) were used alternately, one being held as reserve while two were in use. The two in use were run two 12-hour shifts daily except Sunday. Drills were handled by Mexican labor entirely. Runners were paid \$3.25, helpers \$1.75, Mexican currency, per shift of 12 hours. All repair work, cleaning, etc., was done by a Mexican mechanic, who also did the sharpening, and who was kept daily at this work. He received, with helper, \$5, Mexican, per shift of 12 hours.

The drills worked in highly metamorphosed lime shale, pyroxene andesite and quartz vein-filling, all three being unusually hard. The workings were wet and continuously hot, also "foggy" from poor ventilation.

I wish to emphasize the fact that these drills worked under hard conditions, but a successful drill must be able to withstand the hardest conditions to be encountered, not the easiest.

Each drill put in one round of 16 five-foot holes per 24 to 28 hours, and drill was torn down, holes fired, rock mucked and drills reset in the remaining 8 to 12 hours, thus making an advance of 4 ft. per 36 hours in a 5x6-ft. drift or crosscut. At

times the drills did slightly better, at others much worse; but the above is a fair average.

I cannot be quite accurate, but the extra parts used during 10 months included the following:

1 Rheostat or controller.	1 Crank shaft and bevel gears.
3 Sets brush holders.	3 Full sets bearings.
4 Sets graphite motor bearings.	2 Chuck blocks and gears.
36 Carbon brushes.	1 Air-cylinder shell and hammer.
6 Sets chuck gears and shaft.	Wire and insulation.

It will be noted that parts wearing most badly in the body of the drill were those transmitting turning motion to the chuck blocks, and steel. This is explained by saying that the water system, though theoretically complete, is a failure in practice, and, as the drills do not "mud" at all, the bits jammed in the holes from this cause. The drills seldom, if ever, "fitcher."

However, the most trying and greatest difficulty lies in the power system, in the motors and connections. B. H. Locke, in the JOURNAL of Oct. 20, states: "The proper method of connecting the motor to the drill is to have the axis of the drill and the axis of the motor parallel, and thus the vibration of the machine will not throw the brushes off the commutator, thus causing the motor to spark and the commutator to corrode." I can heartily agree to this statement of results of vibration, and would call attention to the number of brushes, brush holders and connections used in this instance. I would also say that each commutator was turned down once or more. Also it was impossible, because of the excessive vibration and heating of motors, to run the drill at full speed or current; so to save motors, the drill runners were prone to use half- or three-quarters speed, thus burning all four of the rheostats almost to cinders.

Mr. Locke differs from Mr. Palmer, whom he quotes as follows (JOURNAL of Aug. 18): "No form of insulation has yet been devised which will stand up under the continued jar of the drill bodies for any appreciable length of time." He says, in refutation: "A drill has been running in Colorado for 15 months without loosening of the coils or abrasion of insulation." But it would seem from his preceding paragraph concerning vibration that he has not improved the insulation, but has devoted himself to eliminating the vibration or cause of the effect. So I must still agree with Mr. Palmer.

In conclusion I would say that while the work of the Box drill in this case was

far below the standard of air drills, still, owing to poor and uncertain labor (hand drilling in the same ground cost from 37 to 50c., Mexican, per ft.), the electric drills showed a saving over hand work, and progress was greater.

May I add that quite a ludicrous source of annoyance and trouble in the present instance was the breaking down of insulation, i.e., short circuit, or in the vernacular, "Choques."

A perfect electric drill of lighter weight and less power than the Temple would be a veritable boon to mining in Mexico, and let us wish that success will crown the conscientious efforts of those working in this field.

W. M. H. YEANDLE, JR.

El Banco Mine, Ixtlan, Oaxaca, Mexico, Nov. 12, 1906.

The Smelter Question at Salt Lake

BY L. H. BEASON

The smelter situation in the Salt Lake valley has assumed a serious phase since the recent decision of Judge Marshall of the Federal court, which enjoined the American Smelting and Refining, United States Smelting, Bingham Consolidated and Utah Consolidated from the further operation of their respective plants on sulphide ores containing more than 10 per cent. sulphur, or any arsenic. The injunction of the court is so far reaching that, if enforced, it will mean certain death to the smelting industry in the Salt Lake valley. However, the attorneys for the smelters have succeeded in getting a stay of proceedings pending the appeal of the cases to the United States Court of Appeals at Minneapolis and it will probably take six months or more to bring about a settlement of the controversy in that tribunal. In the meantime the present plants will be kept in operation treating the usual tonnage of ore.

The consensus of opinion among smelting men here seems to be that the inevitable result will be the removal of all smelting operations from Murray and Bingham Junction, which points are surrounded by some of the richest farming lands in the Salt Lake basin. But where they will go is a question yet to be solved. The Bingham, like the United States company, is engaged in the treatment of custom ore in addition to that coming from its own mines and both will be compelled to refuse sulphide ores, if the injunction should go into full force and effect; the American Smelting Company would be similarly affected and would not be prepared to handle more than 27 per cent. of the amount of ore going to its Murray plant at the present time. Fortunately for this company, it has its new Garfield smelter to fall back on, besides a system of Colorado plants to which it can divert prohibited ore; hence the sit-

uation is not as black for that corporation as it is for some of the others. The United States company has for some time furnished a competitive market for the producers of the Coeur d'Alene district of Idaho, which will be cut off until the company finds some other location for its plant or the injunction is dissolved. The Bingham Consolidated has stopped all new construction, while the Utah Consolidated directors are evidently figuring on building an entirely new plant and it is not improbable that a site for it will be found somewhere in the camp of Bingham, and at a point where it can be reached by aerial tramway from the mine, thus cutting off the expense of 40c. a ton paid to the Rio Grande Western Railroad at the present time to convey ore from the Highland Boy mine to the smelter. But at best the situation is bad and the future of Salt Lake as a great smelting center has received such a setback that it may not long lay claim to the title. The farmers who went into court alleging that their property had been damaged by fumes from the smelters have won a signal victory. The smelting companies did not deny that damage had been done, in the trial of the cases, yet they did reply that the actual amount had been grossly exaggerated. They believed the court would arrive at some basis whereby the damages might be adjusted, but the injunction proved a disappointment to them.

Questions and Answers

USE OF STONE COAL IN COPPER SMELTING

I have been considering an interesting question, namely the possibility of smelting oxidized copper ore in a blast furnace with stone coal. Can you tell me if stone coal was ever used in smelting in Arizona in the old days, or give me any other references?

H. S. C.

Answer—So far as we are aware, copper smelting was never done with stone coal in Arizona, but the refinery slags at Lake Superior have been smelted with anthracite for many years. The old Revere Copper Company, at Point Shirley, near Boston, used to smelt roasted copper ore in low blast furnaces (5 ft. high) with anthracite, the furnaces being brick lined. They used about 13 per cent. of fuel (figured on the charge) or 20 per cent. (figured on the ore). The furnaces being so low were, of course, wasteful of fuel. There was no special trouble in the smelting, but it was found difficult to train men accustomed to coke to the use of anthracite, the furnace acting quite differently, the heat being more concentrated with anthracite, and the furnace producing more and poorer matte than with coke.

Molten aluminum and bismuth are mutually soluble only to a slight extent. Bismuth will lower the melting point of aluminum by about 5 deg. C.

Tin Production of Bolivia

A correspondent of the London *Mining Journal* communicates the following official returns of tin exported from Bolivia for the first six months of 1906:

Custom Houses.	Kg.	Value, Bs.	Duty, Bs.
La Paz.....	639,764.32	639,764.32	32,188.96
Oruro.....	8,502,055.34	8,502,055.34	412,648.76
Uyuni.....	814,291.08	814,291.08	41,534.69
Tupiza.....	1,910,104.00	1,910,104.00	92,304.25
Recaudadora de Potosi....	3,751,399.82	3,751,399.82	170,606.98
Recaudadora de Colquechaca.....	335,894.30	335,894.30	16,101.08
Total.....	15,963,508.86	15,963,508.86	765,284.74

The average of Straits tin, which governs the price in Europe, was for the first six months of the present year £173 10s. per metric ton, which corresponds, for Bolivian ores averaging 60 per cent., to £98 10s. Taking exchange at $\frac{1}{8}$, and deducting expenses in Europe, there is a net yield of one boliviano per kilogram.—[Signed] V. Tarfon, Inspector General of Customs Houses, La Paz.

The Bolivian export duties on tin ore and bismuth were fixed by decree, Jan. 1, 1906, as follows:

TIN ORES

If the quotation for Straits tin should be inferior to £100, the quintal of 100 lb. Spanish shall pay 1.00 Bs.

From £100 to £110	1.00 Bs.
From 110 to 120	1.15
From 120 to 130	1.30
From 130 to 140	1.45
From 140 to 150	1.60
From 150 to 160	1.75
From 160 to 170	2.00
From 170 to 180	2.25
From 180 to 190	2.60
From 190 to 200	3.00
200 and above	3.50

TIN BARS

If the quotation for Straits tin should be inferior to £100, the quintal of 100 lb. Spanish shall pay 1.50 Bs.

From £100 to £110	1.60 Bs.
From 110 to 120	1.75
From 120 to 130	1.90
From 130 to 140	2.10
From 140 to 150	2.30
From 150 to 160	2.50
From 160 to 170	2.80
From 170 to 180	3.10
From 180 to 190	3.40
From 190 to 200	3.80
200 and above	4.20

In accordance with the quotation for Straits tin in Europe, the Minister of Finance will fix fortnightly and with strict observance of the preceding tariff the rate of duty which the ores and bars shall pay, which rates shall remain invariable during the 15 days, notwithstanding that appreciable fluctuations in the quotation for Straits tin may take place in the meantime.

Companies working tin mines are exempt from the contribution of 3 per cent. on their net profit hitherto levied.

BISMUTH

Ingots or bars } per quintal of 100 lb., { 10.00 Bs.
Ores or barilla } Spanish { 8.00

The boliviano is nominally equivalent to 38.48c., or 1s. 7d.

Personal

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

James M. Malcolmson, of El Paso, Texas, is in Mexico on professional business.

C. S. Smith, president of the Old Dominion Copper Company, is at Globe, Arizona.

H. F. A. Riebling, of Colorado Springs, Colo., has gone to Texas on metallurgical business.

Edward Skewes passed through New York last week, on his way from British Columbia to London.

Dr. John H. Banks, of Ricketts & Banks, New York, has returned from a professional trip to Cobalt, Ontario.

J. M. McClave has been appointed manager of the Damascus Mining and Milling Company, of Leadville, Colorado.

P. R. Forbes, of New York, is visiting the mining properties he is interested in in Jalisco, and in other districts in Mexico.

A. C. Hitchcock, of London, England, who represents extensive British financial interests, visited the Cobalt mining area in Ontario, recently.

John Weir, of New York, president of the Nevada-Utah Mines and Smelters Corporation, is in the West on an inspection trip.

John R. Stanton, of the Atlantic Mining Company, returned to New York this week from a brief tour of inspection at Lake Superior.

Hermann A. Keller, mining engineer, of New York, returned home last week from a long stay in Alaska, where he was engaged on professional work.

E. H. Hoffman has resigned the general superintendency of the Carisa Copper and Gold Mining Company, of Utah, to accept a similar position at Manhattan, Nevada.

H. H. Webb, of London, England, consulting engineer of the Consolidated Gold Mines, Ltd., is in Mexico, making examinations in Tepic and other parts of the Republic.

John E. Rothwell, of the Colorado Iron works, of Denver, returned from California and Nevada to Denver a few days ago, and has left there for a professional trip to Mexico.

Edward L. Dufourcq is examining mineral properties in the southwestern part of Chihuahua and in Sonora, Mexico. He expects to be in New York about the middle of December.

W. L. Moyer, president of the Mechanics' and Traders' Bank, of New York, has spent a few days in Butte, Mont., recently, for the inspection of mining properties, in which he is interested there.

Cyrus Robinson, engineer, of New York City, has just returned from a trip to Europe. He has recently been appointed consulting engineer for the Balbach Smelting and Refining Company.

W. C. Perry, of Kansas City, Mo., president of the Central Coal and Coke Company, and of the Southwestern Interstate Coal Operators' Association, is seriously ill at his home with kidney trouble.

W. P. Thomas, of Houghton, Mich., has accepted the position of chief engineer for the Indian Territory mines of the Rock Island Coal Company, effective Dec. 1, with headquarters at Hartshorne, Indian Territory.

W. H. Yeandle, Jr., has resigned the management of Compania Minera El Banco y Anexas, Oaxaca, Mexico, to accept the position of superintendent with the San Luis Mining Company, of Gabriel, Durango, Mexico.

W. R. Wardner has been appointed general superintendent of the Bamberger De Lamar Gold Mines Company, De Lamar, Nevada, in place of Geo. E. Metz, resigned. Mr. Wardner was formerly superintendent of the Mono Mining Company.

H. E. West has concluded an examination trip in southwestern Siberia for the Siberian Syndicate, covering 1500 miles in the month by "troika" and "karabec." He has now assumed the superintendency of the Yuspensky mine, of the Spassky Copper Company, Akmolinsk, Siberia.

A. G. Blackwell, managing director of the Shweli Gold Dredging and Mining Syndicate, of Burma, has been visiting the United States to obtain the latest information with regard to gold dredging and hydraulic mining for the benefit of his company. He leaves New York for London this week.

Robert McF. Doble, of Colorado Springs, Colo., formerly of San Francisco, has been retained as consulting and supervising engineer by Curtis & Hine, general managers of the recently organized Central Colorado Power Company, in the development of the large hydro-electric power projects on the Grand river, Colorado.

Obituary

Gen. John H. Bryant, of Richmond, Va., died in Washington, Nov. 19. He was a prominent manufacturer in Richmond, and was largely interested in coal-mining properties, being a director or president of the Choctaw Coal and Railroad Company, the Seattle Coal and Iron Company, the Gilman Coal Company and other similar enterprises.

Frederick A. Tritle, governor of Arizona from 1882 to 1885, died in Phoenix, Nov. 18, aged 73. He was born in Pennsylvania, studied law, and was admitted

to the bar in 1855. In the same year he removed to Des Moines, Iowa, where he began the practice of his profession. In 1859 he emigrated to the Pacific coast and settled in Carson City, Nev., in 1860. In 1863 he became president of the Belcher Mining Company, which position he filled until 1868. In 1866 he was elected to the State senate of Nevada, serving several years.

R. G. Hart, well known in the mining circles of Mexico, died at the age of 67, in Mexico City, Nov. 14, of heart failure. Mr. Hart has for years been interested in mines and other enterprises in various parts of New Mexico, but particularly in the State of Sonora, and has been especially successful at El Tino mine in the Altar district. Feeling quite run down of late, he last August came to Mexico to rest, but he did not seem to improve. His death, though, was unexpected. Besides his wife and relatives in Berkeley, Cal., he leaves a son, Glanville Hart, who is operating the Antrevida mines, near Ameca, Jalisco, Mexico.

Societies and Technical Schools

American Society of Mechanical Engineers—The annual meeting will be held in New York, Dec. 4. The headquarters will be at the auditorium of the New York Edison Company, No. 44 West Twenty-seventh street. Business sessions will be held on Dec. 4, 5, 6 and 7, and a reception on the evening of Dec. 6. A number of papers have been prepared for this meeting, and most of them are already in type.

Industrial

Among recent sales secured by the Crocker-Wheeler Company, of Ampere, N. J., appear the following: Generator to the DeLaval Steam Turbine Company, Trenton, N. J.; generator to the National Tube Company, McKeesport, Penn.; a number of generators, etc., for railroad work.

W. E. S. Dyer, formerly manager of the Reeves Engine Company, Philadelphia, has been appointed manager of the Philadelphia office of the A. D. Granger Company, Commonwealth building, Philadelphia. With his new connection he will handle several types of engines, fire and water-tube boilers.

Henry A. Hitner's Sons have just purchased a large tract of land at Eddystone, N. J., where they intend to erect one of the largest scrap-iron plants in the country, the great advantage of this tract being its extensive water front. William B. Ilko has been appointed manager of the New York office of the firm, at 32 Broadway.

Special Correspondence

San Francisco Nov. 22

The price of quicksilver is at the present time not sufficient, nor is the demand ample enough, to keep all of the California quicksilver mines at work profitably. A number of them in San Luis Obispo county have stopped work for the present. The domestic consumption is comparatively small and the surplus product must be shipped abroad, where it is sold at much lower prices than in the United States.

California has never made any product of zinc, but the Western Zinc Company, operating in Santiago cañon, Orange county, has commenced to ship concentrates to a smelter near San Francisco. It is expected that these shipments will continue. The company has a 30-ton mill, and has 30 men at work. The last shipment was 30 tons of concentrates.

If the little Tightner mine at Alleghany, Sierra county, were in one of the Nevada camps, it would create great excitement and be the making of the camp. The owner, Mr. Johnson, got nearly \$100,000 out last month, and a few days ago 1500 lb. of the ore milled \$90,000 or over \$60 per pound. They have some rich ore in the Mohawk in Nevada, but nothing like this. Yet very few people ever heard of the Tightner, because its stock is not dealt in in the Stock Exchanges.

The strike difficulties of the Standard Portland Cement Company, of Napa Junction, are over, after the works had been closed several months. The company and the strikers came to an agreement after a consultation had been held; both sides yielding a little, the difficulties were adjusted. The terms agreed upon give some of the employees of the works the raise they requested, others a slight increase in salary, while some of the men have returned to their employment at the same scale they were receiving before the strike.

The Southern California Cement Company, which is preparing to erect an extensive plant near Riverside, has also organized the Crescent City Railway Company to operate from Crescent City, San Bernardino county, to the works of the cement company, a distance of 10 miles. In San Bernardino county a number of claims have been taken up where cement is to be made. A group in Cajon pass, owned by Geo. S. Branch, has been bonded by Los Angeles men recently. A cement plant is also to be built at Ely, Nevada, by Senator Nixon, D. W. Linton and R. H. Richardson, who object to paying the present railroad rates.

San Francisco men have mined gypsum in Nevada, 10 miles from Lovelock, for several years, and are now surveying for a branch railroad, in order to handle larger quantities of material. The Lovelock gypsum deposit, and the one located near Mound House, Nevada, are among the largest in the country.

The Ashburton Mining Company, owning

dredging ground near the town of Folsom, Sacramento county, has let a contract for a large dredge. It is expected that other companies now operating in the Folsom field will build at least six new dredges during the coming season. Gravel mining in that whole section has revived within the past few years.

Salt Lake City Nov. 23

The Beck Tunnel Consolidated Mining Company has posted a dividend of \$40,000; the Grand Central one for \$15,000 and Victoria for \$10,000. All are Tintic mines.

Jesse Knight, of Provo, Utah, has completed the purchase of the property of the Mammoth Consolidated Mining Company, situated in the Snake Creek mining district, and it will probably become an asset of the Mountain Lake Mining Company.

Officials of the Boston Consolidated Mining Company state that 30 carloads of structural steel for the new mill near Garfield are on the way from the factory. Some of the material has already arrived. Nearly all the concrete foundations for the building are in.

The San Pedro, Los Angeles & Salt Lake will build a branch line into the Deep Creek mining district in western Utah and it is the intention to extend the line on to Ely, Nev. The surveys through Utah west from Tintic Junction have been completed and maps were filed this week in the United States land office.

The Nevada Douglas Copper Company, which is developing an attractive copper property at Yerington, Nev., will probably inaugurate ore shipments in the near future. Pending the construction of a railroad to the mine, it is the intention to use traction engines, for which orders will soon be placed. Walter C. Orem, of Salt Lake, is manager.

For the reason that it needs the money to apply toward the purchase of adjoining mining property, the Mammoth Mining Company, operating in the Tintic district, has passed the regular dividend of \$20,000 this month.

Another syndicate of Salt Lake people was formed this week to operate a mining property at Ely, Nev., and will conduct its business under the name of the McDonald-Ely Copper Company, with the Robust, McDonald and Maceo groups, covering about 4000 ft. of the mineral zone extending eastward from the Nevada Consolidated properties, as the basis. In addition, the company owns about 1300 acres of land south of Ely, on which is located a lake a mile long by a quarter of a mile wide, fed by numerous springs, thus affording an excellent site for the location of a smelter and mills. Ex-Senator Thomas Kearns, David Keith and Col. E. A. Wall, of Salt Lake, are the largest individual shareholders. Two shafts are being sunk and one of them entered the sulphide zone at 70 ft. depth.

The annual meeting of shareholders of the St. Joe Mining Company, operating in Bingham, resulted in the re-election of the old board of directors, consisting of R. A. Hasbrouck, D. H. Wenger and W. L. Burton, of Salt Lake; W. A. Menta, of Kansas City, and L. R. Benton, of Batavia, New York.

Shareholders of the Lower Mammoth Mining Company, operating in the Tintic district, have authorized a bond issue of \$40,000, convertible into stock at \$1 a share within one year. The bonds are to bear interest at the rate of 8 per cent. per annum. The capital stock has been increased 40,000 shares, or to a total of 190,000 shares. The shaft will be sunk to the 1700 level.

Denver Nov. 23

Judging from late reports received from England, it seems probable that before long a reorganization of Stratton's Independence Company will take place. During the past two years or more the property has been operated under the lease system. Probably the capitalization will be reduced.

The exodus from the Cripple Creek district to the goldfields of Nevada during the past few weeks has been very large, as well as that for the copper camps in the vicinity of Ely, for which point it was reported that nearly 100 tickets were sold in one day. The coming of winter in the high altitudes has undoubtedly a good deal to do with this migration on the part of many miners.

In the District Court of San Miguel county, a verdict of \$5000 was rendered against the Smuggler-Union Mining Company in favor of William Dunlap and Joseph Kent in their suit for \$100,000 damages for being ousted from a five-year lease on a part of the above named company's property.

After litigation during the past 12 years, the United States Circuit Court of Appeals at St. Paul, Minn., has just set aside the decree in the case of N. A. Munn and others against the Ixex Mining Company, involving a large interest in the Independence property at Leadville. The case has attracted a great deal of attention in the mining world, and at one time, during the prolonged struggle, the complainants secured a judgment for nearly \$400,000 in the Federal Court at Denver.

The chances of the construction of the large electrical power plant, referred to in a late letter in these columns, are favorable. It will probably be built at Lafayette, the plant to cost about \$450,000, while the construction of the power lines will cost nearly double that amount. Among the many uses will be the supplying of power for the operation of a system of interurban lines between Denver and Boulder on the Colorado & Southern tracks. A party of engineers

and capitalists have just taken a trip over the territory to be benefited, one of them being John F. Wallace, formerly in charge of the construction of the Panama canal, now president of the Electrical Properties Corporation.

Duluth Nov. 24

Ore business from the upper lakes has been delayed exceedingly the past two weeks, first and chiefly by cold weather, and second, especially from eastern Lake Superior ports and Escanaba, by stress of storms. The Duluth, Missabe & Northern road was making as high a record for this month, up to Nov. 15, as in the very high of the best month of the year—about 15,000 tons a day—but it is now working very much harder and is moving forward as high some days as 25,000 tons. The two other Minnesota roads are carrying out a combined traffic about as large. It is a difficult matter to handle ore when the thermometer ranges from freezing to 10 deg. above zero and remains cold day and night, as has been the case of late. It is impossible to place ore in docks for storage till vessels arrive to carry it away, for it would freeze and ruin the docks. It is impossible to time the arrival of ships at port as is done to a few minutes during the summer, for storms are common. Vessels up-bound are always reported from the Sault, and shippers know to a few minutes the time of their arrival at Duluth or Two Harbors docks, 500 miles away; but at this time of year too many unexpected circumstances may arise to take them longer than expected. Therefore ore cannot be brought down from mines till the ships are at port and ready. It cannot be mined from open-pit properties or loaded from underground mines in readiness to be sent forward, as it might freeze in steel cars, subject as they are to cold. Therefore the underground mines are practically out of business for anything except stockpiling for next spring, and the steam-shovel mines are the resource for shipments. In other words, many grades cannot well be shipped at all. Ore must be mined after the ship is in dock, rushed down the line to dock, shot through the open pockets into the hold and taken off, and that is about the way this business is now being carried on. It is remarkable, under these circumstances, that so much can be forwarded as is coming down. But many furnaces are short of supplies and some doubtless have insufficient supply to last through till spring. Of course a warmer season may arrive and help everybody out, but the prospects seems unfavorable for very much change. There is from 18 in. to 2 ft. of snow on the Mesabi range, the open pits are covered, and everything moves slowly. It is very early for so cold weather long continued, and much earlier than last year, when shipments were maintained well into December.

Scranton Nov. 26

It is stated semi-officially that James E. Roderick, chief of the Department of Mines of Pennsylvania, will be reappointed by the new governor.

A remarkable accident took place in a shanty at the Harwood colliery, Hazleton, a few days ago, when the building took fire, and as it contained dynamite and explosive caps, no one would approach to extinguish the flames. The caps exploded while the fire was in progress, but the dynamite was found uninjured.

Two bosses of the Central mine of the Lackawanna company, in Scranton, were lost in the old workings on Friday, where they went to investigate an interruption to the ventilation. After a search of 36 hours their bodies were found. One of the men carried a naked light and this had exploded an immense body of gas in the old workings.

Morgan O. Morgans, who claimed that he was elected mine inspector in Carbon county, has been appointed assistant superintendent of the Lehigh Coal and Navigation Company, in Panther creek valley.

Collieries in the anthracite region are now working full time, and there are indications that this condition will continue until March.

London Nov. 17

The drop in quotations for South African gold-mining shares is well exemplified by the results disclosed in the report of the Consolidated Goldfields of South Africa for the year ended June 30, just published. Though the company made a profit of over £400,000 during the year, chiefly from dividends declared by companies whose shares it holds, yet it was found necessary to write off no less than £700,000, which represented the depreciation in the capital value of the shares thus held, and of other shares in South African ventures, which are not on the dividend-paying list. Consequently, the shareholders get nothing this year, and in addition, the large balance, which the company always holds, is seriously depleted. The directors in their report blame the uncertain political situation, especially in connection with labor, for this continued fall in the value of South African gold shares, and much as all mining men would like to divorce mining from politics, it is still found impossible to do so in the case of South Africa. It might just as reasonably be proposed to divest mining operations from stock-exchange influence. It seems a pity, however, that a mining district producing, as it did in October, over half a million fine ounces of gold monthly, and having an unrivaled organization from a mining and engineering point of view, should have to combat political interference and see the shares of its companies depreciate on the stock exchange. Without entering into details on

the subject, it is sufficient here to point to the report of the Consolidated Goldfields as a type of the present state of things.

The property of the Mexico mines of El Oro, Ltd., is developing in a most satisfactory manner, and the prognostications at the time of flotation two years ago are being fully realized. Your readers will remember that this property belonged to El Oro company, which is under the wing of the Exploration Company, and that its sponsors decided to form a separate organization for the purpose of its development. The bulk of the share capital belongs to El Oro company, and the shares subscribed for in cash for working capital were chiefly taken up by El Oro shareholders. The ore developed to date is conservatively estimated at 110,000 tons, averaging \$15, but the amount of partially developed ore at the lower levels may safely be put down at as much again. Arrangements are now being made for the erection of a 20-stamp battery, tube mills and cyanide plant, capable of treating 100 tons a day, so that production will commence before long. It should be noted that the Esperanza, which has been recently producing rich sulphides, is on the same vein and between El Oro and the Mexican mines, and shareholders in the latter are not unnaturally hoping that their coffers may be enriched by similar discoveries.

After much investigation and negotiation, the Australian Smelting Corporation has decided to move its smelters from Dapto to Port Kembla, and the Government of New South Wales has agreed to spend £20,000 on the construction of a jetty, wharves, etc., for the company's benefit. The Corporation, it will be remembered, was formed a year ago by Bewick, Moreing & Co., to acquire the smelters of the Smelting and Refining Company, of Australia, whose checkered career has often received notice in the JOURNAL. Great difficulties, both financial and topographical, had to be overcome in this latest reconstruction, and it is satisfactory to find the negotiations are now bearing fruit.

A new copper-mining company has been introduced to the public. This is the Mount Cattlin Copper Mining Company, Ltd., which has been formed to acquire and work a mine of that name in the Phillips river district of West Australia, situated 30 miles inland from Hopetown. It is one of the properties recently acquired and developed by Charles Kaufman and his friends, with a view of finding new sources of ore for the Fremantle smelter. For about a year F. W. Morgan has been doing development, and recently G. C. Klug and Trewartha James have made examinations. About 22,000 tons of ore have been blocked out, averaging 5 per cent. copper, 4 to 5 dwt. of gold, and 10 dwt. of silver. The present flotation is intended to provide the company with adequate working capital, and there can be little doubt that the money will be easily obtained.

General Mining News

ALASKA

VALDEZ

Outcroppings of a quartz ledge carrying copper sulphides and some gold have been discovered at Baba-Buchka bay, 10 miles from Afognak, by N. Larionoff.

Deposits of clay resembling bauxite have been found on Spruce island, and samples have been sent for investigation into the quality.

ARIZONA

GRAHAM COUNTY

Shannon Copper Company—At the annual meeting in New York last week, it was voted to authorize the removal of the main office to Boston. The following directors were chosen: Archibald McNeill, William A. Paine, N. L. Amster, Charles Hayden, B. Hochschild, R. Townsend McKeever, David A. Ellis, Alexander B. Clough and James Burden. Messrs. McKeever, Ellis, Clough and Burden are new members of the board. The directors elected N. L. Amster president, in place of W. J. Palmer; A. B. Clough, vice-president, in place of B. Hochschild; R. T. McKeever, treasurer, in place of J. W. Hazen.

YAVAPAI COUNTY

Eldorado Gold Mining Company—A discovery of 28 in. of sulphide ore running over \$100 per ton has been made by this company in its mines, six miles west of Prescott. The body has been explored for about 50 ft. and shows indications of being a permanent orebody.

Mildred Gold Mining Company—This company is installing a whim on one of its claims near Stanton, preparatory to sinking its shaft deeper. At present the shaft is 80 ft. deep and all in ore of a good grade, all of the value being in gold.

Storm Cloud—H. J. Beemer is developing large bodies of sulphide ore in this mine, the chief value of which is copper. The mine is situated in the Hassayampa district, 12 miles south of Prescott.

CALIFORNIA

HUMBOLDT COUNTY

Center Star—In this claim at Horse mountain, owned by G. M. Haney and G. W. Henderson, an 8-ft. ledge of high-grade copper ore carrying some gold has been found. Other locations near by are very promising, and great things are expected of this new copper field.

INYO COUNTY

Telluride—This is a new camp six miles from Olanca, where high-grade telluride ore has recently been found, and a number of men have been attracted to the camp, especially from Lone Pine. Shipping ore has been found in three places.

MODOC COUNTY

Gold Mining Company—This is the first mining corporation formed in the county under California laws, the claims lying in the new Hogue district, near Fort Bidwell, the latter place being the home office. The president is R. Moffitt; vice-president, A. B. Glazier; manager, W. B. Hall.

NEVADA COUNTY

Bear River Consolidated Quartz Mining Company—This company has been formed in Grass Valley, to operate three claims in Bear river. A 500-ft. tunnel is to be run to prospect the ledges. The officers are: Dr. W. G. Thomas, president; R. J. Davis, vice-president; C. H. Barker, secretary and treasurer; B. A. Penhall, general manager.

TRINITY COUNTY

Lappin—At this mine, Deadwood, the 1000-ft. tunnel has been completed, and superintendent F. O. Hollingworth is now raising to tap the immense body of water standing in the upper levels and drifts. He expects to make a connection soon with the raise, and will then be ready for stoping.

TUOLUMNE COUNTY

Confidence—In the reopening of this mine, W. H. Scott, superintendent, a three-compartment shaft will be started on the vein at a point 1200 ft. north of the present shaft. It is the intention to sink to a depth of 1000 ft. As the shaft increases in depth, drifts will be run to tap the old workings, and to uncover the new orebodies. When the development work shall have been completed, twenty stamps will be added to the mill, making a total of forty stamps.

COLORADO

LAKE COUNTY—LEADVILLE

Tam O'Shanter—This group of mines, consisting of seven patented claims, seven miles east of Aspen on the Pearl range, at an altitude of 14,000 ft., after 12 years of litigation, settled in favor of the original owners, has resumed work. In 1880 the group was bought by H. A. W. Tabor and Joel W. Smith, of Leadville, and worked for several years before litigation was started. When this took place the property was closed down and has remained idle ever since. During the week the property was sold to New York capitalists and one-third of the purchase price paid down and deeds for the balance were placed in one of the Denver banks. The property contains large bodies of ore that runs from \$50 to \$100 per ton and a great quantity of zinc ore that will go better than 25 per cent. Thousands of tons of this class of ore are on the dumps and the new company will erect a concentrating mill in the spring to treat this grade of ore. In early days the Tam O'Shanter was a heavy producer and will

again take its place among the big mines of the State.

Shortage of Cars—The three railroads running into Leadville are unable to supply the different shipping mines with sufficient cars to haul the ore from the mines, and as a result the big producers are only sending out half the tonnage; a number of the smaller properties have been obliged to stop breaking ore. The railroad companies state that they are unable to supply the rolling stock.

TELLER COUNTY—CRIPPLE CREEK

The mining situation in the district is in a very favorable condition at present. The surface water caused by the large amount of early fall snow is fast receding and making it much pleasanter for the lessees and the companies. Several new deals are being talked of and are in a fair way to consummation. A good deal of attention is being paid to leasing on a good scale by companies who are willing to do a considerable amount of development on a good showing.

Portland—President Howbert, of this company, who has just returned from the East, also denies the report that an option has been given on the control of the Portland stock. For some time a number of reports have been afloat that an option on the control of the stock had been given. A number of denials were made that this was the case, but it continued to bob up.

Jennie Sample—It is probable that there will be no compromise in the case of the Minnehaha claim and the Ophir. The former alleges that the ore being taken out of the latter is from a vein the apex of which is on Minnehaha ground. It was reported that the suit was to be compromised, but now it seems as though it would not and it will probably go to trial soon. The Ophir has been taking out some very rich ore of late. The properties are situated on Raven hill.

Trilby—It is understood from a reliable source that the deal for the Trilby and Ben Harrison claims that has been pending for some time will be consummated in a very short time. These properties belong to the Moose Gold Mining Company. It is understood that Pittsburg parties are the ones who take hold of the properties. The Trilby has shipped a large amount of ore in the past. It is situated on Bull hill, adjoining the Gold Sovereign.

Little Clara—A number of mining men of the district were in Colorado Springs the past week as witnesses in the case in which Knight is suing Marsh for an interest in the famous Little Clara lease. Knight claims 11/32 interest in the lease. This lease is probably one of the richest that has been in the district for a long time. In the past few months it has shipped a large amount of ore. This claim belongs to the Work Company and is under lease to Marsh & Hodges.

Gold Dollar Consolidated—The election of the directors of this company resulted

in the Shepherd faction winning out as against the Woods faction. The Woods Investment Company now hardly controls any properties in the district at all.

INDIAN TERRITORY

The United States senate committee appointed to investigate the value of the segregated coal lands, both leased and unleased, in the Choctaw and Chickasaw Nations, Indian Territory, arrived in South McAlester, Nov. 18. The Indian Territory coal operators appointed the following committee to meet them: W. C. Perry, of Kansas City, president of the Central Coal and Coke Company, and of the Southwestern Interstate Coal Operators' Association; Carl Scholz, of Chicago, president of the Rock Island Coal Company, and vice-president from Indian Territory of the Coal Operators' Association; William Busby, of South McAlester, president of the Osage Coal and Mining Company and the Great Western Coal and Coke Company, and vice-president of the Operators' Association; B. F. Bush, of St. Louis, vice-president and general manager of the Western Coal and Mining Company, and Judge C. B. Stuart, of South McAlester, attorney for the Operators' Association.

The operators met the senatorial committee on Nov. 19 to discuss with them the value and sale of the coal lands.

CHOCTAW NATION

On Friday night, Nov. 16, there was a bad explosion in mine No. 6, of the McAlester Coal and Mining Company, killing the two shot-firers, badly wrecking the inside of the mine and damaging the fan house at the top of the air shaft, which is 600 ft. deep. It has not yet been determined whether it was a gas or dust explosion, probably both. The company reports that it will take two months and cost \$10,000 to put the mine in shape for operating again.

INDIANA

The last half of 1906 will be the duller in the oil-mining business, since oil was first discovered in Indiana, unless, unexpectedly, there should be an advance in the price of crude oil. A new oilfield that promises well has been discovered in Vigo county, near Terre Haute, and a number of wells are being drilled.

CLAY COUNTY

Hall-Zimmerman Coal Company—This company has been incorporated by W. C. Hall and Paul Zimmerman to open mines in this county. The office is in Brazil.

KNOX COUNTY

The American Coal Mining Company, of Brazil, has just closed negotiations for the purchase of over 4000 acres of coal land near Bicknell, at a cash outlay of nearly \$250,000. The tract bought by this company is underlaid with three veins of coal, averaging 4 ft., 6 ft., and 7 ft. respec-

tively. The company has been testing the land for the last two years. The lower vein is hard and resembles anthracite in appearance. It is said to be the best coal in Indiana outside of the block coal. The company is arranging to sink several shafts on the tract at once. William Zeller and Wm. J. Snyder are the leading stockholders in the American Coal Mining Company.

VIGO COUNTY

Midvale Coal Mining Company—This company has been incorporated to mine coal in Vigo and adjoining counties. John G. Dobbs and Chas. S. Davis are directors.

VERMILION COUNTY

Clinton Coal Mining Company—This company, with offices in Clinton, has almost completed work on its new mine, Crown Hill No. 3. It will be one of the largest and best equipped mines in the State, capable of hoisting more coal than any two mines in this district.

MICHIGAN

HOUGHTON COUNTY—COPPER

Quincy Mining Company—The directors have voted to purchase 800 acres of land, adjoining the Quincy, from the Arcadian Copper Company. The Arcadian stockholders have already approved the sale. The Quincy directors also voted to issue 10,000 shares of new stock, \$25 par value, at the price of \$70 per share. A circular announcement issued by the company says that the rights will be placed to the credit of stockholders of record Dec. 7, in proportion to their holdings, and will be transferable at the Old Colony Trust Company, Boston, on and after Dec. 8. Payment for shares represented by rights becomes due Jan. 15, 1907, after which the certificates will be ready for delivery. Certificates will not be issued for fractional shares, which may be adjusted by purchase or sale of rights with other holders. Six per cent. interest will be charged upon all deferred payments, and failure to make payment when due renders rights to stock forfeitable at the option of the directors. Any portion of stock which is not taken by Jan. 15, 1907, on terms stated will be disposed of as the directors determine.

MINNESOTA

IRON—VERMILLION RANGE

Though opened in 1884 and explored almost continuously since, no new district has been opened on the Vermillion range since 1888. Many million dollars have been expended in exploration, both by drill and sinking, and the most flattering surface showings have proved mere disappointments. This is so notorious that most mining companies decline to expend much there, though what ore has been found on that range is in many respects the best on Lake Superior. Indeed the Zenith mine, at Ely, is known as producing the most desirable ore to be mined

on any of the five ranges around the lake. Most mining men fully believe there are deposits of great value yet to be found on the Vermillion, but they hesitate in seeking them. Explorations carried on under the most favorable auspices have been unsuccessful time after time.

Four operations, including that on section 30-63-11, which is so close to Ely as to be regarded as a part of the Ely district, are now in progress on the range, and a fifth is liable to commence as soon as tangles over titles can be adjusted. These, aside from Section 30, are the work of the Biwabik Mining Company on Pine island, which lies about five miles north of the Soudan mines, and that of the same company in 29-63-11, just east of Ely. On the former drills are boring and an exploratory shaft is to be sunk on the ledge this winter. On the latter drills that had been at work have taken off, but it is reported unofficially that a shaft will be sunk in the near future. The White Iron Lake Iron Company, which has been drilling for some years in section 2-62-12, two miles south of Ely, has reached the depth of 1400 ft. with its last drill-hole, and is now sinking a shaft. The drill-holes are reported to have cut a considerable amount of ore at depth. Three old and long abandoned properties lying two or three miles southwest of Ely are to be taken up for extensive exploration as soon as the titles are confirmed. On these work done many years ago showed ledges and some ore, more or less mixed, with some that was clean, and the walls of what then seemed a large vein. In section 29, the Biwabik work, a wide ledge has been crosscut; mixed and clean ore were shown by shallow pits in ledge while the walls of the deposit have been traced. These are the chief and probably the only operations that will be carried on over the Vermillion range this winter, and it is hoped they may be more successful than most of the work that has been carried on there in the past.

IRON—MESABI RANGE

Hill Iron Ore Lands—The disposition of the ownership of these lands, now under lease to the United States Steel Corporation, is announced in the following circular, which has been issued to the stockholders of the Great Northern Railway Company:

"Certain iron-ore properties have been acquired and are now held for your benefit by the Lake Superior Company, Ltd.

"The board of directors of your company, by resolution approved by the stockholders, has authorized and instructed the Lake Superior Company, Ltd., to transfer the iron-ore properties to Louis W. Hill, James N. Hill, and Walter J. Hill, to be by them held in trust and for the benefit of the stockholders of the Great Northern Railway Company, appearing as such of record at the close of business on Dec. 6, 1906, and of their assigns.

"The entire beneficial interest of the trust to be created will consist of 1,500,000 shares, and each stockholder of this company of record on the date above named will receive from the trustees a certificate for a number of shares of beneficial interest in said trust equal to the number of shares of stock of the Great Northern Railway Company held by him.

"The certificates issued by the trustees will be transferable upon their books in the same manner as stock certificates.

"The net proceeds and profits of the iron properties will, from time to time and at least once each year, be distributed by the trustees to the certificate holders of record at the date of distribution."

MONTANA

BUTTE DISTRICT

Work was suspended in all of the mines of the Amalgamated, North Butte and Red Metal companies, Nov. 20. The reasons for the shutdown, as given out at headquarters of the three companies, are full ore-bins and shortage of ore cars to keep them empty, a shortage of coal at the Boston & Montana mines, and a wreck on the Butte, Anaconda & Pacific road that prevents the transportation of ores to the Washoe. The Butte public gives another version of it. A few years ago the miners of the district were given the benefit of an eight-hour day. A few months ago their time was again reduced by the companies, giving them the privilege of going in and out of the mines on company time, something which had not been accorded them previously. On Nov. 15 the wages of every man working underground were increased 25c. a day, and on that date a committee from the miners' union waited on the officials of the various companies and demanded an increase of 50c., making the wages \$4 a day of eight hours. The demand was promptly refused. A two-thirds vote of the members is necessary to carry the point. The real cause of the present suspension was said to be for the purpose of preventing a proposed strike, for every man was practically discharged when the mines closed. In this way the companies hoped to be able to retain their pumpmen, for the miners, having been let out, have nothing for which to strike. Up to Nov. 15 the wages of underground men had been \$3.50 a day since the organization of the union, June 13, 1878, with 10 hours a day up to the time the eight-hour rule became effective. The men argue that with copper at its present price the companies can afford to pay them \$4, but there are not less than 25 companies developing ground here that have not extracted a pound of ore. The Pittsburg & Montana has spent more than \$3,000,000 in its enterprise and prior to this year had never earned a dollar. Its loss last year was \$268,000. It is doing better this year. It employs about 175 men underground, as many as some of the larger

producing companies. Each of the other non-producing companies employs from 6 to 40 men underground.

On the evening of Nov. 20, a meeting of the union was held, when the committee reported and the union accepted the report, discharged the committee and let it go at that. Afterward the officers of the union said they did not intend to call a strike, but thought they could get \$4 and made an effort to do it.

NEVADA

NYE COUNTY—TONOPAH

Ore Shipments—The shipments of ore over the Tonopah Railroad for the week ending Nov. 15 were: Tonopah Company, 1,400 tons; Belmont, 410; Tonopah Extension 285; Midway, 100; total, 2,195 tons. In addition, there were 2645 tons shipped from Goldfield, making a total of 4845 tons for the week.

WASHOE COUNTY

The city of Reno is rapidly becoming to Nevada what Denver is to Colorado. Its growth during the last year has been remarkable, and the boom looks like a permanent one. Business in every line is excellent, with more orders than can be taken. The population has trebled during the last five years. The Nevada Engineering Works is crowded with orders, largely for mining machinery to be used in the southern camps. A stock exchange has been organized. When the northern camps—Ramsey, Olinghouse, Wonder and Seven Troughs—come into their proper prominence, Reno will doubtless be the point from which they will draw their supplies.

Ramsey—Work is progressing steadily on the Ramsey-Comstock. Low-grade ore has been encountered throughout the crosscut on the 50-ft. level, with occasional high-grade streaks. The nearness of this camp to Dayton and Virginia City, with their mills and cyanide plants, should make it possible to work \$20 ore at a good profit. A rich strike has been made on the Walk-over claim, controlled by W. H. Clark and associates of Fairview. The rock appears to be a decomposed quartz andesite, heavily stained, and pans freely. It is thought this property lies on the extension of the Clark dike. On the Majestic group, owned by H. W. Knickerbocker and associates, they are preparing to ship some ore of good grade. Lessees are actively developing the Ramsey-Ophir, with encouraging pinnings reported as depth is gained.

PENNSYLVANIA

ANTHRACITE COAL

Delaware, Lackawanna & Western—The National breaker of this company, in Scranton, resumed operations on Nov. 26, after an idleness of six months, during which time it has been equipped with new machinery which will more than double the output. It will give employment to 600 men and boys.

Kingston Coal Company—This company's colliery, near Wilkes-Barre, has been connected with the Delaware & Hudson railroad, which will now handle all the coal from the Nos. 1, 2, 3 and 4 collieries of the company. A branch is also being built to No. 5 colliery.

Harleigh Colliery—This colliery, near Hazleton, has been closed for the winter, during which general repairs will be made and a new opening sunk.

Lehigh Valley Coal Company—This company is carrying out extensive improvements at the Exeter colliery, where the breaker was destroyed by a windstorm. The shaft is being lined with concrete and the hoisting engine is being moved a distance of 180 ft. from the breaker. The shaft after the alterations will be 40 ft. in length and 16 ft. wide, this being effected by the removal of a 4-ft. wall and heavy wooden cribbing built 30 years ago.

UTAH

BEAVER COUNTY

Talisman—An important strike has been made in this property, near Milford. An extension of the vein recently encountered in the Cedar mine adjoining has been encountered, showing about 9 ft. width.

Frisco Contract—Drifting is in progress on a large body of low-grade ore. General conditions are very satisfactory.

Lulu—The shaft is being sunk to the 1300-ft. level, when connections will be made with workings of the Horn Silver mine for the double purpose of ventilation and safety.

Newhouse Mines and Smelters—The mill operating on ore from the Cactus mine is turning out about 100 tons of concentrates daily.

SALT LAKE COUNTY

Columbus Consolidated—This company, operating at Alta, has intercepted the second contact ledge of this property in a crosscut run for a distance of about 1500 ft. An orebody has been penetrated for 40 ft., nearly all of which is of commercial grade.

Scottish Chief—This company, operating near Alta, is marketing high-grade copper ore, with considerable silver.

New England Gold and Copper—This Bingham company is operating its mill with two shifts, and turning out about 500 tons of high-grade concentrates per month. The management reports mine conditions better than ever before.

Standard Copper—A full breast of ore has been encountered in the Saginaw tunnel, a foot of which carries shipping values. The Deems tunnel is being extended 800 ft. farther into the property.

Utah Development—This company is shipping to a custom mill about 1000 tons of ore from the New Red Wing mine that will net from \$10 to \$12 per ton.

Foreign Mining News

CANADA

BRITISH COLUMBIA

Granby Consolidated Mining, Smelting and Power Company, Ltd.—A circular just issued by the directors is as follows: "We are pleased to advise you that your charter has been amended by the Legislative Assembly of the province of British Columbia so as to authorize the issue of shares of a par value of \$100 each. The holders of shares of the present issue are entitled to exchange them for shares of the new issue upon surrender to the company of 10 shares of a par value of \$10 each for 1 share of a par value of \$100. It is proposed to have the new issue listed on the stock exchanges of New York and Boston, when the commission for buying or selling the new stock will be only \$1.25 per \$1000 par value, which results in a substantial saving for the stockholders. The transfer agents—Title Guarantee and Trust Company, 176 Broadway, New York, and American Loan and Trust Company, 53 State street, Boston—have been authorized to receive stock for exchange, and you are advised to forward your certificates to one of those companies without delay, as the old stock will not be a good delivery on the exchanges.

"Holders of less than 10 shares of the old stock may either purchase enough to make a full share, or they may sell their fractional interests; and for the convenience of stockholders either of the transfer agents will buy or sell such interests at the market price. All stock must be duly endorsed in blank and witnessed, or be accompanied by power of transfer in blank duly executed."

ONTARIO

Work has been begun on the Lehigh portland cement works, four miles from Belleville, Ont. The plant when completed will be the largest in Canada.

Coal Trade Review

NEW YORK, Nov. 28

There is nothing new in the coal trade in the East, beyond an increased activity as winter approaches. There has been no continued cold weather as yet, and the improvement is noted chiefly in the coastwise trade, and to points where ice prevents winter shipments.

In the West the traffic conditions continue bad, with little prospect of improvement. The position is really serious, and the railroads are being pressed to relieve it, but with little result.

COAL-TRAFFIC NOTES

Shipments of coal and coke originating on the Pennsylvania Railroad Company's lines east of Pittsburg for the year to Nov. 17, were as follows, in short tons:

	1905.	1906.	Changes.
Anthracite.....	4,010,624	3,934,184	D. 76,440
Bituminous.....	26,396,294	28,299,684	I. 1,903,390
Coke.....	9,836,574	11,147,698	I. 1,311,124
Total.....	40,243,492	43,381,566	I. 3,138,074

Shipments of Broad Top coal over the Huntingdon & Broad Top Railroad for the week ending Nov. 24 were 21,438 tons; for the year to Nov. 24 they were 724,299 tons.

New York Nov. 28

ANTHRACITE

The hard-coal trade still reflects the variations of temperature; the activity of the last two weeks has largely subsided. Nevertheless, a considerable number of orders dating from two weeks ago are still unfilled, and the difficulty that producers have in shipping their coal prevents them from taking on as much business as they might. Demand for small sizes particularly is exceedingly brisk, but has not affected prices in any way. The shortage of cars is the predominating factor in the hard-coal trade.

Prices remain unchanged at \$4.75 for broken, and \$5 for egg, stove and chestnut; for steam sizes, \$2.80@3 for pea; \$2.25@2.50 for buckwheat; \$1.45@1.50 for rice; and \$1.30@1.35 for barley, all f.o.b. New York harbor shipping points.

BITUMINOUS

The Atlantic seaboard soft-coal trade shows continued improvement, and in fact the demand now exceeds the supply, which is curtailed by the car shortage. Present traffic conditions seem worse than those of last week; some producers say they do not receive more than one-tenth of their needs, and all operations are curtailed to a great extent. The old complaint of favoritism is heard, but this is always in evidence when the car situation reaches such an acute condition.

The far East is demanding more coal than for some time; this has no doubt been due to lack of vessels, many of which have been tied up in Eastern ports. These are now getting around again, and conditions are easier. The Sound is taking a large quantity of coal, and is not able to get all that it needs, on account of the difficulty of securing Sound barges.

New York harbor is absorbing all the coal that comes to tidewater. Prices range \$2.70@2.75 for good steam coal, while the best grades secure \$3 and above.

Vessels in the coastwise market are beginning to arrive from the East, where they have been confined by the bad October weather. Current rates from Philadelphia are now quoted at \$1 to Boston, Salem and Portland, and 85c. to the Sound, on large vessels.

Birmingham Nov. 26

The coal production in Alabama is still being seriously interrupted by the railroad-car shortage.

Statistics kept show that there have

been 94 fatal accidents in coal mines in Alabama during the present year, 12 men being killed in one accident.

Mason H. Sherman, superintendent of the Ensley plant of the Semet-Solvay Company, has been appointed general superintendent of all the plants of the corporation, in New York, Illinois, Alabama and other States. Mr. Sherman has been with the company for years. His assistant superintendent will take charge of the Ensley plant.

Chicago Nov. 26

Firmness has continued in the wholesale coal market, despite the mild weather of the last week that has turned the thoughts of many consumers of bituminous and anthracite away from the question of fuel for the winter. Sales have been good in both city and country, the trade in the territory west of Chicago being especially heavy. Steam needs are increasing steadily, and domestic supplies are far from being assured by stocks in the bins of consumers and retailers. Domestic coals are in lively demand, showing that the householder is at last awake to the desirability of buying early.

Illinois and Indiana lump and egg, most in demand and firmest in price, bring \$2.10 @ \$3; run-of-mine, \$1.80@2.25 and screenings—very weak—have in some cases brought not more than 90c., though most shipments have brought \$1@1.30. Brazil block is still scarce at \$3.20. Hocking valley coal is weakening from the high prices of \$3.30 for run-of-mine and \$3.65 for 1¼-in. lump, run-of-mine being in less demand. Youghiogheny continues scarce and holds up firmly to \$3.55 for ¾-in., and Pittsburg is strong at \$3.40 for 1¼-in. lump, both coals being held out of the local market by car shortage. Smokeless is in better supply, though prepared sizes are slow in coming forward; quotations remain \$4.30 for lump and egg and \$3.40 for run-of-mine.

Anthracite is coming somewhat slowly by lake in the closing days of navigation, and the end of the season will see a shortage of 150,000 to 200,000 tons from last season's stores.

Cleveland Nov. 27

The principal interest in this territory, in the coal trade, centers in the lake movement. During the past week it has been possible to move some big cargoes of coal, although in general the coal has been carried in the smaller boats which are loaded quickly, releasing the cars. The new steamer "Hanna" went out with 11,500 tons, a record for this port. Northwestern consumers are pleading for more coal by lake, but shippers are helpless in the face of the car famine.

The same car shortage is responsible for the movement of very small amounts of coal into the strictly local market. Prices have not changed materially, mine-run selling for \$1.50 to a little higher at

the mines. Pennsylvania coal is bringing about \$1.35 at the mines. Ohio slack is selling at \$1.25 at the mines, while Pennsylvania slack is selling at \$1 to a little higher at the mines.

There is only a hand-to-mouth supply of strictly domestic coal. The car shortage is the occasion for this. Gas is a factor there, being substituted for coal as fuel. The prices have not changed from \$2.35 at the mines, Massillon, for selected lump.

The coke market is exceptionally strong all the way through. The best grades of 72-hour foundry are selling at \$4.25 at the oven, while furnace coke is selling at \$3.35@3.50 at the oven.

Pittsburg Nov. 27

Coal—The rivers have fallen and coal shipments have stopped for the present, but not until fully 25,000,000 bu. got out. A boating stage came late last week and large tows were sent to New Orleans and Mississippi river points. The bulk of the shipments, however, went to Cincinnati and Louisville. The coal arrived in time, for according to reports down-river points were on the verge of a coal famine. Prices hold up well and the minimum price is based on \$1.60 a ton for mine-run coal at mine. Higher prices have been paid for prompt delivery, but these orders came from new buyers. Old customers are supplied at prices a trifle under the regular quotations. An inquiry was received here for 70,000 tons of coal for shipment to Europe. It came from New York, but is not being considered, as operators in the central fields of Pennsylvania can quote as low a price and have an advantage in a cheaper freight rate.

Connellsville Coke—Prices for furnace coke for prompt shipment are higher this week, some sales having been made at \$3.50. For next year the range is from \$3 to \$3.25. Foundry coke is quoted at \$3.85@4 for any delivery. According to the *Courier* the production in the Connellsville region for the week amounted to 281,242 tons. The shipments aggregated 15,414 cars, distributed as follows: To Pittsburg and river points, 4769 cars; to points west of Pittsburg, 8815 cars; to points east of Connellsville, 1630 cars.

Foreign Coal Trade

Nov. 28

Exports of fuel from France for the nine months ending Sept. 30 were as follows, in metric tons:

	1905.	1906.	Changes.
Coal.....	1,162,100	1,002,260	D. 159,840
Coke.....	167,560	124,750	D. 42,800
Briquets.....	72,010	96,360	I. 24,340
Total.....	1,401,660	1,228,360	D. 78,300

The exports are small in comparison with the imports, which were as follows for the nine months:

	1905.	1906.	Changes
Coal.....	7,435,740	10,567,120	I. 3,131,380
Coke.....	1,188,310	1,094,180	I. 505,870
Briquets.....	267,270	406,170	I. 118,900
Total.....	8,911,320	12,667,470	I. 3,776,150

The chief imports of coal were from Great Britain; of coke from Belgium and Germany.

Iron Trade Review

NEW YORK, Nov. 28

The sales of imported iron in the Eastern markets have done little to relieve the pressure for immediate supplies of pig iron. High prices have been paid for deliveries desired, but the supply is nearly exhausted. Even for the second quarter of 1907 prices have advanced recently.

In finished materials there is little change. The demand continues good, but the pressure is not so strong as for raw material. There is no doubt, however, of an active market some time to come.

Coke and ore prices for next year will be higher, as is now well known; and these, with higher wages, will make a considerable advance in the cost of iron, as well as its price.

Baltimore Nov. 27

Imports into the port of Baltimore for the week included 250 tons of spiegel-eisen and 719 tons of ferro-manganese from Liverpool; 787 tons of spiegeleisen from Bremen. There was also a lot of 100 tons of manganese ore from Liverpool. Receipts of iron ore were three cargoes, 13,450 tons, all from Cuba.

Birmingham Nov. 26

The top-notch price is believed to have been reached in the pig-iron market in Alabama. There has been no reaction as yet nor is there any expectation of a drop in the quotations, but the indications are there is to be hardly any further advances in prices. Iron that can be delivered right now commands between \$23 and \$24 per ton, and even \$25, for No. 2 foundry or No. 2 soft. There is but little of this iron to be had in this district. Iron for delivery during the first quarter of the coming year is quoted at \$20@21 per ton, No. 2 foundry, while iron for delivery during the second quarter is priced at \$18@19 per ton, No. 2 foundry. The furnace companies in this section have sold the better part of their probable make for the first quarter of the coming year. The aggregate business already accepted for delivery during the second quarter is most satisfactory.

Chicago Nov. 26

The last week has seen no sudden change in conditions. Buying continues to be chiefly of small lots for quick delivery, with a moderate amount of contract business for delivery in the second, third and fourth quarters of 1907. There is much talk of foundries shutting down rather than pay the high prices for quick-delivery iron, but the small amount of iron taken by each melter for such purposes

would seem to make such action improbable. The small lots are needed because of larger business than was expected by the melter at the time he made his contract for present supplies.

Quick-delivery iron is scarce, and growing scarcer. Northern foundry iron is practically out of the market for deliveries before the end of the first quarter, but an occasional carload is picked up at \$25@26 for No. 2. Lake Superior charcoal is equally scarce, and quoted at the same prices, or perhaps 50c. more. Southern is not quite so scarce as Northern, No. 2 in small lots selling for quick delivery at \$21@22 Birmingham (\$24.90@25.90 Chicago).

Coke continues very scarce, the shortage being attributed to lack of cars; Connellsville 72-hour brings \$6.90, and West Virginia cokes \$6.25@6.50.

Cleveland Nov. 27

Iron Ore—The chartering of boats to carry ore during the season of navigation of 1907 has not started on any scale which might be called general. In fact such a movement is not expected until toward the end of the year. Some small shippers, fearful of the short supply of boats for next season, have closed contracts on this season's rates. Shippers are so confident there will be no change in rates, however, they have sold their ore, taking this year's carrying charges into calculation as the basis for those of next season. There will be a movement of about 4,000,000 tons for November, assuring a total of 38,000,000 tons for the season.

Pig Iron—Southern furnaces, having sold iron off their stock piles in this territory, are unable to make delivery, due to the shortage of cars. This cause is also intensifying the situation as far as Northern furnaces and foundrymen are concerned. No spot iron is being sold, but Southern producers are selling for second quarter at \$19, Birmingham. They refuse to sell for second half. Among Northern stacks No. 2 foundry is selling on the basis of \$25@26 in the Valley for immediate shipment. Virtually the same prices apply on delivery during the first half of next year. A good buying movement has started for delivery during the second half of next year. The price ruling is \$22 in the Valleys, although some furnaces are holding for higher figures. Basic and bessemer are selling on the basis of \$22@23 for second half, while immediate shipment and first-half material are bringing about \$25 in the Valleys.

Finished Material—Bar iron is scarce, due to a shortage of scrap, and is selling on the basis of 1.80c. Pittsburg. Sheets are strong with the mills three months behind orders. Plates and shapes are bringing a premium at most mills. Billets are strong at \$35 Pittsburg for forging quality.

New York Nov. 28

Pig Iron—The market has been a little quieter, though there is still a demand for small orders for short delivery, which is hard to satisfy. Quotations are still irregular, and depend largely upon the deliveries wanted.

Foreign iron is higher at \$24@24.50 for Scotch and \$22.50@23 for Middlesboro, ex-ship duty paid; to these prices about 75c. is added for unloading and weighing charges. Sales are all at seaboard points.

Current quotations for pig iron are for New York or parallel delivery.

Northern:	
No. 1 X foundry	\$23.50@26
No. 2 X foundry	23@25.50
No. 2 plain	21@23.50
Forge pig	20@21.50
Southern:	
No. 1 foundry	23.50@26
No. 2 foundry	22.50@25
No. 3 foundry	22@23.50
No. 4 foundry	21@22.50
No. 1 soft	23.50@26
No. 2 soft	22.50@25
Gray forge	20@21.50
Basic pig:	
Northern	21.50@23
Virginia	22@23.25
Alabama	22@23.50

City or local deliveries are not included in prices, which are for large lots, on docks or cars.

Bars—Bars are strong at 1.845c. tide-water, for common iron, while refined is 1.895c. Steel bars are quoted at 1.745@1.845c., according to size and conditions of orders. Store trade is ready at 2.50c. delivered.

Old Material—Dealers are still busy, and prices good. No. 1 yard wrought is \$18@19; No. 1 machinery cast, \$17.25@17.50. Heavy steel melting scrap is strong at \$18@19. Prices are on cars, Jersey City or other tidewater terminal.

Philadelphia Nov. 28

Pig Iron—In a comparative sense pig iron has been quiet, and comparatively little business has been done, although there is a great deal of business backed up against the market and awaiting acceptance. The situation remains unchanged and the reliance upon foreign source of supply is increasing. The evidence of an upward tendency of iron on the other side of the water has stimulated demand within a few days, the effect of which has been to precipitate an upward movement. Northern iron is not selling to any extent. Forge iron is wanted in considerable quantities, but for the present there will be very little done. Basic pig is most urgently wanted, and prices have nominally advanced 50c. per ton. Great trouble is experienced, especially by the smaller buyers, and although everybody has iron at present and for some little time to come, there is no telling how soon some of our smaller consumers will be absolutely out of iron for immediate needs. Quotations may be given at \$25.50@26 for No. 1X foundry; \$24@24.50 for No. 2X; \$23.50 for No. 2 plain; \$21.50 for gray forge; \$22 for basic;

\$27 for low phosphorus; \$22.50 for Middlesboro No. 1 on dock and \$24 for Scotch.

Steel Billets—Steel billets are badly wanted among all large consumers, the chief source of anxiety being the upward tendency in prices, which is threatened, and the oversold condition of mills.

Bars—Bar iron has advanced within the week at least \$2 per ton, in small lots, and inquiries today from some car-builders indicate that even in large lots advances will be enforced.

Structural Material—The demand for structural material is rather dull just at present, because of the withdrawal temporarily from the market of a number of large consumers. This sudden lull in the demand is something of a surprise.

Scrap—Scrap has suddenly moved up in price and quotations are nominal. The advance in certain kinds of scrap has been as much as 50c. per ton, while higher prices could readily be obtained if the material could be had. The larger dealers are scouring the country for scrap and a further advance is certain.

Pittsburg Nov. 27

There is but little change in the iron and steel market. New business continues to come in, and prices in all lines are firm. Demand for structural material has increased and premiums are offered to insure delivery this year. The mills are well sold up, the large mills having orders that will keep them busy for over six months. It was expected that an advance in plates would be ordered this week, but while it had been contemplated there does not seem to be any likelihood that the present "official" price of 1.60c. will be disturbed. Eastern mills are quoting 2c. but this has no effect on the Western market, as premiums have been paid in the East for plates for some time. Plate mills have been crowded with specifications from steel-car and shipbuilding interests for several weeks and there is enough business in sight and on the books to keep them running steadily into the third quarter of next year.

The scarcity of pig iron has caused a greater demand for scrap, and prices have advanced. The offer of the Carnegie Steel Company of \$17.50 for heavy melting scrap was not entertained by any of the dealers and offers of \$1 more from other consumers also were rejected. Dealers are holding heavy melting scrap at \$19 a ton. Negotiations are now on for several large tonnages but so far have not resulted in sales. The purchase of 10,000 tons of bundled sheet scrap last week at \$16 by the Carnegie company had the effect of stimulating the market, and sheet scrap cannot be bought this week at the price paid a week ago.

The Carnegie Steel Company received contracts for about 25,000 tons of standard steel rails for next year. It also got or-

ders for several thousand tons of light steel rails. The rail mills cannot take on any more business for delivery this year and small re-rolling mills that are able to furnish rails get premiums over the established prices.

The idle tin-plate mills of the American Sheet and Tin Plate Company at New Castle, Penn., are in operation again. It is given out that the suspension of two weeks was due to a lack of coal. The tin-plate trade is said to be in good condition for this season, and but little of the product is going into the warehouses. Sheets also are in good demand and the leading interest is operating most of its mills.

Pig Iron—Buying of pig iron for third quarter is still delayed and it seems that consumers expect to get better prices later on. For early and first-half delivery almost any price can be obtained, and there are a number of consumers who failed to place orders for their full requirements. One sale of 6600 tons of basic was made yesterday. It calls for 3000 tons for first half at \$22, Valley furnaces, and 3600 for third quarter at \$21. Two lots of 1000 tons each of bessemer were sold, one for prompt at \$22.50, Valley, and the other for January and February at \$22.60, Valley. The first sale is regarded as a low price, as several small lots sold at \$25, Valley, for spot shipment. A 2000-ton lot of basic for second quarter was sold at \$21.50, Valley. Foundry iron commands as high a price as bessemer, one lot of No. 2 having sold at \$25.85, Pittsburg. Several sales of gray forge were made at prices ranging from \$21.85 to \$22.35, Pittsburg. Southern iron is quoted here at \$23.50 for No. 2 equal to \$28.10 delivered in the Pittsburg district. No sales at that price are recorded.

Steel—Billets continue scarce and prices are higher, bessemer billets being quoted at \$29 and open-hearth at \$31@32. Sheet bars are quoted nominally at \$30. Steel bars are strong at 1.60c. and tank plate remains at 1.60c.

Sheets—There is no change in the market. The demand is good and prices remain at 2.60c. for black sheets and 3.65c. for galvanized for No. 28 gage.

Ferro-Manganese—While 80 per cent. is quoted at \$80@81 there are indications of an advance owing to a congestion in the Baltimore yards which has delayed deliveries.

Chemicals

New York, Nov. 28

Copper Sulphate—The market conditions remain unchanged and prices continue at \$7 per 100 lb. for carload lots, with smaller parcels selling at \$7.25.

Nitrate of Soda—There is nothing new to report concerning market conditions. The price is held very firm at \$2.62½ per 100 lb. and the demand is very strong.

The English market is quiet with ordinary grades ruling at £11 15s. and refined selling at from £12 2s. 6d. to £12 5s. od. per ton.

Metal Market

NEW YORK, Nov. 28.

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

Metal.	Exports.	Imports.	Excess.
Gold:			
Oct. 1906...	\$7,051,350	\$27,224,313	Imp. \$20,172,963
" 1905 ..	310,696	10,722,132	" 10,411,436
Year 1906..	42,842,312	139,000,330	" 96,158,018
" 1905 ..	42,968,617	41,061,734	Exp. 1,926,883
Silver:			
Oct. 1906..	3,557,560	3,816,293	Imp. 258,733
" 1905 ..	4,511,924	2,432,553	Exp. 2,079,371
Year 1906..	48,998,899	36,810,362	" 12,188,537
" 1905 ..	49,955,134	26,939,551	" 17,015,583

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

Gold and Silver Movement, New York.
For week ending Nov. 24 and years from Jan. 1.

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week.....	\$ 7,581	\$ 27,809	\$ 997,818	\$ 138,442
1906.....	6,047,734	92,819,867	46,888,961	2,022,873
1905.....	34,592,003	10,514,830	30,859,077	3,879,631
1904.....	94,942,459	5,765,073	33,078,776	1,104,483

Exports of gold for the week were to the West Indies; of silver to London. Imports of gold for the week were from the West Indies and Central America; of silver from Mexico.

The statement of the New York banks—including all the banks represented in the Clearing House—for the week ending Nov. 24 gives the following totals, comparisons being made with the corresponding week of 1905:

	1905.	1906.
Loans and discounts..	\$1,012,288,300	\$1,043,468,300
Deposits.....	999,177,600	997,965,100
Circulation.....	54,602,600	52,365,400
Specie.....	184,466,600	185,016,200
Legal tenders.....	74,484,900	68,878,500
Total reserve.....	\$258,951,500	\$253,894,700
Legal requirements....	249,794,400	249,491,275
Deficit.....	\$ 9,157,100	\$ 4,403,425

Changes for the week this year were increases of \$4,070,500 in loans, \$3,484,600 in deposits, \$908,200 in circulation, \$1,109,800 in specie, \$1,793,100 in legal tenders and \$2,031,750 in surplus reserve.

The following table shows the specie holding, in dollars, of the leading banks of the world:

	Gold.	Silver.	Total.
New York.....			\$185,016,200
England.....	\$155,690,910		155,690,910
France.....	556,862,945	\$202,957,575	759,820,520
Germany.....	145,855,000	48,620,000	194,475,000
Spain.....	76,630,000	120,625,000	197,255,000
Netherlands....	27,653,000	28,037,500	55,690,500
Belgium.....	16,296,665	8,148,335	24,445,000
Italy.....	157,295,000	20,594,500	177,889,500
Russia.....	570,275,000	21,805,000	592,080,000
Austria.....	234,645,000	58,825,000	293,470,000
Sweden.....	19,815,000		19,815,000

The returns of the associated banks of New York are of date Nov. 24 and the others Nov. 23. The foreign bank statements are from the *Commercial and Financial Chronicle*, of New York. 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 Nov. 15:

	1905.	1906.	Changes.
India.....	£5,534,721	£13,940,296	I. £ 8,405,575
China.....	814,246	430,700	D. 383,546
Straits.....	39,299	1,750	D. 36,549
Total.....	£ 6,387,266	£ 14,372,746	I. £ 7,985,480

Receipts for the week were £8000 from the West Indies, £134,000 in bars and £48,000 in Mexican dollars from New York; a total of £190,000. Exports were £354,900, to India.

Indian exchange has been stronger, owing to heavy exports of jute and rice. The Council bills offered in London were all taken at an average of 16.06d. per rupee. Shipments of silver to India have been moderate.

Prices of Foreign Coins

	Bid.	Asked
Mexican dollars.....	\$0.53½	\$0.55½
Peruvian soles and Chilean.....	0.48½	0.51
Victoria sovereigns.....	4.85½	4.87½
Twenty francs.....	3.87	3.91
Spanish 25 pesetas.....	4.78	4.80

SILVER AND STERLING EXCHANGE.

Nov.	Sterling Exchange.	Silver.		Nov.	Sterling Exchange.	Silver.	
		New York, Cents.	London, Pence.			New York, Cents.	London, Pence.
22	4.85½	70½	32½	26	4.85½	70	32½
23	4.85½	69½	32	27	4.85½	69½	32
24	4.85½	70½	32½	28	4.85½	69½	32½

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.

November.	Copper.			Tin.	Lead.	Spelter.	
	Lake, Cts. per lb.	Electrolytic, Cts. per lb.	London, £ per ton.			New York, Cts. per lb.	St. Louis, Cts. per lb.
22	22½ @22½	21½ @22	101½	43	5.75	6.40 @6.45	6.25 @6.30
23	22½ @22½	21½ @22	102	43½	5.75	6.40 @6.45	6.25 @6.30
24	22½ @22½	21½ @22½	.....	43½	5.75	6.40 @6.45	6.25 @6.30
26	22½ @22½	21½ @22½	101½	43½	5.75	6.40 @6.45	6.25 @6.30
27	22½ @22½	21½ @22½	101½	43½	5.75	6.40 @6.45	6.25 @6.30
28	22½ @22½	21½ @22½	101½	43½	5.75	6.40 @6.45	6.25 @6.30

London quotations are per long ton (2240 lb.) standard copper, which is now the equivalent of the former z.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 Co. for near-by shipments of desilverized lead in 50-ton lots, or larger. The quotations on spelter are for ordinary western brands; special brands command a premium.

Copper—The market has been without any special features. European buyers have not yet reentered the field except for small quantities, nor are any large transactions on the part of domestic buyers reported. The scarcity of supplies, however, has had a strengthening effect on the market, and quotations at the close are firm at 22½@22½c. for Lake copper; 21½@22½ for electrolytic in ingots, cakes and wirebars; while 21¾ is the average for the week for casting copper.

Standard prices in London moved within narrow limits, but seem to be firmly supported. The close is cabled at £101 11s. 3d. for spot, £102 10s. for three months.

Refined and manufactured sorts we quote: English tough, £103@104; best selected, £106@107; strong sheets, £109@110.

Exports of copper from New York for the week were 2833 long tons. Our special correspondent reports the exports from Baltimore for the week at 1032 long tons of fine copper.

Copper Sheets—The base price of copper sheets, as established by the manufacturers, is 27c. per lb. This price is subject to change without notice.

Tin—Notwithstanding the firmer tone which was displayed in the London market, domestic consumers could not be induced to buy their supplies for future delivery. The business done is from hand to mouth only and necessarily of small volume. The close here is 43¼@43½, while the cable quotations from London are £198 for spot, £198 10s. for three months.

Lead—The quotation remains unchanged at 5¾ New York, business being of fair volume.

While at one time the good demand created a firmer tone in the London market, prices became softer again after the buying power was exhausted. The market closes steady at £19 5s. for Spanish lead, £19 7s. 6d. for English lead.

St. Louis Lead Market—The John Wahl Commission Company telegraphs us on Nov. 28 as follows: Lead is firm and 5.85c. is asked for Missouri brands.

Spanish Lead Market—Messrs. Barrington & Holt report from Cartagena, Spain, under date of Nov. 10, that the price of lead has been 89 reales per quintal, silver being paid at 14.25 reales per ounce. Exchange, 27.71 pesetas to £1. The price of lead is equivalent, on current exchange, to £17 19s. 7d. per long ton, f.o.b. Cartagena. Exports for the week were 66 tons desilverized lead to Marseilles.

Spelter—There has been quite a good demand for this metal, especially for shipment the first month of next year. Spot metal is rather scarce, and commands a slight premium over the ruling quotations, which are 6.40@6.45 New York, 6.25@6.30 St. Louis.

There was some good buying in the London market, which, in consequence thereof, became rather firm, and closes at £28 for good ordinaries, £28 5s. for specials.

Spanish Zinc Ore Market—Messrs. Barrington & Holt report from Cartagena, Spain, under date of Nov. 10, that there were no shipments for the week. The market is quiet.

Zinc Sheets—The price of zinc sheets is \$8 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 lb. The base price for sheet zinc has varied little this year; the highest was \$8 on Jan. 6, the lowest \$7.65 on May 18; it is now again at the highest point.

Antimony—The large demand has subsided, and the market has, therefore, become much quieter. Quotations, however, remain practically unchanged, ordinary brands being 24½@25c., Hallett's, 25@25½, and Cookson's, 26@26½ cents.

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

	Per Lb.
Bismuth.....	\$1.50@1.60
Cadmium, 99.5% f. o. b. Hamburg....	1.40@1.46
Chromium, pure (N. Y.)	90c.
Copper, red oxide	50c.
Ferro-Chrome (70).....	13c.
Ferro-Chrome (7-9% carbon, per lb. Cr.)	9@9½c.
Ferro-Chrome (1% C. for ea. 10% Cr.)	11c.
Ferro-Chrome (60-64% Cr., 3-4% C.)..	14c.
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).....	\$7.20@7.50
Magnesium, pure (N. Y.).....	1.50
Manganese, pure 98@99% N. Y.....	75c.
Manganese—Copper (80%@70%) N. Y.	45c.
Molybdenum (98@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	1.10
Ferro-Silicon (50%) spot. Ex ship Atlantic ports.....	\$98@100 ton.

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

Nickel—Quotations for large lots, New York or other parallel delivery, as made by the chief producer, are 45@50c. per lb. for large orders, according to size of order and terms. For small lots, 50@65c. is charged.

Platinum—Demand continues strong. Unmanufactured platinum is quoted at \$38 per oz., while \$30@31.50 is paid for good scrap. A further advance is probable.

Quicksilver—This metal remains steady, with no material changes. The New York quotation is \$40.50@42 per flask of 75 lb., according to size and conditions of order. San Francisco quotations are \$39@40 per flask for home orders, and \$37@38 for export. The London price is £7 per flask, with £6 18s. 9d. named by jobbers.

Aluminum—The chief producer gives list prices for ton lots and over as follows: No. 1, over 99 per cent. pure, 36c.

per lb.; No. 2, over 90 per cent., 34c. Small lots are from 1 to 3c. higher. Granulated metal is 2c. per lb. over price of ingots; rods, 1c. per lb. up, according to size.

Wisconsin Ore Market

PLATTEVILLE, Nov. 24

A strong \$45 per ton is being paid for 60 per cent. zinc ore. Some few lots of roasted ore were sold at \$49.50. Every indication points to a continuance of the present satisfactory market. Prices at the beginning of the week were firm and the concentration of buying on the part of the ore buyers was more in evidence last week than at any time this year. It is a recognized fact that the majority of the 55 to 58 per cent. ore goes to Grasselli Brothers, while Matthiessen & Hegeler get their share of the 60 to 64 per cent. ore and the Illinois Zinc Company secures just about what it wants, while the Mineral Point Zinc Company and the Joplin Separating Company clean up the lower grades of zinc ore.

Lead ore remains steady selling at \$35@40 per thousand. Drybone and sulphur range the same as last week.

The different camps in the district loaded ore as follows:

Camps.	Zinc, Lb.	Lead, Lb.	Sulphur, Lb.
Platteville.....	276,600	64,000	.....
Linden.....	196,500	.....	.....
Galena.....	165,200	.....	.....
Highland.....	137,980	60,000	.....
Benton.....	165,600	.....	.....
Rewey.....	130,000	.....	.....
Cuba City.....	126,000	.....	.....
Buncombe & Hazel Green	120,000	100,000	.....
Mineral Point.....	84,540	.....	.....
Livingston.....	44,000	.....	.....
Total for week.....	1,446,420	244,000	.....
Year to Nov. 24.	69,813,266	3,295,130	4,053,910

The shipment of sulphur ore for the year to date had to be corrected, owing to a typographical error which had slipped in some weeks ago.

Missouri Ore Market

JOPLIN, Nov. 24

The highest reported price for zinc was \$48.50 per ton, the assay buying basis ranging from \$43 to \$47 per ton of 60 per cent. zinc. The average price, \$42.96.

The highest reported price for lead was \$85.50 per ton, medium grades selling at \$81 to \$84 per ton. The average price, \$83.98.

On Friday one smelting company, desirous of enlarging its zinc purchases, advanced the assay basis on 60 per cent. zinc \$1.50 per ton, and in securing ore recently purchased by other companies, caused them to meet the advance or lose a part of their usual tonnage.

Only New Year and Fourth of July weeks show a less shipment in any one week of this year than this week. This was caused by an unusually heavy November storm bringing an inch of sleet, covered with 3½ inches of snow, that pre-

vented loading on cars until Thursday's thaw. Even then it made settlements hard, on account of the heavy deductions for moisture caused by the ice and snow on the ore. Moisture averages were 2 to 4 per cent. heavier, ranging from 4 to 6, and in a few instances, 8 per cent.

Following are the shipments of zinc and lead ores from the various camps of the district for the week ending today:

	Zinc, lb.	Lead, lb.	Value.
Webb City-Carterville.....	1,859,830	585,270	\$64,662
Joplin.....	1,346,110	120,790	36,033
Galena-Empire.....	941,510	57,290	22,645
Badger.....	853,950	.....	20,068
Duenweg.....	711,920	91,310	19,497
Alba.....	561,840	11,930	13,708
Aurora.....	667,470	.....	11,780
Neck City.....	221,720	37,420	9,154
Baxter Springs.....	392,990	67,630	8,838
Prosperity.....	136,150	76,520	6,208
Oronogo.....	242,400	1,920	5,313
Spurgeon.....	171,430	30,900	4,702
Granby.....	260,000	10,000	4,020
Sherwood.....	152,400	9,260	3,894
Zincite.....	98,430	5,070	2,477
Sarcoite.....	42,810	.....	941
Totals.....	8,760,960	1,085,240	\$233,935

Eleven months.... 503,866,860 70,471,340 \$13,621,719
Zinc value, the week, \$188,358; 11 mos., \$10,987,626
Lead value, the week, 45,577; 11 mos., 2,724,033

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.	1905.	1906.	Month.	1905.	1906.
January...	52.00	47.38	January....	61.50	75.20
February...	52.77	47.37	February....	57.62	72.83
March.....	47.40	42.68	March.....	57.20	73.73
April.....	42.88	44.68	April.....	58.00	75.13
May.....	43.31	40.51	May.....	58.27	78.40
June.....	40.75	43.83	June.....	57.80	80.96
July.....	43.00	43.25	July.....	58.00	74.31
August.....	48.83	43.56	August.....	58.00	75.36
September..	46.75	42.58	September..	63.50	79.64
October....	47.60	41.55	October....	63.86	79.84
November..	49.55	.....	November..	68.67	.....
December..	49.00	.....	December..	76.25	.....

Mining Stocks

NEW YORK, Nov. 27

The tone of the market during the past week has been variable. During the early part the money market was extremely tight and had a depressing effect upon stocks in general. Later on, however, rates softened considerably, but stocks failed to show an upward tendency, with a few exceptions. Among the mining shares Amalgamated Copper showed weakness and selling seems to have been in evidence. The stock opened at \$114¾ and sold off to \$112, closing at \$112½. Anaconda was also sold down, the high price being \$282½, the low \$278 and the close \$279½. Federal Mining and Smelting showed a loss of \$4 a share on small dealings. Steel Common showed a decline from \$49½ to \$47¼, closing at \$47¾. The preferred showed very little change throughout the week. Virginia Iron, Coal and Coke Company was a sensational feature in a small way. On rumors that this company will be merged with big iron-ore and coal companies in the South

the stock jumped from \$65 $\frac{3}{8}$ to \$75 $\frac{3}{8}$ and later advanced to \$77, closing at \$76 $\frac{1}{2}$.

The curb market showed the usual activity, the largest sales being among the Cobalt stocks. Nipissing showed the largest dealings, but they were of a selling nature, forcing the stock down from \$29 $\frac{3}{4}$ to \$26, with a closing price of \$27 $\frac{1}{4}$. McKinley-Darragh was well dealt in, showing very little range in price on fairly large sales. Silver Queen was sold off from \$3 to \$2 $\frac{5}{8}$. Among the coppers, British Columbia Copper, Cumberland-Ely, Giroux, Granby, Green Consolidated Copper and Nevada Smelting were active all week. Mines Company of America, Old Hundred, Tennessee Copper, United Copper, United Greenwater, Death Valley and West Columbus were largely dealt in. No stocks showed a sensational rise or decrease in price and changes were more or less fractional. An exception to this statement is shown in the price of Standard Oil, which fell from \$560 to \$505 and closed at \$520. This was due to recent court decisions, and in spite of the dividend of \$10 which was recently declared.

Boston Nov. 27

The market for mining shares is one of specialties, and new record prices have been made for many the past week. There is talk of concentrated buying of certain Lake Superior stocks by Calumet & Hecla, or Amalgamated people, or both. At any rate, there is a quiet accumulation of the second class of mining stocks, and prices are the best yet. Allouez has risen \$6.75 to \$48.75 during the week, and Centennial \$5 to \$38.25 on heavy trading in both cases. Mohawk is up \$5.50 to \$75, and Osceola spurted \$8 to \$136. Tamarack has advanced \$6 to \$106, and Quincy \$3.75 to \$105. Amalgamated in the meantime is fractionally below a week ago at \$112.50. Shannon is almost \$2 higher than a week ago at \$18.62 $\frac{1}{2}$. The change in the directorship of this company was carried through at the annual meeting, and the next move will be to bring the office back to Boston.

Copper Range advanced \$1.37 $\frac{1}{2}$ to \$84.25 on the extra 50-cent dividend declared Monday, but reacted somewhat today. Trading in Arcadian has quieted down somewhat, and the price is off \$1.75 from the week's highest to \$11.25. It is admitted that copper-bearing veins have been struck at a depth of 200 ft. at this property. Adventure had a setback of \$1.25 to \$4.75 on heavy selling, accompanied by rumors of another assessment; but this met with an official denial. The lesser Lake stocks have also been in good request, notably Franklin, Isle Royale, Michigan and Rhode Island. The latter is up \$1.50 to \$6.75 on heavy trading today.

Old Dominion has been heavy the greater part of the week, and closed tonight the

same as a week ago, at \$57.50. President Smith, who has just returned from the property, admits that possibly the Phelps-Dodge interest would like to sell their ownership in the property. Parrot has advanced \$1.25 to \$27.25 on a better demand for the stock, and Tecumseh rose \$1.75 to \$18.37 $\frac{1}{2}$. Calumet & Arizona went up \$8.50 to \$163.50, holding the greater part of it. Bingham rose over \$2 to above \$32, and North Butte closes a trifle better at \$111.75. Butte Coalition has been very quiet, and closes a trifle better at \$36.50. The curb continues to take on new stocks, but the prices of the standard issues there show little variation of importance during the week.

Colorado Springs Nov. 23

More than usual interest has been manifested in Cripple Creek stocks during the past week; the market has held strong and in some instances has advanced, with an increased volume of business. The secretary of the Colorado Springs Mining Exchange has recently made a comparison of Colorado with Nevada, showing that stocks are selling in Nevada for many times the price of similar propositions in Colorado, with the mint figures of \$25,333,000 for Colorado in 1905 as against \$4,700,000 for Nevada. Certainly Colorado mines should be a much better investment at present prices, and the public is becoming awakened to the condition.

San Francisco Nov. 22

The boom in mining stocks, which has been so strongly in evidence for two weeks past, seems to be subsiding, though dealings are still on a large scale. Early in the week there was an uncertain market, and today the bears have been in control. The Comstocks were weaker, under comparatively light trading, but rallied a little toward the close. Tonopahs were fairly strong, but there was a break in Goldfield stocks, under large offerings and only moderate buying. Most traders, however, look for an early recovery.

There are now over 400 mining stocks being called at the Stock Exchange in this city, and the daily record of sales is very large. The brokers are reaping a harvest after many years of light business. With so many stocks, no one or two mines can greatly influence the rise or fall of the others, so there are surprises occasionally by a stock jumping up several dollars a share in a few days. This naturally causes great interest among speculators, and makes a brisk market. Two years ago seats on the San Francisco Stock and Exchange Board had fallen as low as \$300. Two months ago they were \$3000, and a few weeks since \$5000. The Board owns 13 seats bought from estates, etc., and the president has now been authorized to sell them at \$10,000 each.

Monthly Average Prices of Metals

SILVER.

Month.	New York.		London.	
	1905.	1906.	1905.	1906.
January.....	60.690	65.288	27.930	30.113
February.....	61.023	66.108	28.047	30.464
March.....	58.046	64.597	26.794	29.964
April.....	56.600	64.765	26.108	29.984
May.....	57.832	66.976	26.664	30.968
June.....	58.428	65.394	26.910	30.185
July.....	58.915	65.106	27.163	30.113
August.....	60.269	65.949	27.822	30.529
September.....	61.695	67.927	28.528	31.483
October.....	62.084	69.523	28.637	32.148
November.....	63.849	.....	29.493	.....
December.....	64.850	.....	29.977	.....
Year.....	60.352	.....	27.839	.....

The New York prices are in cents per fine ounces; the London quotation is in pence per standard ounce, 0.925 fine.

COPPER.

	NEW YORK.				LONDON.	
	Electrolytic.		Lake.		1905.	1906.
	1905.	1906.	1905.	1906.		
Jan.....	15.008	18.310	15.128	18.419	68.262	78.869
Feb.....	15.011	17.869	15.136	18.116	67.963	78.147
March.....	15.125	18.361	15.260	18.641	68.174	81.111
April.....	14.920	18.376	15.045	18.688	67.017	84.793
May.....	14.627	18.457	14.820	18.724	64.875	84.867
June.....	14.673	18.442	14.813	18.719	65.881	83.994
July.....	14.888	18.190	15.006	18.585	66.887	81.167
Aug.....	15.664	18.380	15.725	18.706	69.590	83.864
Sept.....	15.965	19.033	15.978	19.328	69.667	87.831
Oct.....	16.279	21.203	16.332	21.722	71.405	97.269
Nov.....	16.599	.....	16.758	.....	74.727	.....
Dec.....	18.328	.....	18.398	.....	78.993	.....
Year..	15.590	.....	15.699	.....	69.465	.....

New York prices are in cents per pound. Electrolytic quotations are for cakes, ingots or wire bars. The London prices are in pounds sterling, per long ton of 2240 lb., standard copper.

TIN IN NEW YORK.

Month.	1905.	1906.	Month.	1905.	1906.
Jan.....	29.325	36.390	July.....	31.760	37.275
Feb.....	29.262	36.403	August.....	32.866	40.606
March.....	29.523	36.662	Sept.....	32.095	40.516
April.....	30.526	38.900	Oct.....	32.441	42.852
May.....	30.049	43.313	Nov.....	33.143	.....
June.....	30.329	39.260	Dec.....	35.835	.....
			Av. year.	31.358	.....

Prices are in cents per pound.

LEAD IN NEW YORK.

Month.	1905.	1906.	Month.	1905.	1906.
Jan.....	4.552	5.600	July.....	4.524	5.750
Feb.....	4.450	5.464	Aug.....	4.665	5.750
March.....	4.470	5.350	Sept.....	4.850	5.750
April.....	4.500	5.404	Oct.....	4.850	5.750
May.....	4.500	5.685	Nov.....	5.200	.....
June.....	4.500	5.750	Dec.....	5.422	.....
			Av., year.	4.707	.....

Prices are in cents per pound. The London average for January, 1906, was \$16.850 per long ton; February, \$16.031; March, \$15.922; April, \$15.959; May, \$16.725; June, \$16.813; July, \$16.525; August, \$17.109; September, \$18.266; October, \$19.350.

SPELTER.

Month.	New York.		St. Louis.		London.	
	1905.	1906.	1905.	1906.	1905.	1906.
Jan....	6.190	6.487	6.032	6.337	25.062	28.225
Feb....	6.139	6.075	5.989	5.924	24.594	25.844
Mar....	6.067	6.209	5.917	6.056	23.825	24.563
April..	5.817	6.078	5.667	5.931	23.813	25.781
May....	5.434	5.997	5.284	5.846	23.594	27.000
June..	5.190	6.096	5.040	5.948	23.875	27.728
July....	5.396	6.006	5.247	5.856	23.938	26.800
Aug....	5.706	6.027	5.556	5.878	24.675	26.393
Sept..	5.887	6.216	5.737	6.066	26.375	27.563
Oct....	6.087	6.222	5.934	6.070	28.225	28.076
Nov....	6.145	.....	5.984	.....	28.500	.....
Dec....	6.522	.....	6.374	.....	28.719	.....
Year.	5.822	.....	5.730	.....	25.433	.....

New York and St. Louis prices are in cents per pound. The London prices are in pounds sterling per long ton (2240 lb.) good ordinary brands.

STOCK QUOTATIONS

NEW YORK.

Week Nov. 24.

Name of Company.	High.	Low.	Clg.	Sales.
Alaska Mine.....	2 3/4	1 3/4	2 3/4	7,280
Am. Nev. M. & P. Co.	5 1/2	2 1/2	3 3/4	4,600
Amalgamated*.....	11 1/4	11 1/2	11 3/4	361,550
Anacosta.....	28 3/4	27 3/4	27 3/4	92,200
Balakala.....	12	11 1/4	11 1/4	1,300
British Col. Copper...	14 1/2	12 1/2	12 1/2	34,500
Buffalo Cobalt.....	5	4 1/2	5	6,900
Butte of London.....	2 3/4	2 3/4	2 3/4	
Butte Coalition.....	3 3/8	3 1/8	3 1/8	1,320
Butte Copper & Zinc...	7 1/2	7	7 1/2	16,800
Cobalt Contact.....	1 1/2	1 1/2	1 1/2	6,250
Colonial Silver.....	5 1/2	5	5	5,270
Cum. Ely Mining.....	12 3/4	11 1/2	12 1/2	11,200
Davis Daly.....	13 1/2	12 1/2	12 1/2	4,747
Dominion Cop.....	5 1/2	5	5 1/2	3,300
El Rayo.....	7 1/2	6 1/2	7	3,450
Poster Cobalt.....	3 3/4	3 3/4	3 3/4	18,800
Furnace Creek.....	4 1/2	3 1/2	3 1/2	10,110
Giroux Mine.....	11 1/2	10 1/2	11	9,910
Gold Hill.....	6 1/2	5 1/2	5 1/2	6,500
Greene Gold.....	2	2	2	
Greene Gold & Silver.	2	1 1/2	1 1/2	24,700
Greenwater & D. Val.	3	2 1/2	3	400
Guanajuato.....	4 1/2	4 1/2	4 1/2	600
Guggen. Exp.....	3 1/2	3 1/2	3 1/2	
Hanapah.....	3 1/2	3 1/2	3 1/2	5,900
McKinley Darragh.....	3 1/2	2 1/2	3 1/2	36,300
Micmac.....	6 1/2	6 1/2	6 1/2	10,130
Mines Co. of Am.....	3 1/2	2 1/2	2 1/2	20,000
Mitchell Mining.....	5 1/2	5	5 1/2	7,650
Mont. Sho. Con. (New).	17	16	16	1,680
Nev. Utah M. & S.....	4 1/2	4 1/2	4 1/2	2,650
Newhouse M. & S.....	16 1/2	15 1/2	15 1/2	8,200
Nipissing Mines.....	29 1/2	26	26 1/2	113,500
Old Hundred.....	5	4 1/2	4 1/2	24,400
Richmond Eureka.....	7 1/2	7 1/2	7 1/2	
Silver Queen.....	3	2 1/2	2 1/2	28,000
Stewart.....	5 1/2	2 1/2	2 1/2	8,310
Tennessee Copper.....	48 1/2	46 1/2	47 1/2	5,000
Union Copper.....	1 1/2	1 1/2	1 1/2	
Utah Apex.....	7 1/2	7	7	415
West Columbus.....	25	22	22 1/2	15,700

NEW YORK INDUSTRIALS.

Am. Agri. Chem.....	26	25	25	1,050
Am. Smelting & Ref.....	157	153 1/2	153 1/2	96,950
Am. Smelt. & Ref., Pf.	117	116	116	2,525
Bethlehem Steel.....	19	19	19	1,000
Colo. Fuel & Iron.....	57 1/2	53 1/2	54 1/2	99,440
Federal M. & S., Pf.*	98 1/2	98	98 1/2	1,400
Inter. Salt*.....	32	31	31	200
National Lead.....	77 1/2	75 1/2	75 1/2	5,800
National Lead, Pf.....	104	103 1/2	104	600
Pittsburg Coal.....	18 1/2	15 1/2	17	16,300
Republic I. & S.....	38 1/2	36 1/2	37 1/2	23,400
Republic I. & S., Pf.	101 1/2	99	100 1/2	8,525
Sloss-Sheffield.....	77 1/2	73 1/2	75 1/2	6,200
Standard Oil.....	560	505	522	1,467
Tenn. C. & I.....	160 1/2	156	160	1,100
U. S. Red. & Ref.....	29 1/2	29	29 1/2	
U. S. Steel.....	49 1/2	47 1/2	47 1/2	261,610
U. S. Steel, Pf.....	105 1/2	105	105	21,065
Va. Car. Chem.....	39 1/2	37 1/2	37 1/2	3,750
Va. I. Coal & Coke.....	78 1/2	60 1/2	74 1/2	22,540

PHILADELPHIA Nov. 24

Name of Company.	High.	Low.	Clg.	Sales.
American Cement.....	10 1/2	10	10 1/2	5,689
Cambria Steel.....	38	37	37 1/2	1,448
General Asphalt.....	7	7	7	
Penn. Steel, pd.....	105	105	105	20
Philadelphia Co.....	48 1/2	48 1/2	48 1/2	85
Tonopah Mining.....	20 1/2	20 1/2	20 1/2	4,285

PITTSBURG Nov. 24.

Crucible Steel.....	13 1/2	12 1/2	13	415
Crucible Steel, Pf.....	81	80 1/2	80 1/2	1,094
Harbison-Walker Ref.	13 1/2	13 1/2	13 1/2	110
Ohio Tonopah.....	.28	.28	.28	6,100
Tonopah Ext.....	7 1/2	6 1/2	7	2,000

St. Louis Nov. 24.

Adams, \$0.40—\$0.25; American Nettle, \$0.08—\$0.06; Center Creek, \$2.50—\$2.25; Central Coal and Coke, \$65.00—\$64.25; Central Coal and Coke, pfd., \$80.00—\$79.00; Central Oil, \$60.00—\$58.00; Columbia, \$4.00—\$3.90; Con. Coal, \$24.00—\$22.00; Doe Run, \$140.00—\$130.00; Granite Bimetallic, \$0.24—\$0.22; St. Joe, \$19.00—\$17.00.

COLORADO SPRINGS Nov. 24

Name of Company.	High.	Low.	Clg.	Sales.
Acacia.....	13	12 1/2	13	9,000
C. C. Con.....	7 1/2	6 1/2	7	
Dante.....	7	6 1/2	6 1/2	49,000
Doctor Jack Pot.....	8 1/2	8	8 1/2	20,000
Elkton.....	59	55 1/2	59	25,800
El Paso.....	58	56	57 1/2	8,600
Findley.....	68 1/2	67	67	10,500
Gold Dollar.....	8 1/2	8 1/2	8 1/2	17,350
Gold Sovereign.....	6 1/2	6 1/2	6 1/2	21,000
Isabella.....	29	25	27 1/2	30,000
Jennie Sample.....	9 1/2	9	9 1/2	
Mary McKinney.....	70 1/2	70	70	11,000
Pharmacist.....	6 1/2	6 1/2	6 1/2	
Portland.....	1.45	1.40	1.44	2,300
Vindicator.....	95	94	94	
Work.....	24 1/2	22 1/2	24 1/2	29,000

BOSTON Nov. 24

Adventure.....	6 1/2	4 1/2	5 1/2	12,960
Allouez.....	45	40	45	18,478
Am. Zinc.....	30 1/2	29 1/2	30 1/2	326
Arcadian.....	15 1/2	11	12	62,226
Atlantic.....	14 1/2	13 1/2	14 1/2	1,585
Bingham.....	33	30	33	5,040
Boston Consolidated.....	32 1/2	31	31	1,595
Calumet & Arizona.....	163	164 1/2	163	6,805
Calumet & Hecla.....	875	875	875	42
Centennial.....	36	32 1/2	36	34,309
Con. Meeur*.....	53	50	50	4,575
Copper Range.....	83 1/2	82	83 1/2	6,750
Daly-West.....	21 1/2	20	20 1/2	4,275
Franklin.....	23 1/2	21 1/2	21 1/2	5,955
Granby.....	13 1/2	13	13 1/2	809
Greene C. n. olidated*.....	26 1/2	26	26 1/2	11,840
Ile Royal.....	24	22 1/2	22 1/2	1,010
Mass.....	8	7 1/2	8	790
Michigan.....	18 1/2	17 1/2	18 1/2	3,010
Mohawk.....	74	69	73	4,882
Mont. Coal & Coke new.	2 1/2	2	2 1/2	22,750
Nevada.....	20 1/2	19 1/2	19 1/2	1,333
North Butte.....	112 1/2	110 1/2	112	7,099
Old Colony.....	2	1 1/2	2	5,276
Old Dominion.....	26 1/2	26	26 1/2	4,700
Oscuela.....	135	128	135	4,106
Parrot.....	27	26 1/2	26 1/2	504
Phoenix.....	1 1/2	1 1/2	1 1/2	520
Quincy.....	104	100	103 1/2	3,347
Rhode Island.....	5 1/2	5	5 1/2	3,020
Santa Fe.....	5 1/2	4	5	31,958
Shannon.....	17 1/2	16 1/2	17 1/2	23,961
Tamarac.....	102	100	100 1/2	123
Tecumseh.....	18 1/2	15 1/2	18	26,555
Trinity.....	13	11	11 1/2	13,733
United Copper, com.....	76 1/2	74 1/2	76	3,290
U. S. Oil.....	9 1/2	9 1/2	9 1/2	609
U. S. Smg. & Ref.....	62 1/2	61 1/2	62 1/2	2,453
U. S. Smg. & Ref., pfd.....	46	45 1/2	45 1/2	1,256
Utah Copper.....	64 1/2	63 1/2	63 1/2	4,211
Victoria.....	6 1/2	5 1/2	6 1/2	2,640
Washington.....	2	2	2	135
Winona.....	11 1/2	10	11	1,840
Wolverine.....	160	159 1/2	160	377
Wyandotte.....	2 1/2	1 1/2	2	5,285

*Ex. Div. †Ex. Rights.

BOSTON CURB.

Abitibi & Cobalt.....	.37	.30	.33	49,890
Ahmeek.....	100	100	100	15
Ariz. Con'l.....	39 1/2	36	36	2,959
Black Mt.....	10	9 1/2	9 1/2	2,940
Cananea Cent.....	29 1/2	27 1/2	28 1/2	14,252
East Butte.....	12 1/2	11	11	2,356
Hancock Con.....	13 1/2	12	13	905
Keweenaw.....	12	11 1/2	11 1/2	695
Majestic.....	4 1/2	4	4	3,896
Raven.....	.87	.84	.85	11,415
Shawmut.....	1.25	.90	.90	3,625
Superior.....	19	17 1/2	19	245
Superior & Pitts.....	28 1/2	26	26	10,574
Troy.....	3 1/2	3 1/2	3 1/2	3,255

NEVADA MINING STOCKS. Nov. 21.

(Revised by Weir Bros. & Co., New York.)

TONOPAH STOCKS.	High.	Low.	Last.
Tonopah Mine of Nevada.....	2.50	20.25	20.50
Tonopah Extension.....	6.75	6.25	6.50
Montana Tonopah.....	3.85	3.75	3.80
Belmont.....	6.37 1/2	6.25	6.25
Tonopah Midway.....	2.55	2.50	2.50
West End Con.....	2.35	2.30	2.30
Jim Butler.....	1.45	1.42	1.43

GOLDFIELD STOCKS.	High.	Low.	Last.
Sandstorm.....	.87	.85	.85
Kendall.....	.74	.72	.73
Red Top.....	4.25	4.12 1/2	4.12 1/2
Jumbo.....	4.25	4.12 1/2	4.12 1/2
Goldfield Mining.....	2.35	2.30	2.35
Diamondfield B. B. Con.....	.64	.62	.63
Atlanta.....	.94	.92	.93
Mohawk.....	16.25	16.25	16.25
Silver Pick.....	2.22	2.20	2.20
Laguna.....	1.75	1.70	1.70

BULLFROG STOCKS.	High.	Low.	Last.
Montgomery Shoshone Con.....	14.75	13.75	14.00
Tramps Con.....	2.15	2.10	2.10
Gold Bar.....	1.80	1.75	1.75
Bullfrog Mining.....	.59	.57	.58
Bullfrog National Bank.....	.66	.64	.65
Homestake Con.....	1.60	1.50	1.60

MANHATTAN STOCKS.	High.	Low.	Last.
Manhattan Con.....	1.05	1.00	1.03
Manhattan Dexter.....	.65	.64	.64
Jumping Jack.....	.51	.50	.50
Stray Dog.....	.70	.70	.70
Indian Camp.....	1.10	1.10	1.10

LONDON. (By Cable.) Nov. 28.

Dolores, £1 11s. 3d.; Stratton's Independence, £0 3s. 3d.; Camp Bird, £1 9s. 0d.; Esperanza, £2 18s. 9d.; Tomboy, £1 11s. 3d.; Es-Oro, £1 7s. 6d.; Oroville, £1 3s. 3d.; Somera, £0 6s. 10d.; Utah Apex, £1 11s. 10d.; Arizona Copper, pref., £3 12s. 6d.; Ariz. Copper, def., £3 10s. 6d.
*Furnished by Hayden, Stone & Co., New York.

SAN FRANCISCO Nov. 21.

Name of Company.	Low.	Clg.	Sales.
COMSTOCK STOCKS.			
Belcher.....	.45	.40	2,650
Best & Belcher.....	1.65	1.50	1,250
Caledonia.....	.58	.45	1,000
Chollar.....	.25	.21	1,500
Con. Cal. & Va.....	1.60	1.25	90,000
Crown Point.....	.30	.24	5,200
Gould & Curry.....	.44	.30	7,700
Hale & Norcross.....	1.10	1.10	900
Mexican.....	1.30	1.05	4,000
Ophir.....	3.35	3.00	4,000
Overman.....	.22	.12	2,500
Potosi.....	.24	.20	8,000
Savage.....	1.40	1.15	2,650
Sierra Nevada.....	1.25	.86	4,950
Yellow Jacket.....	1.60	1.15	8,200
TONOPAH STOCKS.			
Belmont.....	6.75	6.62	6.75
Golden Anchor.....	.67	.59	26,700
Jim Butler.....	1.62	1.50	25,700
McNamara.....	.83	.77	37,400
Midway.....	2.85	2.65	2,700
North Star.....	.56	.50	24,000
West End.....	2.65	2.15	8,744
GOLDFIELD STOCKS.			
Atlanta.....	1.05	.86	79,600
Columbia Mt.....	1.37	1.15	44,100
Comb. Frac.....	6.37	5.25	17,400
Diamondfield B.B. Con.....	.75	.52	89,232
Florence.....	5.00	4.00	1,300
Frances-Mohawk.....	1.00	.90	1,600
Goldfield Mining.....	2.32	1.35	93,420
Jumbo.....	5.00	4.10	40,400
Kendall.....	.85	.80	12,100
Laguna.....	2.00	1.65	26,900
Mohawk.....	18.50	16.00	2,140
Red Top.....	4.50	4.10	32,000
Silver Pick.....	2.20	1.55	88,900</

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

ABRASIVES—		COPPERAS—Bulk..... 100 lb.	\$0.47½	POTASSIUM—	
Bort, good drill quality, carat..	\$85.00	In bbls.....	.57½@.70	Bicarbonate crystal..... lb.	\$0.09@.11
Carborundum, f.o.b. Niagara		In bags.....	.52½@.65	Powdered or granulated..	.09@.11
Falls, powd.....	.08	CRYOLITE..... lb.	.06½	Bichromate, Am.....	.08½@.08½
Grains.....	.10@.17	FELDSPAR—Ground best...sh. ton.	12.00@15.00	Scotch.....	.11
Corundum.....	.07@.10	FIRE BRICK.		Bromide.....	.16
Crushed Steel, f.o.b. Pitts-		American..... per M.	30.00@40.00	Carbonate (80@85).....	.08½@.09½
burg.....	.05½@.06	Imported.....	35.00@45.00	Caustic, ordinary.....	.04½
Emery, in kegs: Turkish		St. Louis No. 1.....	16.00	Elect. (90%).....	.06½
flour.....	.01½@.02½	No. 2.....	14.00	Chloride (muriate), 100 lb..	.09½
Grains.....	.03½@.04½	Extra.....	20.00@23.00	Chlorate, powdered.....	.09½
Naxos flour.....	.01½@.02½	FIRE CLAY.		Crystals.....	.09½
Grains.....	.03½@.04½	St. Louis mill,..... per ton	2.50	Cyanide (98@99).....	.18@.19
Chester flour.....	.01½	FLUORSPAR—		Kainite, long ton, bulk, 8.50; bags, 9.50.	
Grains.....	.03½@.04½	Domestic f.o.b. shipping port:		Permanganate..... lb.	.09½
Peekskill, f.o.b. Easton,		Lump..... sh. ton.	8.00@10.00	Prussiate, yellow.....	.17
Pa. flour.....	.01½@.01½	Ground.....	11.50@13.50	Red.....	.33
Grains, in kegs.....	.02@.02½	Gravel.....	4.25@4.50	Sulphate..... 100 lb.	2.18½@2.21½
Garnet, per quality, sh ton	25.00@35.00	Foreign crude ex. dock.....	8.00@10.00	PYRITE—	
Pumice Stone, Am. Powd. 100 lb.	1.60@2.00	FULLER'S EARTH—Lump, 100 lb.	.80@.85	Domestic, non-arsenical, furnace	
Italian, powdered.....	.01½@.01½	Powdered.....	.80@1.25	size..... per unit	11@11½c.
Lump, per quality.....	.03@.20	GRAPHITE—		Domestic, non-arsenical, fines, per	
Rottenstone, ground.....	.02½@.03½	American, ore, common.... lb.	.01@.10	unit.....	9@10½c.
Lump, per quality.....	.05@.25	Artificial.....	.06	Imported non-arsenical, furnace	
Rouge, per quality.....	.06@.30	Ceylon, common pulv.....	.02½@.03½	size, per unit.....	.13@.13½
Steel Emery, f.o.b. Pitts-		Best, pulverized.....	.04@.08	Imported, arsenical, furnace size,	
burg.....	.07½@.07½	German, com. pulv.....	.01½@.01½	per unit.....	12@12½c.
ACIDS—		Best, pulverized.....	.01½@.02	Imported fines, arsenical, per unit.	8½@9c.
Acetic 28%..... lb.	.02½	Italian, pulverized.....	.01@.02	unit..... non-arsenical, per	
Boric.....	.10@.11	GYPNUM—		unit.....	10½@11c.
Hydrofluoric, 30%.....	.02½@.03	Fertilizer.....	7.00	Pyrite prices are per unit of sulphur. An	
" 48%.....	.06	Rock..... lg. ton.	4.00	allowance of 25c. per ton is made when delivered in	
" 60%.....	.10@.10½	INFUSORIAL EARTH—		lump form.	
Hydrochloric acid, 20°, per lb.....	1.25@1.50	Ground Am. best..... lb.	.01½	SALT—N. Y. com. fine 280 lb. bbl.	.72@1.18
Nitric acid, 38°..... per lb.	4.25@4.62½c.	French..... lg. ton.	56.00	N. Y. agricultural..... sh. ton.	3@4.40
Sulphuric acid, 50°, bulk, per ton..	\$12 up.	German..... lb.	.02½@.02½	SALTPETER—Crude..... 100 lb.	4.25@4.50
60°, 100 lb. in carboys.....	.90@1.12½	LEAD—Acetate (sugar of)..... lb.	.07½	Refined, crystals.....	5.25@5.75
60°, bulk, ton.....	17.00@18.00	Nitrate, com'l.....	.07½@.08	SILICA—	
66°, 100 lb. in carboys.....	1.00@1.25	MAGNESITE—Greece.		Ground quartz, ord'ry... sh. ton	13.00@15.00
66°, bulk, ton.....	18.50@20.00	Crude (95%)..... lz. ton.	7.00@8.00	Silex.....	30.00@40.00
Oxalic.....	.08½@.08½	Calced..... sh. ton.	30.00@35.00	Lump Quartz.....	2.50@4.00
ALCOHOL—Grain..... gal.	2.46½	Bricks, domes, per qual.		Glass sand.....	2.75
Refined wood, 95@97%.....	.70@.75	f.o.b. Pittsburgh..... M.	160@200	SILVER—Nitrate, crystals..... oz.	.43½@.45½
ALUM—Lump..... 100 lb.	\$1.75	MAGNESIUM—		SODIUM—	
Ground.....	1.85	Chloride, com'l..... lb.	.01@.01½	Acetate..... lb.	.04½@.04½
Chrome Alum..... lb.	.03½@.03½	Sulphate (Epsom salt)... 100 lb.	.90@1.25	"Alkali," per 100 lb., 68/48.....	.80@.87½
ALUMINUM—Sulphate, com'l.	1.25@1.60	MANGANESE—		Bicarb. soda, per lb.....	1.25@1.50c.
26 ".....	.04½@.05½	Crude powdered:		Soda, caustic, per 100 lb., 76/60.....	1.85@2.00
AMMONIA—24 deg. lb.	.04½@.05½	70@75% binoxide..... lb.	.02	" " powdered.....	.02½@.03
26 ".....	.05@.05½	75@85% binoxide.....	.02½	Salt cake, per 100 lb.....	.70@.85
AMMONIUM—		85@90% binoxide.....	.04	Soda, monohydrate, per lb.....	.06½@.06½
Bromide..... lb.	.23	90@95% binoxide.....	.05½	Bichromate..... lb.	.06½@.06½
Carbonate.....	.07½@.08	Ore, 80%-85%..... sh. ton.	27.00@35.00	Bromide.....	.09
Muriate grain.....	.06½	MARBLE—Flour..... sh. ton.	8.00@8.50	Chlorate, com'l.....	.09
Lump.....	.09½@.09½	MINERAL WOOL—		Cyanide, ("100% KCN").....	.18@.19
Sulphate, 100 lb.....	3.10@3.15	Slag, ordinary.....	19.00	Hyposulphite, Am.....	1.40 up
Sulphocyanide com.....	.30	Selected.....	25.00	German.....	1.60@1.70
" chem. pure.....	.40	Rock, ordinary.....	32.00	Phosphate..... 100 lb.	1.90 up
ANTIMONY—needle, lb.	.16½@.17	Selected.....	40.00	Prussiate.....	.12@.13
ARSENIC—White..... (nominal) "	.06½@.07½	MONAZITE SAND—		Sal soda, f.o.b. works... 100 lb.	.60
Red.....	.06½@.06½	Guar. 97%, with 5% Thorium		Foreign, f.o.b. N. Y.....	.90
ASPHALTUM—		oxide, nominal..... lb.	.08 and up.	Silicate, com'l..... 100 lb.	.75@1.00
Barbadoes..... per ton.	40.00@80.00	NICKEL—		Sulphate, com'l, (Glauber's salt) 100 lb.	.50@.60
West Indies.....	20.00@60.00	Oxide, crude, lb. (77%)	.47	" " calcined.....	.60@.75
Egyptian..... lb.	.06@.07	for fine metal contained..	.18@.24	STRONTIUM—Nitrate..... lb.	.08½@.08½
Gilsonite, Utah ordinary per ton.	50.00	Sulphate, single..... lb.	.11½@.14	SULPHUR—	
Trinidad.....	30.00@40.00	double.....	.11½@.14	Louisiana (prime) to New York, Boston	
California.....	20.00@30.00	NITRATE OF SODA—100 lb. 96% for 1906	2.60@2.62½	or Portland..... lg. ton	22.00
BARIUM—		95% for 1907.....	2.60@2.62½	To Philadelphia or Baltimore.....	20.50
Carb. Lump, 80@90%..... sh. ton.	30.00@35.00	95% for 1908.....	2.45@2.50	Roll..... 100 lb.	1.85@2.15
Powdered, 80@90%..... lb.	.02@.02½	96% is 7½c higher per 100 lb.		Flour.....	2.00@2.40
Chloride com'l..... ton.	34.00	OZOKERITE—best..... lb.	.14@.17	Flowers, sublimed.....	2.20@2.60
Nitrate, powdered, in casks.. lb.	.06	PAINTS AND COLORS—		TERRA ALBA—French & Eng. 100 lb.	.90@1.00
Sulphate (Blanc Fixe).....	.02½	Litharge, Am. powdered....	.07½@.07½	TALC—Domestic..... sh. ton.	15.00@20.00
BARYTES—		English glassmakers'.....	.08½@.08½	French, best.....	20.00@25.00
Am. Ground..... sh. ton.	14.00@21.00	Lithopone.....	.04@.05	Italian, best.....	35.00@40.00
Floated.....	15.00@21.00	Metallic, bro..... sh. ton.	19.00	TIN—Bi-chloride, 50%..... lb.	.12½ up
Foreign floated.....	19.50@21.00	Red.....	16.00	Crystals.....	.28 up
White.....	21.00	Ocher, Am. common.....	8.50@9.00	Oxide, lb.....	.44
BISMUTH—Sub-nitrate..... lb.	1.50	Best.....	16.00	URANIUM—Oxide.....	3.50
BLEACHING POWDER—35%, 100 lb.	1.30@1.50	Dutch, washed..... lb.	.02½@.03	ZINC—Metallic ch. pure.....	.15
BLUE STONE—(copper sulphate), car-		French, washed.....	.01½@.02½	Chloride solution, com'l.....	.02½@.04
load, per 100 lb.....	7.00	Paris green, pure, bulk.....	.21@.23	Chloride, granular.....	.04½@.4½
BONE ASH..... lb.	.02½@.03	Red lead, American.....	.07½@.07½	Dust.....	.05½@.06
BORAX.....	.07½@.08	Foreign.....	.08½@.08½	Sulphate.....	.02½@.02½
CALCIUM—Acetate, gray.....	2.35@2.40	Turpentine, spirits bbl., per gal.	.70@.71	Note—These quotations are for wholesale lots in	
Acetate, brown.....	1.60@1.65	White lead, Am., dry..... lb.	.06½@.06½	New York, unless otherwise specified, and are	
Carbide, ton lots f.o.b. Ni-		American, in oil.....	.07@.07½	generally subject to the usual trade discounts.	
agara Falls, N. Y., for		Foreign, in oil.....	.09@.10	Readers of THE ENGINEERING AND MINING JOUR-	
Jersey City, N. J..... sh. ton.	65.00	Zinc white, Am. extra dr.....	.05½@.05½	NAL are requested to report any corrections	
Chloride, f.o.b. N. Y.....	13.00@15.00	Foreign, red seal, dry.....	.07½@.07½	needed, or to suggest additions which they may	
CEMENT—		Green seal, dry.....	.07½@.08½	consider advisable.	
Portland, Am. 500 lb..... bbl.	1.55@1.60	PHOSPHATES—Acid..... 65@67½c per unit			
Foreign.....	2.25@2.50	*Fla., hard rock.....	7.50		
" Rosendale, 300 lb.....	.85	land pebble 68%.....	4.50		
(in sacks).....	.65	†Tenn., 78@80%.....	6.50@7.00		
Slag cement.....	.75@1.25	78%.....	5.50		
CHROME ORE—		75%.....	5.00		
New Caledonia 50% ex. ship		68@72%.....	4.50		
N. Y..... per lg. ton	17.00@19.75	†So. Car. land rock.....	6.00		
Bricks, f.o.b. Pittsburg, M.. "	175.00	" " river rock.....	.....	
CLAY, CHINA—Am. common		*F. o. b. Florida or Georgia ports. †F. o. b. Mt.			
ex-dock, N. Y.....	8.00 up.	Pleasant. †On vessel Ashley River, S. C.			
Foreign.....	11.00@18.00				
COBALT—Oxide..... lb.	2.50				

THE MINING INDEX.

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

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

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

ALUMINUM AND BAUXITE

1423—**PRODUCTION** of Bauxite and Aluminum in 1905. (Advance chapter from Mineral Resources of the U. S., Calendar Year 1905; 3 pp.) Gives the production and consumption of both bauxite and aluminum, together with tables showing imports.

BORAX

1424—**PRODUCTION** of Borax in 1905. C. G. Yale. (Extract from Mineral Resources of the U. S., Calendar Year 1905; 9½ pp.) A review of the borax industry for 1905, and tabulation of the production, imports and uses of borax.

CEMENT

1425—**ALABAMA**—Cement Possibilities of Alabama. R. C. Lane. (Mfrs. Rec., Nov. 8, 1906). Draws comparisons between the cement and the iron industries in the United States, and calls attention to the great possibilities of the South as a manufacturing center for cement. 20c.

CLAY

1426—**QUEENSLAND**—China Clay from Queensland. (Bull., Imperial Institute, Vol. IV, No. 3, 1906). Brief remarks concerning the deposits, with analyses of certain samples. 40c.

COAL AND COKE

1427—**ACCIDENTS** in Coal Mines. (Sci. & Art of Mg., Oct. 20 and Nov. 3, 1906). Continuation of a series of articles, previously indexed, describing several disastrous accidents, and suggesting the proper enactment of laws for the prevention of such occurrences. 40c.

1428—**BREAKER**—Anthracite Breaker of the Pacific Coal Company, Limited, Bankhead, Alberta. L. Stockett and B. R. Warden. (Jl. Can. Mg. Inst., Part of Vol. IX., advance copy; 19 pp. and detailed diagrams showing method of preparing the coal). An interesting description of the building and machinery recently erected for the preparation of the anthracite coal mined by the above company, illustrated by numerous photographs and drawings.

1429—**BRITISH COLLIERIES**—Report of Meeting of the North of England Institute of Mining and Mechanical Engineers to Receive the Members of the American Institute of Mining Engineers, Aug. 1, 1906. (Published by the Institute, 1906; 20 pp.). Describes the features of interest seen by the visiting members of the American Institute of Mining Engineers while inspecting several collieries and steel works in the North of England district.

1430—**BRITISH COLUMBIA**—The Nanaimo-Comox Coal Field. H. S. Poole. (B. C. Mg. Rec., Sept., 1906; 2½ pp.). Extract from Summary Report of the Geological Survey Department of Canada for 1905; the location, extent and preliminary explorations throughout this field are mentioned in the description of this Canadian coal field. 40c.

1431—**BRITISH COLUMBIA**—The Northern Extension of the Elk River Coal Basin. D. B. Dowling. (B. C. Mg. Rec., Sept., 1906). Extract from Summary Report of the Geological Survey of Canada for 1905, dealing with the general conditions throughout the field and speaking of the progress in development work at the mines. 20c.

1432—**CANADA**—Coal in Alberta. P. Thompson. (Eng. & Mg. Jl., Nov. 17, 1906). Describes conditions as they exist at present, and tells of the discovery of new coal seams. 20c.

1433—**CARBON**—Rates of Action of Oxygen, Carbon Dioxide and Steam on Carbon.

P. Farup. (Zeit. anorg. Chem., Vol. 50, 1906; pp. 276-296). A statement of the results of an investigation with regard to the dissociation of carbon dioxide and steam at high temperature, also a discussion of the relation between the oxygen concentration and the reaction velocity.

1434—**CLASSIFICATION** OF COALS. (Bull. Imperial Institute, Vol. IV., No. 3, 1906; 6½ pp.) The subject is dealt with in an interesting and original manner. After giving analyses of the different coals, they are classified according to their composition. 40c.

1435—**COAL ANALYSIS**—Moisture in Coal. E. E. Somermeier. (Jl. Amer. Chem. Soc'y, Nov., 1906; 8 pp.) Standard methods for accurately carrying out the determination of the percentage of moisture in coal are described. Precautions suggested by experience are also given. 60c.

1436—**COAL CUTTING**—Neuere Erfahrungen mit maschineller Schrämarbelt in den Dortmunder Bergrevieren. E. Reinke. (Glückauf, Oct. 20, 1906; 7 pp.) Gives details of longwall undercutting by machine in some German mines. 40c.

1437—**COAL-MINING TOWN**—A Modern Coal-Mining Town. F. W. Parsons. (Eng. & Mg. Jl., Nov. 3, 1906). The manner of conducting the modern coal town of Zelgler, Ill., is described, and many points of interest are shown in the illustrations. 20c.

1438—**COAL WASHING**—Kohlen-Separation und Wäsche der Zeche Mansfeld. H. Nienaber. (Bergbau, Oct. 18, 25, Nov. 1 and 8, 1906.) Continuation of article previously indexed, describing the apparatus for washing coal at this mine in Germany. 80c.

1439—**COKE AND COKING** COALS. J. M. Van Harlingen. (Yale Sci. Monthly, Oct., 1906; 5 pp.) A brief and simple statement relative to coking and non-coking coals. Contains analyses of coals from various districts. 40c.

1440—**COLLIERIES**—The Mechanical Equipment of Collieries. E. M. Hann. (Engineering, Nov. 26, 1906). Paper read before the Brit. Instn. of Mechan. Engineers, Oct. 19, 1906, describing the equipment of the Bargoed colliery of the Powell Duffryn Steam Coal Co. in considerable detail, and illustrated by drawings. 20c.

1441—**DISTILLATION** PRODUCTS—Die Kohlen und ihr verschiedenes Verhalten bei der trockenen distillation. U. Klünder. (Montan-Zeitung, Oct. 15, 1906). Enumerates the distillation products from different classes of fuel. 40c.

1442—**EXPLOSIONS**—Mittellungen über einige der bemerkenswertesten Explosionen beim preussischen Steinkohlenbergbau im Jahre 1905. (Zeit. f. Berg-Hütten-u. Sallnswesen, Jahrgang 1906, Band 54, 4 heft; 20 pp.) A discussion of colliery explosions at the Hoiland mine, the Centrum mine, the Wendel mine, the Werne mine, and the Eschweiler Reserve mine, all in Prussia, in 1905, illustrated by many valuable drawings and diagrams.

1443—**EXPLOSIONS**—The Relation of Barometric Pressure to Mine Explosions. F. W. Parsons. (Eng. & Mg. Jl., Nov. 17, 1906.) A suggestion that explosions of gas may be guarded against by attention to meteorological conditions. The article is accompanied by actual observations taken at different mines, and is further illustrated by an explanatory diagram. 20c.

1444—**EXPLOSIVE**—Inquiry re "Bobblinite" by the British Home Office. Jas. Ashworth. (Mines & Minerals, Nov., 1906; 2½ pp.) The article deals with the various characteristics of flameless explosives, and contains the results of tests of Bobblinite and other explosives. 40c.

1445—**FAROE ISLANDS**—Coal in Sudero; One of the Faroe Islands. H. L. Williams. (Iron & Coal Tr. Rev., Nov. 2, 1906). Paper

read before the Nat. Assn. of Colliery Managers, describing the geology of the Faroe Islands, and the exploitation of the coal field, including analysis of the coal. 20c.

1446—**FUEL BRIQUETTING** in America. C. M. Barber. (Engineer, Nov. 15, 1906). Abstract of paper read before the Detroit Engineering Society, describing the materials used, types of presses and cost of process. 20c.

1447—**HAULAGE**—Goodman Haulage Equipment as Used by the Victor Fuel Co., of Colorado. (Elec. Mining, Oct., 1906; 13 pp.) Illustrated description of the methods of haulage at the mines of the Victor Fuel Co. in Colorado. 20c.

1448—**HOISTS**—Collery Holsts. F. Ernest Brackett. (Eng. & Mg. Jl., Nov. 3, 1906; 3 pp.) The author gives many mathematical formulas for hoisting engines, and describes cages, etc. 20c.

1449—**LOW GRADE FUEL**—The Burning of Cheap Fuel. (Elec. Wid., Nov. 3, 1906). A description of a system whereby cheap fuel may be burned under various types of boilers, containing illustrations and boiler tests. 20c.

1450—**MINE FIRE**—Extinguishing a Mine Fire at St. George's Colliery, Natal. W. T. Heslop. (Mines & Minerals, Nov., 1906). A record of the author's experience in dealing with an underground fire at St. George's colliery, Natal. 20c.

1451—**MINING METHOD**—Die Zsytaler Gruben der Salgo-Tarjaner Steinkohlen-Bergbau-Aktiengesellschaft. J. Adreles and A. Blascheck. (Oest. Zeit. f. Berg-u. Hüttenw., Oct. 13, 1906; 4 pp.) Conclusion of serial previously indexed. 40c.

1452—**MINING METHOD**—Method of Working the Barnsley Seam in South East Yorkshire. T. Rontree. (Mg. Engineering, Nov., 1906; 4½ pp.) This article was delivered as a lecture to the students of the Coal-bridge Mining College on their visit to the Yorkshire coal field. Several maps accompany the description, and both the methods and geology are treated. 20c.

1453—**PEAT**—Iowa Peat. G. B. Zanke and F. F. Taylor. (Iowa Engineer, Sept., 1906; 12½ pp.) Results of an investigation into the extent and quality of peat bogs in Iowa, cost of preparing peat for the market, and Iowa peat as compared with other peat on the market. 20c.

1454—**PENNSYLVANIA**—Clearfield Coal Fields. Geo. H. Ashley. (Coal, Nov. 15, 1906.) Briefly describes the various seams in this region, giving their thickness and classification. 20c.

1455—**SAFETY IN MINES**—Die grossbritannienische Grubensicherheits-Kommission (Royal Commission on Safety in Mines). (Zeit. f. Berg-Hütten-u. Sallnswesen, Jahrgang 1906, Band 54, 4 heft; 25 pp.) Translation of the report of the British Royal Commission on Safety in Mines.

1456—**SAFETY LAMP**—The Wolf Acetylene Safety Lamp. (Mines & Minerals, Nov., 1906). The use of acetylene in safety lamps is dealt with generally, and the Wolf lamp is described in particular. 20c.

1457—**SCREEN**—A Unique Coal Screen. F. W. Parsons. (Eng. & Mg. Jl., Nov. 17, 1906). Treats the subject of screening coal in a general manner, and describes a recent invention that operates on principles which overcome present disadvantages. 20c.

1458—**SHAFT SINKING** With the Aid of Pumps through Heavily Watered Strata. (Mg. Engineering, Nov., 1906; 3 pp.) The many problems in sinking through watered strata are dealt with in detail. The author describes a method which he used satisfactorily and accompanies his article with a descriptive diagram. 20c.

1459—**STEAM TURBINES** AND CENTRIFUGAL PUMPS—Note sur les Turbines

a Vapeur et Pompes Centrifuges installées au Charbonnage de Baudour. M. Passelecq and C. Rehir. (Rev. univ. des Mines, Sept., 1906; 37 pp.) Gives the results of long-duration tests of steam turbines and centrifugal pumps at the above Belgian colliery. Illustrated. \$1.00.

1460—STORAGE—Water vs. Land Coal Storage. (Coal, Nov. 15, 1906.) Defines the advantages accruing from the storage of coal under water, and gives the possibilities of damage and loss from storing in the usual surface bins. 20c.

1461—TRANSVAAL COAL INDUSTRY. A. McA. Johnston. (Mg. Wld., Nov. 17, 1906.) The various fields throughout the district that have undergone development are described in a practical manner, while figures concerning the output and value of the product are included. The author also gives several analyses of the various coals. 20c.

1462—VIRGINIA—The Pocahontas Collieries Co. F. W. Parsons and W. Leckle. (Eng. & Mg. Jl., Oct. 27, 1906; 4 pp.) Details of an ideal system of mining a monster vein of coal, with special reference to economy, safety and simplicity. 20c.

COPPER

1463—ALASKA—Ketchikan, Southeast Alaska. (B. C. Mg. Rec., Sept., 1906.) Contains a brief description of the field with a list of producing mines. 20c.

1464—AMALGAMATION OF Copper Ore. A. H. Keller. (Mg. & Sci. Press, Oct. 20, 1906.) Description of the method used by the author for the treatment of copper-silver ore, which decreases the loss of silver. 20c.

1465—ARIZONA—A New Copper Region in the Pinal Mountains of Arizona. (L. A. Mg. Rev., Nov. 10, 1906.) Deals with the mines in the Pinal Mountains of Arizona, discussing the geology and occurrence of metals in this field. 20c.

1466—BRASS FOUNDRY—Cost Accounting in the Brass Foundry. D. C. Eggleston. (Iron Age, Nov. 15, 1906.) A description of methods for dealing with fixed charges, depreciation, insurance and taxes. Also classifies these various items under proper heads. 20c.

1467—BRASS WIRE—The Manufacture of Brass Wire. E. J. Bolton. (I. & C. Tr. Rev., Oct. 26, 1906.) Paper read before the Graduates' Section of the Brit. Institution of Mechan. Engrs. Describing the processes of casting, rolling, slitting, drawing, etc., besides dealing with the various dies used in England and America. 20c.

1468—COPPER SMELTING PLANTS, Depreciation of. E. P. Mathewson. (Eng. & Mg. Jl., Nov. 10, 1906.) Brief description of the items going to make up the equipment of a copper smelting plant, and the probable depreciation of such a plant; also editorial comment. 20c.

1469—ELECTRO-METALLURGICAL PROCESS—Procédé électro-métallurgique d'extraction du cuivre de ses minerais. J. Jumeau. (Echo des Mines, Oct. 29, 1906, and Mg. Jl., Nov. 10, 1906.) Account of a new electro-metallurgical process for the extraction of copper from ores, in which the copper is dissolved by an ammoniacal solution. 20c.

1470—IDAHO—The Priest Lake Mining District, Idaho. Wm. M. Courtis. (Eng. & Mg. Jl., Nov. 10, 1906.) Description of the geology of the district above-mentioned, and of the ores, together with information regarding the value of the metallic contents. 20c.

1471—LAKE SUPERIOR—Ore Breaking at Lake Superior. W. R. Crane. (Eng. & Mg. Jl., Oct. 27, 1906; 3 pp.) A description of the methods employed in the different copper mines, describing the size and arrangement of pillars and giving descriptive views of different stoping operations. 20c.

1472—LAKE SUPERIOR—The Calumet and Hecla Company's Properties. A. L. Carnahan. (Mg. Wld., Oct. 27 and Nov. 10, 1906; 4½ pp.) Continuation of article previously indexed, giving a description of the stamp mills and smelters at the Calumet and Hecla Company's plants at Lake Linden and Hubbell, Mich. Contains photographs and drawings. 40c.

1473—NEVADA—Copper Mining in Nevada. M. L. Requa. (Mg. & Sci. Press, Nov. 3, 1906.) Abstract from an address by the author, being a general review of copper mining in the West, with special reference to Nevada. 20c.

1474—NONESUCH SANDSTONE—G. W. Corey. (Eng. & Mg. Jl., Oct. 27, 1906.) Deals with this variety of sandstone with reference to its copper-bearing qualities. 20c.

1475—POWER PLANT at the Eustis Mine, Quebec. C. T. Rice. (Eng. & Mg.

Jl., Nov. 10, 1906.) Brief description of the hydro-electric power plant in use at this mine. 20c.

1476—SMELTING—The Wallaroo Smelting Works. T. C. Cloud. (Instn. of Mg. & Metallurgy, Bull. No. 26, Nov. 8, 1906; 15½ pp.) Deals with the methods used at this plant, gives the composition of the ore received, of the slag produced, and the chief constituents of the matte.

1477—TASMANIA—Stand der Betriehe der Mount Lyell Mining and Railway Company, Ltd., am Schlusse des Jahres, 1905. Robert Sticht. (Metallurgie, Oct. 22, 1906; 9 pp.) Continuation of article previously indexed, giving in this instalment a very full and authoritative description of the mines and smelting works of the above company. 40c.

1478—TASMANIA—The Mount Lyell Mining and Ry. Co., Ltd. R. Sticht. (Annual Report of Zeehan Sch. of Mines, 1905; 27½ pp.) Describes the geology of the district, the equipment of the mines and methods of working; also deals with the reduction works, smelting plant, converter plant and railway department of the company.

1479—VIRGINIA—The Copper Deposits of Virginia. T. L. Watson. (Eng. & Mg. Jl., Nov. 3, 1906; 2½ pp.) Description of the geology of the Piedmont, Blue Ridge, Southwest Virginia and Triassic area regions in Virginia, with information regarding the character and occurrence of the ores, and notes on past production. 20c.

CORUNDUM

1480—CORUNDUM—Occurrence and Uses of Corundum. (Bull., Imperial Institute, Vol. IV., Nov. 3, 1906; 6 pp.) The article describes the properties of the mineral, and its occurrence. Gem corundum and the various other forms of the mineral are described. 40c.

GOLD AND SILVER

1481—AMMONIA-COPPER-CYANIDE PROCESS. (Instn. of Mg. & Met., Bull. No. 26, Nov. 8, 1906; 4½ pp.) Author's reply to the discussion on his paper of the above title, which was read before the Institution.

1482—ANTIMONIAL SILVER ORE—Dyscrasite or Antimonial Silver Ore in the Cascades in Washington. J. B. Adair. (N. W. Mg. Jl., October, 1906.) Discusses the production from the various mines and deals with the value and use of the ore. 20c.

1483—ASSAY of Antimonial Gold Ores. W. Kitto. (Instn. of Mg. & Metallurgy, Bull. No. 26, Nov. 8, 1906; 4½ pp.) Discusses the various methods that have been used.

1484—ASSAYING—Routine Assaying on the Rand. A. Whitby. (Jl. Chem., Met. & Mg. Soc'y of So. Afr., August, 1906; 2½ pp.) Reply by the author to the discussion of his paper on the above subject, which was read in March, 1906. 60c.

1485—AURIFEROUS BLACK SANDS—Treatment of Auriferous Black Sands. (N. Z. Mines Rec., Aug. 16, 1906; 3½ pp.) A detailed description of the operations in New Zealand, including the results of experiments in Otago and Southland. 40c.

1486—AURIFEROUS ROCKS of India, Western Australia and South Africa. M. Maclaren. (Instn. of Mg. & Met., Bull. No. 26, Nov. 8, 1906; 14 pp.) Discussion of the paper of the above title, which was previously read before the Institution.

1487—BRITISH COLUMBIA—The La Plata Mine. A. W. Dyer. (Can. Mg. Rev., November, 1906.) An interesting description of this peculiar mine which is located near the foot of a glacier. The methods used in milling and concentrating are dealt with. 40c.

1488—BRITISH COLUMBIA—The Unuk River Mining Region of British Columbia. F. E. Wright. (B. C. Mg. Rec., September, 1906; 4½ pp.) Extract from Summary Report of the Geological Survey of Canada for the Year, 1905, consisting of a discussion of the geography, geology and mineral deposits. 40c.

1489—CHINA—Gold Mining at Wel-Hal-Wel, China. W. Denham Verschoyle. (Eng. & Mg. Jl., Nov. 17, 1906; 2½ pp.) Illustrated description of the geology of the district, character of the ore, and the mining and milling methods, together with data of costs. 20c.

1490—COBALT—A Silver Vein Under Clear Lake, Cobalt. J. J. Bell. (Eng. & Mg. Jl., Nov. 3, 1906.) Description of the exploration by the diamond drill under Clear Lake in the Cobalt district, Ont., and mention of the work that has been done on the property. 20c.

1491—COBALT, Canada's Wonderful Silver Camp. F. J. Frank. (Mines & Minerals, Nov. 1906; 2½ pp.) A review of the geological features of the region, with a description of the method of hydraulic prospecting and a number of facts dealing with present conditions. 40c.

1492—COBALT, Ontario, Mining Craze. J. A. Macdonald. (Eng. News, Nov. 1, 1906.) Brief remarks concerning the present activity in booming mining stocks and the Cobalt region in particular. The permanency of the camp and other features are spoken of. 20c.

1493—COLORADO—Mills and Milling Practices at Aspen, Colorado. (Mg. Rep., Oct. 25, 1906.) Gives description of several mills in this district and their method of operation. 20c.

1494—COLORADO—The Gunnison Gold Belt of Colorado. A. Lakes. (Mg. Wld., Nov. 10, 1906.) Description of the geology of this district with an account of the Vulcan and Mammoth Chimney mines. 20c.

1495—CYANIDATION—Sand Sampling in Cyanide Works. D. Simpson. (Instn. of Mg. & Met. Bull. No. 26, Nov. 8, 1906; 4 pp.) Discussion by various members of the Institution of the above mentioned paper which was previously indexed.

1496—CYANIDATION VS. CHLORINATION. W. E. Greenawalt. (Mg. & Sci. Press, Oct. 27, 1906.) The author discusses the increase in chlorination in the Cripple Creek district and compares this method with cyanidation. 20c.

1497—CYANIDE POISONING. H. L. Brown. (Eng. & Mg. Jl., Nov. 3, 1906.) Gives notes on cyanide poisoning, describing the poisoning of cattle and method for detecting same. 20c.

1498—CYANIDE PROCESS—Progress in Cyanide Process. (Ores and Metals, Nov. 15, 1906.) Paper read before the Amer. Mining Congress, October, 1906, being a resume of the changes that have taken place in the treatment of ores by cyanidation within recent times, including the displacement of zinc shavings, the use of the filter press in Australia, the use of the Moore filter and improved practice at the Homestake mill. 20c.

1499—FILTER PRESS—Notes on the Use of the Filter Press for Clarifying Solutions. S. J. Truscott and A. Yates. (Jl. Chem., Met. & Mg. Soc'y of So. Afr., Aug. and Sept., 1906.) Discussion of the above paper which was read at the July, 1906 meeting of the Society. \$1.00.

1500—GEOLOGICAL DISTRIBUTION of Gold. T. A. Rickard. (Mg. & Sci. Press, Oct. 20, 1906; 3½ pp.) Paper read before the American Mg. Congress, October, 1906, discussing the geology of the principal gold-producing districts of the world. 20c.

1501—GOLD DREDGE—A New American Gold Dredge. (Eng. News, Nov. 1, 1906.) A brief history of dredgers heretofore used, accompanied by a number of cuts and a description of a dredge recently built. 20c.

1502—GOLD DREDGING. D'Arcy Weatherbe. (Mg. & Sci. Press, Nov. 3, 1906.) Discussion of an article by J. H. Curle, previously published, the author undertaking to answer seven specific questions asked by Mr. Curle. 20c.

1503—GOLD DREDGING—The Weaver Dredging System for the Recovery of Fine Gold. (Mg. Rep., Nov. 1, 1906.) Detailed description of a dredge used on the Snake River, Idaho, for the recovery of fine or flour gold. 20c.

1504—GOLD DREDGING—Up-to-date Electric Gold Dredging. F. C. Perkins. (Mg. Jl., Nov. 3, 1906.) Description of the operations of several gold dredges in use in Idaho, Oregon and California, giving the dimensions, capacity and power required to operate, costs, etc. 20c.

1505—GOLD IN SEA WATER—Ueber den Goldgehalt des Meerwassers. A. Wiesler. (Zeit. f. ange. Chemie, Oct. 26, 1906.) A summary of the published investigations on the percentage of gold contained in sea water and the methods proposed for its commercial extraction. 40c.

1506—GOLD WASHING in the South. E. B. Wilson. (Eng. & Mg. Jl., Nov. 17, 1906.) Deals with the crude methods that are used and have proved successful where other modern and more expensive outfits would have failed. 20c.

1507—HUNGARY—Die Goldgruben von Karacs-Czebe in Ungarn. K. von Papp. (Zeit. f. prak. Geologie, Oct., 1906; 13 pp.) An interesting geological discussion of a gold producing district in Hungary. 40c.

1508—HYDRAULIC MINING—A Device for Regulating the Discharge of Water from a Reservoir. P. Bouery. (Paper read before the American Inst. Mg. Engrs., July,

- 1906.) Illustrated description of a device to regulate the supply of water from a reservoir, especially useful in hydraulic mining.
- 1509—HYDRAULIC MINING as a Business. D. H. Stovall. (Ores & Metals, Nov. 15, 1906.) A discussion of the cost and other conditions affecting hydraulic mining as a profitable business, the author being of the opinion that this class of mining offers good margins of profit with comparatively low risks, as ground can be sampled and cost of handling closely estimated in advance. 20c.
- 1510—HYDRAULIC MINING—Recent Practice in Hydraulic-Fill Dam Construction. J. D. Schuyler. (Proc. Amer. Soc'y of Civil Engrs., Oct., 1906; 57 pp. 29 plates.) The selection of a proper location; the building of the foundations; and the method of constructing the dam impervious to water are briefly described. Methods of repairing and enlarging, as well as hydraulic sluicing, are also dealt with.
- 1511—HYDRAULIC MINING—The Rehabilitation of Hydraulic Mining. J. P. Hutehins. (Eng. & Mg. Jl., Nov. 10 and 17, 1906; 6 pp.) Account of the steps now in progress to restore California's gold washing industry to its former importance, without interfering with agriculture. Illustrated. 20c.
- 1512—INDICATORS. T. S. Hart. (Barrat School of Mines Students' Magazine, Vol. IX, No. 3, 1906; 2½ pp.) The article is unique in that it deals with the relation between surface indications and important underground deposits.
- 1513—MEXICO—The Cerro Colorado Gold Mines of Mexico. (S. L. Mg. Rev., Nov. 15, 1906.) Brief description of the geology of these mines, which are situated in western Sonora, with an account of the development work done. 20c.
- 1514—MEXICO—Three Weeks in Mexico. Pachuca—Its Early History. T. A. Rickard. (Mg. & Sel. Press, Nov. 3 and 10, 1906; 4½ pp.) Continuation of the description of the author's travels in Mexico, this instalment dealing with the early history of Pachuca, and pumping methods used in the mines at that place. 40c.
- 1515—MINE AIR—Witwatersrand Mine Air: Recent Investigations. J. Moir. (Jl. Chem., Met. & Mg. Soc'y of South Africa, September, 1906; 6 pp.) Deals with the results secured from the analysis of mine air in several deep-level mines. 60c.
- 1516—MINING COSTS—Rand and Rhodesia: A Contrast in Working Costs. F. White. (So. Afr. Mines, Sept. 29, 1906.) Discussion of the costs of mining at the Wanderer mine of Rhodesia, as compared with other Rhodesian and Rand mines. 20c.
- 1517—NEVADA—The Bonnie Clare Mine. (L. A. Mg. Rev., Nov. 10, 1906.) Speaks of the development of this mine at Gold Mountain, Nev., giving some costs and a description of methods used. 20c.
- 1518—NEW ZEALAND—The First Gold Discoveries in New Zealand. R. A. Loughnan. (N. Z. Mines Rec., Aug. 16 and Sept. 17, 1906; 25 pp.) Continuation of article previously indexed, being historical notes on the discovery of gold in New Zealand. 60c.
- 1519—ORE REDUCTION PLANT and Process of Reduction on the Great Fingall Mine. Robt. Allen. (Monthly Jl., Chamber of Mines of W. Australia, Sept. 30, 1906; 16 pp.) The various steps in the reduction of ores at the above mine are described, including crushing, transportation, milling, classification, concentration, roasting, sliming, precipitation, etc., with data of costs and diagrams. 80c.
- 1520—PLACER MINING and Vein Mining. J. P. Hutehins. (Eng. & Mg. Jl., Nov. 10, 1906.) Discussion of the skill, experience and judgment required in placer and vein mining. 20c.
- 1521—PROSPECTING Dredging Ground. D'Arcy Weatherbe. (Mg. & Sel. Press, Oct. 20, 1906; 2½ pp.) Description of methods used in prospecting dredging ground, containing a number of points to be considered. Illustrated by photographs and describing some "salting" methods. 20c.
- 1522—QUEENSLAND—Mount Langan, Upper Brisbane Valley. L. C. Ball. (Queens. Gov. Mg. Jl., Sept. 15, 1906; 3 pp.) Describes the gold, silver and blismuth prospecting areas with their location, accessibility and topography. 60c.
- 1523—QUEENSLAND—The Highland Mary Reef and Bennion's Mine, Croydon. B. Dunstan. (Queens. Gov. Mg. Jl., Sept. 15, 1906.) Describes the operations at this mine, and is accompanied by a sketch showing old leases, position of bore-holes, and sites of existing and proposed shafts. 60c.
- 1524—RAND—Progress on Mines of the Consolidated Gold Fields of South Africa. (So. Afr. Mines, Oct. 6, 1906.) An economical review of the production of gold in the mines of the above company for the last six months, with data of costs and profits. 20c.
- 1525—RAND METALLURGICAL PRACTICE and Recent Innovations. G. A. and H. S. Denny. (So. Afr. Assn. of Engrs., Sept., 1906; 4½ pp.) Discussion by W. Dowling, of the above paper, which was previously mentioned in the Index. 80c.
- 1526—RECOVERY OF GOLD—Treatment of the Precipitate and Manipulation of the Tilting Furnaces at the Redjang-Lebong Mine, Sumatra. S. J. Truscott. (Instn. of Mg. & Met., Bull. No. 26, Nov. 8, 1906; 4 pp.) Discussion by several members of the Institution of the above paper which was read previously by S. J. Truscott.
- 1527—SAMPLING—Some Tailing Samplers. R. Gilman Brown. (Mg. & Sel. Press, Nov. 3, 1906.) Illustrated description of a mechanical sampler for tailings and method of operating. 20c.
- 1528—SOUTH DAKOTA—Cheap Mining and Milling in South Dakota. E. J. Kennedy. (Mg. & Sel. Press, Nov. 3, 1906.) Brief description of the various steps in the ore treatment at the Golden West mine, Rochford, S. D. 20c.
- 1529—STAMP MILL—Position of Amalgamating Plates in the Stamp Mill. C. G. Dennis. (Mg. & Sel. Press, Nov. 10, 1906.) Brief description of a practical installation. 20c.
- 1530—STAMP MILLS—Masonry Foundations for Mortars of Stamp Mills. A. B. Foote. (Eng. & Mg. Jl., Nov. 10, 1906.) Mentions some of the causes for failure in the foundations for stamp mill mortars, and the proper steps to be taken to prevent these faults. 20c.
- 1531—STEAM SHOVEL in Atlin, B. C. R. W. Young. (B. C. Mg. Ex., Oct. 1906.) Illustrated account of the operation of the steam shovel on the property of the Atlin Cons. Mining Co., at Tar Flats, Atlin. 20c.
- 1532—SUMATRA—Description of the Ancient Gold and Silver Mines of Salida, Sumatra. (Mg. Jl., Oct. 20, 1906.) An interesting history and description of the early operations of the Dutch East India Co. in Sumatra during the 17th Century. Tells of the difficulties of ancient working and the application of modern processes. 20c.
- 1533—TAVENER PROCESS. L. A. E. Swinney. (Instn. of Mg. & Met., Bull. No. 26, Nov. 8, 1906; 10½ pp.) A comprehensive description of a new method for smelting zinc-gold slimes, treating the operation from the drying of the gold slimes to the ultimate production of the gold bullion.
- 1534—TUBE MILL LINING. S. D. McMiken. (Mg. & Sel. Press, Nov. 3, 1906.) Discussion of the relative merits of tube mill linings, with a description of an improved iron liner, together with dimensions and data of costs. 20c.
- 1535—TUBE MILL PRACTICE. W. R. Dowling. (Jl. Chem., Met. & Mg. Soc'y of So. Afr., Aug. and Sept., 1906; 3 pp.) Discussion of the above paper which was read before the Society at the April meeting, 1906. \$1.00.
- 1536—TUBE MILLS—The Computation of the Crushing Efficiency of Tube Mills. S. H. Pearce and W. A. Caidecott. (Jl. Chem., Met. & Mg. Soc'y of So. Africa, Sept., 1906.) Especially considers the amount of useful work performed by the tube mill and gives a detailed description of the methods used, with additional tables, formulas, etc.
- 1537—WYOMING—The Present Status of Wyoming Mining. H. C. Beeler. (Mg. Rep., Nov. 15, 1906.) Brief notes on present mining conditions in the State. 20c.

GRAPHITE

1538—ARTIFICIAL GRAPHITE—Die Technische Gewinnung von Graphit und Amorphem Kohlenstoff. E. Donath. (Stahl u. Eisen, Oct. 15, 1906; 6 pp.) Outlines the method of making artificial graphite in the electric furnace, with a discussion of the chemistry involved. 40c.

IRON AND STEEL

1539—ACID-IRON WASTES—Stream Pollution by Acid-Iron Wastes. H. Stabler. (U. S. Geol. Surv., W. S. & I. Paper No. 186; 36 pp.) A report based on investigations made at Shelby, Ohio, describing experiments to determine the pollution of streams by waste pickle solutions from iron plants. Contains tables showing the effect of acid-iron waters upon sewage. Also gives a description of the recovery of coppers.

1540—BESSEMER PROCESS—Metallurgical Calculations. J. W. Richards.

(Electrochem. & Met. Ind., Nov., 1906; 5 pp.) Continuation of this series of articles, describing the bessemer process, giving several problems with a solution of each. Also treats of the proper use of blast pressure. 40c.

1541—BLAST FURNACE PRACTICE—Moderne Hochofen-Begleitungsanlagen. (Stahl u. Eisen, Nov. 1, 1906; 8 pp.) This paper is intended as an illustration of the latest German blast furnace practice, and describes and illustrates the new blast furnaces of the Hasper Eisen-und Stahlwerke, and also the furnace under construction at Aumentz-Friede for the Lothringer-Hüttenvereins. 40c.

1542—BLOWING ENGINE—Neue Stahlwerks-Gebälsemaschine. O. Simmersbach. (Stahl u. Eisen, Nov. 1, 1906.) Brief description, with a large plate showing elevations and sections, of a blowing engine for the Kölnischen Maschinen-bau-Aktien-Gesellschaft in Köln-Bayenthal, Germany. 40c.

1543—CAST IRON—The Control of the Chill in Cast Iron. (Iron Age, Nov. 15, 1906.) Describes the action of carbon in cast iron and speaks of the influence of silicon, phosphorus, manganese, and other elements, giving valuable practical tables. 20c.

1544—CASTINGS—Converter Steel Castings Practice. A. Simonson. (Fdy., Nov., 1906; 5½ pp.) Continuation of article previously indexed, giving a detailed account of the method of operating the Tropenas converter plant for making small steel castings. 20c.

1545—CASTINGS—Steel Castings in Locomotive and Car Construction. J. V. McAdam. (Sibley Jl. of Engineering, Nov., 1906; 6 pp.) Discusses the increasing use of steel castings in locomotive and car construction, and takes up the manufacture of castings, giving representative analyses and physical properties, etc. 40c.

1546—CUTTING OF STEEL by the Combustion Process. S. D. V. Burr. (Iron Age, Nov. 1, 1906.) Description of process for cutting steel by first heating the metal by an oxy-hydrogen flame, and then reducing the supply of hydrogen, causing the metal to oxidize locally. The apparatus employed is described, and data of the rate of cutting are given. 20c.

1547—EFFECT OF NITROGEN ON STEEL—L'Influence de l'Azote sur les Propriétés du Fer et de l'Acier. Remarques sur les Mémoires des Docteurs Braune et H. Thoiander. A. Pourcel. (Rev. univ. des Mines, Sept., 1906; 8 pp.) Discusses the various opinions on the manner in which nitrogen affects the properties of iron or steel.

1548—ELECTRIC FURNACE in the Production of Iron and Steel. (Jl. Elec., Power & Gas, Oct. 27, 1906; 5 pp.) The subject is dealt with in an interesting manner from the practical standpoint, and the results from proper and improper action are discussed. 20c.

1549—ELECTRIC FURNACE: Its Evolution, Theory and Practice. A. Stansfield. (Can. Engr., Nov., 1906; 3 pp.) Continuation of serial, previously indexed, dealing in this instalment with the production of iron and steel in the electric furnace. 20c.

1550—ELECTRICAL FURNACE METHODS of Iron and Steel Production. J. B. Kershaw. (Iron Tr. Rev., Nov. 1, 1906; 2½ pp.) Continuation of serial previously indexed, dealing in this instalment with the operation of the Stassano furnace, and results obtained with its use. Illustrated. 20c.

1551—FLUORSPAR ANALYSIS for Open-Hearth Steel Works. R. Bolling. (Iron Age, Nov. 8, 1906.) Description of the author's method for analysing fluor spar, together with characteristic analysis of a sample of English product. 20c.

1552—FOUNDRY MIXTURES—B. Stoughton. (Iron Tr. Rev., Nov. 15, 1906; 3½ pp.) Paper read before the Pittsburg Foundrymen's Assn., Nov. 5, 1906, treating of the principles governing mixtures for making different classes of castings, illustrated by numerous magnified sections of pig iron castings. 20c.

1553—GREAT BRITAIN IRON MINES—The Outer Barrier Hodbarrow Iron Mines, Milford, Cumberland. H. S. Bldwell. (Paper read before the Brit. Instn. of Civ. Engrs., March 20, 1906, and forming part of the Proceedings, Vol. CLXV.; 65 pp., 5 pls.) An extended and comprehensive review of the large iron mines operating in the county of Cumberland; the geology and methods of operation are treated.

1554—MECHANICAL EQUIPMENT FOR STEEL WORKS—Maschinelle Einrichtungen für das Eisenhüttenwesen. F. Frölich. (Zeit. des Vereines deutscher Ingenieure, Oct. 27, 1906; 7 pp.) Continuation of a

paper on the mechanical apparatus employed in iron and steel works. This instalment treats especially of mechanical charging apparatus for Siemens and Martins furnaces.

1555—METALLOGRAPHY—Metallographische Untersuchungen für das Giessereiwesen. E. Heyn. (Stahl u. Eisen, Nov. 1, 1906; 6 pp.) Paper read before the Assn. of German Fdymen. describing recent studies in foundry iron and foundry mixtures by the metallographic method. 40c.

1556—MINNESOTA—Mines of the Eastern Mesabi. (Iron Tr. Rev., Nov. 8, 1906.) Description of the equipment and development of some of the mines on the East Mesabi range. 20c.

1557—MINNESOTA—The Iron Mines at Biwabik, Minn. (Iron Tr. Rev., Nov. 1, 1906.) These mines located on the Mesabi range are described in detail, including method of mining, and development work. 20c.

1558—NEW YORK—Magnetite Mines at Lyon Mountain, N. Y. D. H. Newland and N. V. Hansell. (Eng. & Mg. Jl., Nov. 10 and 17, 1906; 4½ pp.) A detailed description of the geology, mining and surface equipment at the Lyon Mountain mines; also treats of the milling operations, and describes the Ball and Norton double-drum magnetic separator, which is used. 20c.

1559—NICKEL AND CARBON IN STEEL—The Influence of Nickel and Carbon on Iron. G. B. Waterhouse. (Electrochem. & Met. Ind., Nov., 1906.) A help to the study of the ternary alloys of iron, carbon, and other metals by considering a series of steels of constant nickel with varying carbon percentages. 40c.

1560—OPEN-HEARTH FURNACES—Ueber heizbare Rohelisenmischer. O. Simmerschach. (Stahl u. Eisen, Oct. 15, 1906; 6 pp.) Describes and illustrates types of tilting open-hearth furnaces, mixers and converters. 40c.

1561—OPEN-HEARTH STEEL CASTINGS—W. M. Carr. (Iron Tr. Rev., Nov. 8, 1906.) Continuation of serial previously indexed, dealing in this instalment with the cause and prevention of cracks in steel castings. 20c.

1562—PIG IRON—Grading Pig Iron for the Foundry. F. Munnoch. (Iron Tr. Rev., Oct. 25, 1906; 2½ pp.) Paper read before the Brit. Fdymen's Assn., Aug., 1906, dealing with the composition and grading of the different classes of castings, while the silicon content in the iron is especially treated. 20c.

1563—ROLLING BAR IRON—Neues Verfahren zum Walzen von Rundelisen aus Führung. W. Tafel. (Stahl u. Eisen, Oct. 15, 1906; 6½ pp.) Describes recent practice in rolling bar iron. 40c.

1564—SPECIAL STEELS for Motor-Car Construction. (Iron & Coal Tr. Rev., Oct. 26, 1906.) Deals with the composition of the various steels used in car construction. Also shows how the various ingredients affect lightness, durability, etc.

1565—STEEL PLANT—Additions to the Joliet Plant of the Illinois Steel Co. (Iron Trade Review, Nov. 15, 1906 and Iron Age, Nov. 15, 1906; 6½ pp.) This is a fully illustrated description of the additions and improvements now being made at the Joliet plant of the Illinois Steel Co. These additions comprise a blast furnace with capacity of 500 tons daily, a nut and bolt mill and a plant for making rail joints. 20c.

1566—TOOL STEEL—The Manufacture of Tool Steel. E. T. Clarage. (Amer. Machinist, Nov. 1, 1906; 3 pp.) A comparison of various steels, early and modern, used in making tools, with a reference to high-speed steels. 20c.

1567—VANADIUM STEELS—Der Einfluss des Vanadiums auf Eisen und Stahl. P. Pütz. (Metallurgie, Oct. 22, 1906; 9 pp.) Continuation of article previously indexed, treating on the effect of vanadium on the properties of iron and steel; accompanied by many tables and tests and experimental results. 40c.

LEAD

1568—MISSOURI—Mining and Milling at Fredericktown, Missouri. R. B. Brinsmade. (Mines & Minerals, Nov., 1906; 2½ pp.) Describes the methods of stoping in clay ores and the transportation, crushing, jigging, etc. 40c.

1569—ROASTING—The Pot-Roasting of Ore. L. S. Austin. (Mg. & Sci. Press, Oct. 27, 1906.) A description of a preliminary roasting process, giving the various steps, the advantages and an illustration showing the construction of the furnace. 20c.

1570—TASMANIA—Silver-Lead Smelting on the West Coast of Tasmania. T. Kapp. (Annual Report of Sch. of Mines of Zeehan,

Tasmania for 1905; 6½ pp.) Description of the smelting operations of the Tasmanian Smelting Co. on the West Coast of Tasmania.

NICKEL

1571—CANADA—The Atik-Okan Nickeliferous Pyrrhotite Deposits and Their Origin. F. Hille. (Jl. Can. Mg. Inst., Part of Vol. IX.; advance copy; 17 pp.) Gives an exhaustive review of the geology of the field, and is accompanied by a geological map showing the Atik-Okan river region.

1572—NICKELIFEROUS PYRRHOTITES—Microscopic Examination of Nickeliferous Pyrrhotites. W. Campbell and C. W. Knight. (Eng. & Mg. Jl., Nov. 17, 1906; 3 pp.) Results of a study of a much discussed question in ore deposition, accompanied by original illustrations. 20c.

PETROLEUM

1573—COMPRESSED AIR—The Use of Compressed Air at the Baku Oil Fields. (Pet. Rev., Oct. 27, 1906.) Discussion of the advantages arising from the use of compressed air in connection with oil wells. 20c.

1574—LIQUID FUEL CONFERENCE at St. Petersburg. (Pet. Rev., Nov. 10, 1906; 3 pp.) A lengthy discussion dealing with the petroleum industry in Russia. 40c.

1575—PETROLEUM—The Primary and Secondary Deposits of Petroleum Occurrences. H. Hoefler. (Pet. Review, Oct. 27, 1906.) Discussion of the origin and geological conditions affecting the occurrence of petroleum. Illustrated by diagrams. 20c.

PHOSPHATE ROCK

1576—NEW ZEALAND—The Clarendon Rock Phosphate Deposit near Milton, Otago. A. Andrew. (Trans. Australasian Inst. Mg. Engrs., Vol. XI., 1906.) Deals with a new district that is fast becoming famous. Tells of the origin of the rock phosphate, and the geology of the deposits, also the method of mining and subsequent treatment of the product. 40c.

1577—PHOSPHORIC ACID—Recherche des Phosphates Naturels dans les scories de déphosphoration. (La Metallurgie, Paris, Oct. 31, 1906.) A discussion of the valuation of phosphoric acid in furnace slags employed as fertilizer; also in natural phosphates, together with a method for the determination. 40c.

PLATINUM

1578—PRODUCTION OF Platinum in 1905. F. W. Horton. (Extract from Mineral Resources of the U. S., Calendar Year 1905; 16 pp.) Gives the occurrence, physical properties, methods of extraction and data dealing with imports and production.

POTASH

1579—GERMANY—The Stassfurt Salt Industry. W. C. Blasdale. (Cal. Jl. of Technology, Nov., 1906; 5 pp.) Is an exhaustive treatise dealing with the production of salt, describing the important works in Northern Germany. 20c.

1580—POTASH—Die Explosion auf dem Kallwerk der Gewerkschaft Desdemona im Leinetal, Bergrevier Hannover. Wigand. (Zeit. f. Berg-Hütten u. Salinenwesen, Jahrgang, 1906, Band 54, 4 heft; 13 pp.) An elaborate discussion, illuminated by many geological notes and plates, of a gas explosion which occurred at a potash mine at Elme in Hannover, Germany, in 1906, whereby 12 men were killed. Contains much valuable information as to the German potash industry.

PRECIOUS STONES

1581—BRAZIL—Ueber die Diamantlager im Westen des Staates Minas Geraes und der angrenzenden Staaten Sao Paulo und Goyaz, Brasilien. E. Hussak. (Zeit. f. prak. Geologie, Oct., 1906; 14½ pp.) An elaborate account of the topography, general geological conditions and the occurrence of diamonds in certain states of Brazil, illustrated by a valuable map and some photographs and geological profiles. 40c.

PYRITES

1582—MASSACHUSETTS—Davis Pyrites Mine, Massachusetts. J. J. Rutledge. (Eng. & Mg. Jl., Oct. 27, 1906; 3 pp.) Conclusion of article previously indexed, dealing with the methods of milling, shipping, and general operation, giving detailed plates showing sectional views of the Hartz jigs. 20c.

QUICKSILVER

1583—REDUCTION of Quicksilver Ore. F. J. Booth. (Mg. & Sci. Press, Nov. 10, 1906.) Discusses the various steps necessary in the operation, and is illustrated with comprehensive diagrams. 20c.

RARE METALS

1584—VANADIFEROUS SANDSTONE—Die Verarbeitng eines Vanadin führenden Sandsteines auf Ferro-vanadin durch die Vanadium Alloys Co. in Newmire, Colorado. (Metallurgie, Oct. 22, 1906; 3 pp.) Describes the vanadiferous sandstone of Colorado, and the method of extracting vanadium from the same and the preparation of ferro-vanadium by the Vanadium Alloys Co., at Newmire, Col. Gives much valuable information as to the metallurgy of this rare metal and the market for it. 40c.

SODIUM

1585—SODIUM—The Extraction of Metallic Sodium. C. F. Carrier, Jr. (Electrochem. & Met. Ind., Nov., 1906; 4½ pp.) Gives a scheme of classification, and describes several chemical and electro-thermic processes. 40c.

1586—SODIUM AS CONDUCTOR OF ELECTRICITY—The Use of Sodium as Conductor in Place of Copper. A. G. Betts. (Elec. Wld., Nov. 10, 1906.) The enormous cost of copper for electrical purposes makes a discussion of some possible substitute, both interesting and timely. 20c.

STONE

1587—GERMANY—Die Wirtschaftliche Bedeutung der Kalk- und Marmorindustrie an der Lahn, ihre ungünstige Lage und die Massnahmen zu ihrer Hebung. Boehm. (Zeit. f. Berg-Hütten u. Salinenwesen, Jahrgang 5, 1906, Band 54, 4 heft; 62½ pp.) An important monograph on the lime and marble industries in the Lahn district of Germany.

1588—STRENGTH OF STONE as Affected by Different Methods of Quarrying. F. W. Hoyt. (Eng. News, Nov. 1, 1906.) The author treats the subject in a manner interesting to those engaged in the use of stone in modern construction work. The methods of quarrying as well as schemes for testing are treated at length. 20c.

TIN

1589—MALAY STATES—Geology and Treatment of Tin in the Malay Fields. R. Stokes. (Mg. Wld., Nov. 10, 1906.) Fourth instalment of this article which describes the tin deposits in the Perak district and methods of mining employed. 20c.

1590—SMELTING—Brief Account of the Process of Smelting Tin Ore at the Mount Bischoff Works, Launceston, Tasmania. J. D. Milten. (Annual Report of School of Mines of Zeehan, Tasmania for 1905.)

1591—SOUTH AFRICA—Tin Mining Prospects in South Africa. (So. Afr. Mines, Oct. 13, 1906.) Brief description of recent developments in tin mining in the four producing districts of South Africa. 20c.

1592—SOUTH DAKOTA—Tin in the Black Hills, South Dakota. F. R. Carpenter. (Mg. Wld., Nov. 17, 1906.) The interesting mining district located in the Black Hills of South Dakota is discussed from a geological standpoint. A sketch showing the formation of the tin deposits in the district is included. 20c.

1593—TASMANIA—The Mount Bischoff Tin Mining Company, Registered. H. W. F. Kayser. (Annual Report of Sch. of Mines of Zeehan, Tasmania for 1905; 4 pp.) Brief illustrated description of the operations of the above company, including methods of mining and milling adopted, and notes on the geology of the district.

TUNGSTEN

1594—TUNGSTIC ACID—Extraction of Tungstic Acid from Ores. G. Gin. (Mg. Jl., Nov. 10, 1906.) Translation of article in *L'Industria*, Oct. 14, 1906, giving methods for the disaggregation of tungsten ores. 20c.

ZINC

1595—BRITISH COLUMBIA—Kootenay Ore Co.'s Sampling and Zinc Separating Works at Kaslo. (B. C. Mg. Rec., Sept., 1906.) The equipment of the plant is described in detail, and the method of treating the ore is also dealt with. 20c.

1596—DETERMINATION OF ZINC—The Ferrocyanide Method for the Determination of Zinc. W. H. Seamon. (Mg. Wld., Nov. 3, 1906.) A description of the conditions that influence the determination of zinc by the ferrocyanide method. Contains numerous tables and a great deal of detail. 20c.

1597—LITHOPONE—Fabrication de Lithopone stable a la lumiere. W. Ostwald. (Rev. des Produits Chim., Nov. 1, 1906.) Description of a process for the manufacture of lithopone which is unaffected by sunlight. 20c.

1598—WISCONSIN Zinc and Lead Field.

A. A. Hoskin. (Mg. Rep., Nov. 1, 1906.) Discussion as to the origin and geology of the zinc and lead fields of Wisconsin. 20c.

1599—ZINC AND LEAD SULPHIDE OF Broken Hill, Australia. W. Burrell. (Mines & Min., Nov., 1906.) Included in the article is a description of the Potter and other flotation processes of separation. Many unique features characteristic of this field are dealt with. 20c.

ECONOMIC GEOLOGY—GENERAL

1600—AFRICA—Geology of Togoland. (Bull., Imperial Inst., Vol. IV, No. 3, 1906; 3½ pp.) A geological discussion of a narrow strip of country 350 miles long by 150 miles broad, situated between French Dahomey and the British Gold Coast Territories. The author claims to have found iron ores of good quality. 40c.

1601—CHINA—La Géologie du Bassin Rouge de la Province du Se-Tchouan (China). E. G. Abendanon. (Rev. univ. des Mines, Sept., 1906; 51 pp.) Continuation of article previously indexed, outlining the geology and petrography of the Red river valley of China. \$1.00.

1602—CYPRUS—Minerals from Cyprus. (Bull., Imperial Institute, Vol. IV, No. 3, 1906; 4 pp.) A discussion of the minerals occurring on the above island giving mode of their occurrence. 40c.

1603—GENESIS OF ORE DEPOSITS—Thermal Activity in Its Relation to the Genesis of Certain Metalliferous Veins. Jas. Park. (N. Z. Mines Rec., Sept. 17, 1906; 2½ pp.) Continuation of article previously indexed, treating the subject of thermal activity with reference to its bearing on our mineral deposits. Practical examples are used to help establish the theories. 40c.

1604—ICELAND—The Geological Features of Iceland. L. P. Gratacap. (Mg. Wld., Nov., 17, 1906.) The peculiar geological formations in this volcanic country are dealt with in a comprehensive manner. Photographs and maps accompany the article. 20c.

1605—IGNEOUS ROCKS—Formation of Igneous Rocks. E. A. Ritter. (Ores & Metals, Nov. 15, 1906.) Discusses the part played by heat in modifications of the earth's crust, and the connection between eruptive activity and subsequent segregation of metalliferous deposits. 20c.

1606—IOWA—Notes on the Geological Section of Iowa. S. Calvin. (Jl. of Geology, Oct.-Nov., 1906; 7½ pp.) Description of the limestones, sandstones, shales, etc. through Iowa, illustrated by a geological cross-section. 60c.

1607—MAGNESIUM SILICATE—Minerals of the Composition MgSiO₃; A Case of Tetramorphism. E. T. Allen, F. E. Wright and J. K. Clement. (Amer. Jl. of Sci., Nov., 1906; 54 pp.) An exhaustive discussion of the crystallization, fusibility, chemical composition, the relation of different forms to one another, and general investigation into the physical and chemical properties of such minerals. Illustrated by cuts, diagrams and tables. 60c.

1608—MEXICO—Geologic and Geographic Aspects of Mexico. R. T. Hill. (Mg. Wld., Nov. 3 and 17, 1906.) Continuation of serial previously indexed, describing the Plateau province, which the author divides into six great districts, and proceeds to describe each in detail. 40c.

1609—MEXICO—Paleozoic Strata in Sonora. F. J. H. Merrill. (Eng. & Mg. Jl., Nov. 10, 1906.) Brief description of the limestone formations occurring in Mexico. 20c.

1610—MINERAL BELTS. T. F. Van Wagenan. (Mg. & Sci. Press, Oct. 27, 1906.) The author takes up the occurrence of ore in large belts, and points out how mineral wealth will extend through a great area in a definite direction. 20c.

1611—NEW HAMPSHIRE—Contributions to the Geology of New Hampshire; No. II. Petrography of the Belknap Mountains. L. V. Pirsson and H. S. Washington. (Amer. Jl. of Sci., Nov., 1906; 18½ pp.) A discussion of the geology and the various characteristics of the rocks of New Hampshire, giving chemical composition, classification, etc. 60c.

1612—ORE DEPOSITS—The Geological Investigation of Ore Bodies. John A. Reid. (Mg. & Sci. Press, Nov. 10, 1906.) A plea by the author for the better recognition of the value of geology in mine development. 20c.

1613—SOUTH AUSTRALIA—Northern Territory of South Australia, Northwestern District. Reports (Geological and General) Resulting from the Explorations made by the Government Geologist and Staff During 1905. (Adelaide, 1906; C. E. Bristow, Government Printer; 53 pp.) Describes the geology of this district, its mineral resources, and methods of mining.

1614—UNDERGROUND WATER—The Flow of Underground Water. W. R. B. Wiseman. (Paper read before the Brit. Instn. of Civil Engrs., and forming part of the Proceedings, Vol. CLXV; 46 pp.) An investigation of the relationship between the porosity of a rock and the flow of water through its interstices under various pressures.

1615—UNDERGROUND WATERS—The Genesis of Mineral Waters. E. A. Ritter. (Eng. & Mg. Jl., Nov. 10, 1906.) A summary of a paper by A. Gautier in Annales des Mines, discussing the theory of mineral waters, their origin and various conditions influencing them. The author also discusses the chemistry and gives various analyses of water and gases. 20c.

1616—VOLCANO—L'Eruption du Vésuve en Avril 1906. Première Partie: Les Epanchements de Lave et les Phénomènes Explosifs. A. Lacroix. (Rev. générale des Sciences, Oct. 30, 1906; 18 pp.) A full description, illustrated by many photographs, of the eruption of Vesuvius in April, 1906, discussing types of volcanic explosions in general and the phenomena observed in this particular eruption. 40c.

1617—YUKON TERRITORY—The Head Waters of White River, Yukon Territory. R. G. McConnell. (B. C. Mg. Rec., Sept., 1906; 3 pp.) Extract from Summary Report of the Geological Survey Department of Canada for 1905; the topography and economic geology of the White River district are briefly dealt with. 40c.

MINING—GENERAL

1618—ACCIDENTS—The Prevention of Mine Accidents. E. W. Parker. (Mg. Rep., Nov. 15, 1906.) Paper read before the American Mining Congress, Oct., 1906, on the causes of mine accidents, and pointing out the necessity for securing by legislative action or otherwise, greater safety to mine employes. 20c.

1619—AMERICAN INSTITUTE OF MINING ENGINEERS. R. W. Raymond. (Eng. & Mg. Jl., Oct. 27, 1906.) Paper presented to the American Mining Congress, Oct. 16, 1906, being a brief interesting history of the Institute since its early organization. 20c.

1620—BRITISH COLUMBIA—Mining in Alnsworth Camp, West Kootenay. (B. C. Mg. Rec., Sept., 1906; 2½ pp.) The various metal-bearing veins that extend through the field are treated by the author. 40c.

1621—BRITISH COLUMBIA—The Mining Outlook of British Columbia, Canada. A. Wheeler, Jr. (L. & Z. News, Oct. 22, 1906.) The developments in mining and metallurgy in British Columbia are discussed, and there are short descriptions of various companies operating in the province. 20c.

1622—DRILLING—Modern Diamond Drilling. R. M. Vaughan. (Ballarat School of Mines Students' Magazine, Vol. IX., No. 3, 1906; 7 pp.) The author first deals with the arrangement of a surface plant and concludes with a description of the operation of the machinery.

1623—EXPLOSIVES—Researches on Explosives. A. Nohle. (Roy. Soc. Trans., 1906, Series A, Vol. 206; pp. 453-480.) Shows the results of experiments with various explosives, gives their composition and discusses their action in the chamber of a gun. The article is also accompanied by analyses of the gases taken from the gun-chamber.

1624—GREAT BRITAIN—Mines and Quarries; General Report and Statistics for 1905. Part II.—Labor. (London, 1906; 56 pp.) General report and statistics relating to persons employed and accidents at mines and quarries in the United Kingdom, and to the enforcement of the mines and quarries acts. 40c.

1625—HOISTING—Neuerungen bei der Köpfehrderung. Dr. Faxmann. (Zelt. f. Berg, Hütten- u. Salinenwesen. Jahrgang 1906, Band 54, 4 heft; 2½ pp.) A brief account of the improvements made in the Koepe system of hoisting at the mine of the Burbach Company, near Beendorf, Prussia.

1626—KOREA—The New Korean Mining Law. (Mg. Jl., Oct. 27, 1906.) Translation of the new mining laws of Korea, set forth in 32 articles. 20c.

1627—LEASING SYSTEM OF MINING in the Slocan District. B. C. S. S. Fowler. (B. C. Mg. Rec., Sept., 1906.) Deals with present systems of leasing, and contains suggestions for perfecting present practice. 40c.

1628—MEXICO—Aboriginal Mining in

Mexico. F. J. H. Merrill. (Eng. & Mg. Jl., Nov. 3, 1906.) Notes on the early mining methods of the aborigines, and description of some of the implements used. 20c.

1629—MEXICO and Her Opportunities. W. Scarritt. (Cassier's Mag., Nov., 1906; 15 pp.) Treats generally of industrial and mining conditions and methods throughout the Republic. 40c.

1630—MEXICO—Notes on the Mining Situation in Mexico. E. Ordonez. (Mg. Wld., Oct. 27, 1906.) A description of the improvements in mining and metallurgy in Mexico, touching on the prominence which has been attained in past years. 20c.

1631—MEXICO—Three Weeks in Mexico. Concluding Notes on El Oro. T. A. Rickard. (Mg. & Sci. Press, Oct. 27, 1906; 3 pp.) A description of labor conditions and notes on general conditions in the El Oro district. 20c.

1632—MINE DRAINAGE—Electric Mine Drainage in Europe. (Elec. World, Nov. 17, 1906; 2½ pp.) The article describes the equipment of an electrically operated mine drainage plant in Switzerland. Several diagrams and sectional views of different pumps are included. The method of operation is also dealt with. 20c.

1633—MINE DRAINAGE—Tapping Water in Mines. H. A. Horstfall. (Eng. & Mg. Jl., Nov. 3, 1906.) A description of the method used by the author in unwatering a mine in Mexico, giving illustration of the apparatus used.

1634—MINE DRAINAGE DISTRICTS. D. W. Brunton. (Mg. Rep., Nov. 15, 1906.) Paper read before the Amer. Mg. Congress, October, 1906; the various problems encountered in drainage projects, including the cost of one long drainage tunnel, are dealt with. 20c.

1635—MINING EXAMINATIONS. J. T. Beard. (Mines & Min., Nov. 1906.) Discussion of the methods of conducting mine examinations and the various points entering into such work, with suggestions as to the use of standard text books for reference and help. 20c.

1636—MINING LAWS. W. S. Goodwin. (Can. Mg. Rev., Nov., 1906.) General suggestions and advice concerning the proper steps to take in developing and operating a Canadian mine. 40c.

1637—MINING LAWS—Amendments Admissible to State Laws Affecting Mining Operations. W. S. Snyder. (Mg. Rep., Oct. 25, 1906.) Paper read before the American Mining Congress, Oct., 1906, giving the author's suggestions relative to amending some of the mining laws, so as to make them more just to mining interests. 20c.

1638—PENSIONS FOR MINE EMPLOYEES—Ein Beitrag zum Kapitel der Pensions-Versicherungskassen für technische Grubenheame. Kegel. (Bergbau, Oct. 25, and Nov. 1, 1906.) Conclusion of article on a pensioning system for the technical employes of mines. 40c.

1639—REPORT BOOKS And Other Forms in Use in British Collieries and Metal Mines. (Coll. Guard., Nov. 2, 1906.) Conclusion of serial, previously indexed, dealing with the reports, records, etc. necessary or desirable in those mines which come within the scope of the Metalliferous Mines Regulation Acts of Great Britain. 20c.

1640—SAFETY MEASURES in Mining. D. Macaulay and L. G. Irvine. (Jl. Chem., Met. & Mg. Soc'y of So. Afr., Aug. and Sept., 1906; 13½ pp.) Discussion by various members of the Society of the above paper which was read at the April meeting, 1906. \$1.00.

1641—SANITATION IN MINES. B. W. Jones. (Mg. Wld., Nov. 17, 1906.) Brief abstract of paper read before the Lake Superior Mg. Inst., Aug., 1906, calling attention to the necessity for proper sanitary conditions in mines. 20c.

1642—SHAFT—The Best Shape for a Shaft. J. W. Nell. (Mg. & Sci. Press, Oct. 20, 1906.) The author discusses various shapes and sizes of shafts, giving the dimensions and other data. 20c.

1643—SHAFT SINKING—Ueber die Lagerungs- und Betriebsverhältnisse im Wurm- und Inderelvier. Stegemann. (Glückauf, Oct. 27 and Nov. 3, 1906; 12 pp.) Describes the course of shaft sinking and development in several mines at Morsbach, Germany. 80c.

1644—SURVEYING—Underground Surveying. B. Stevens. (Mg. & Sci. Press, Oct. 27, 1906.) The methods used in underground surveying are discussed, and a number of suggestions to facilitate the work are advanced by the author. 20c.

1645—TASMANIA—Mount Read, Rosebery, Mount Farrell and other Districts. H. W. Judd. (Annual Report of School of

Mines of Zeehan, Tasmania, for 1905; 12 pp.) Interesting description of the geology, ore deposits and the principal mines in the above districts of Tasmania, mainly tin.

1646—TASMANIA—The West Coast of Tasmania Mining Field. J. Craze. (Annual Report of Zeehan Sch. of Mines, 1905; 22 pp.) Notes on the history of this region, with description of its geological features and an account of the workings of the most important mines.

1647—TIMBERING at Lake Superior. W. R. Crane. (Eng. & Mg. J., Nov. 10, 1906; 2 pp.) A detailed illustrated description of the method of timbering employed at Lake Superior, including dimensions. 20c.

1648—TIMBERING—Economy in Mine Timbering. G. E. Wolcott. (Eng. & Mg. J., Nov. 17, 1906.) General discussion of a modern system of timbering, accompanied by an explanatory diagram. 20c.

1649—TIMBERING—Square-set Timbering at Bingham, Utah. C. T. Rice. (Eng. & Mg. J., Nov. 3, 1906.) Describes the methods of timbering employed in the mines of the Bingham district. Illustrated by drawings showing dimensions. 20c.

1650—VENTILATION—Ueber einen neuen Apparat zur Kontrolle der Grubenbetherung. Breyhahn. (Glückauf, Oct. 13, 1906; 5 pp.) Describes and illustrates an apparatus for automatically maintaining a specified condition of a mine ventilating current. 40c.

1651—VENTILATION OF TUNNELS. G. S. Rice and R. P. Bolton. (Proc., Amer. Soc'y of Civ. Engrs., Oct., 1906; 6 pp.) Discussion of paper by C. S. Churchill, previously indexed.

METALLURGY—GENERAL

1652—ACCOUNTING—Metallurgical Accounts. P. H. Argall. (Mg. & Sci. Press, Nov. 10, 1906; 3½ pp.) Suggests a practical method for the division of costs, and gives charts showing a most modern method of bookkeeping. 20c.

1653—ALLOYING—Solders, Novelty Metals and Miscellaneous Alloys. J. Buchanan. (Fdy., Nov., 1906; 6 pp.) Continuation of serial previously indexed, the present installment treating entirely of solders for various metals. 20c.

1654—ALLOYS—Bearing Alloys. A. Sugate. (Engineer, Lond., Oct. 26 and Nov. 2, 1906.) Describes the hardness of binary alloys, and takes up the subject of hard bronze bearings for machinery, malleable bronze, antimonial lead and various other alloys. 60c.

1655—ALLOYS—New Alloys. A. M. Fairlie. (Metal Industry, Sept., 1906.) Description of various alloys, classified according to their principal constituents, giving the commercial uses, composition and directions for making them. 20c.

1656—ALLOYS—A Study of Tin-Lead Alloys as Solders. J. W. & R. I. Caughey. (Iowa Engr., Sept., 1906.) The article contains a description of methods of making soldered joints. Also treats the tensile strength of such joints, and deals with the electrical resistance of solders. 20c.

1657—ALUNDUM, the New Abrasive. (Amer. Machinist, Nov. 8, 1906.) A description of alundum, the method of production, abrasive qualities, hardness and general properties. 20c.

1658—ARIZONA—Metallurgical Plants and Practices of Yavapai County, Arizona. (Mg. Rep., Nov. 1, 1906; 2½ pp.) The growth of the metallurgical industry of this county is briefly mentioned, and the present capacity of the smelting plants is shown and their methods are described. 20c.

1659—BARIUM AND CALCIUM CARBONATES—Behavior of Barium and Calcium Carbonates at High Temperatures. H. E. Boeke. (Zeit. anorg. Chemie, Vol. 50, 1906; pp. 244-248.) Discusses the action of barium carbonate in an open crucible, and the transformations that take place when heat is applied.

1660—CONDUCTIVITY of Oxides and Sulphides. J. Königsberger and O. Reichenheim. (Electrician, Nov. 2, 1906.) Abstract from *Physikalische Zeit.*, Aug. 15, 1906. The subject is treated in a highly technical manner, and deals with the absorption of long heat waves, and methods of overcoming the fusion point of the iron sulphide. 40c.

1661—DEPRECIATION OF PLANTS. R. W. Raymond. (Eng. & Mg. J., Nov. 17, 1906.) A general review of present conditions and practice. 20c.

1662—ECONOMIC MINERALS. (Chem. Engr., Oct., 1906; 6 pp.) Tabulated statement of the most important economic minerals, showing value of the metal, the principal ores in which they are found, the approximate composition and the various uses. 40c.

1663—ELECTROLYSIS—A Switchboard Attachment for Electrolysis. E. L. Larison. (Eng. & Mg. J., Nov. 17, 1906.) Treats the subject in a practical and general manner, accompanying the description by diagrams showing the wiring of the main switchboard and of the auxiliary switchboard. 20c.

1664—ELECTROMETALLURGY — Die Elektrometallurgie im Jahre 1905 und im ersten Halbjahr 1906. Franz Peters. (Glückauf, Oct. 27 and Nov. 3, 1906; 13 pp.) Continuation of the author's monograph on the progress in electrometallurgy, these instalments treating largely of the history of the development of resistance furnaces, and the construction and operation of electric induction furnaces. 80c.

1665—PROGRESS IN METALLURGY. A. E. Outerbridge, Jr. (Jl., Franklin Inst., Nov., 1906; 24½ pp.) A review of the numerous advances made in various branches of the science, with an instructive summary of the remarkable industrial results accomplished during the past year. 60c.

1666—REFINING—Verblasen Zink, Blei, Zinn und Kupfer enthaltender Metallabfälle, sogenannter Metallgiesserei-Rückstände. P. Schweitzke. (Metallurgie, Oct. 22, 1906; 2½ pp.) Treats of a method of refining metallurgical waste products by blowing with air in a converter. 40c.

1667—SMELTER FUMES—Recent Litigation Involving Questions of Damages from Smelter Fumes, Tailings Water and Tailings Debris. F. W. Traphagen. (Mg. Rep., Nov. 1, 1906.) Paper read before the American Mining Congress, Oct., 1906, reviewing the above subject. 20c.

MINING AND METALLURGICAL MACHINERY

1668—ACCIDENTS—Unfälle in elektrischen Betrieben der Bergwerke Preussens im Jahre 1905. (Zeit. f. Berg-, Hütten- u. Salinenwesen, Jahrgang 1906, Band 54, 4 heft; 9½ pp.) A report from official sources of the accidents in connection with electrical apparatus in the mines of Prussia in 1905.

1669—AIR COMPRESSOR—A High Duty Air Compressor. O. P. Hood. (Proceedings, Amer. Soc'y Mechan. Engrs., Nov., 1906; 25 pp.) A detailed treatise of the performance of air compressors, describing several large installations and accompanying the article with valuable tables. The compressor plant at the Champion mine, Michigan, is discussed at length.

1670—AIR COMPRESSOR—The Taylor Hydraulic Air Compressor at Ainsworth. (B. C. Mg. Rec., Sept., 1906; 3 pp.) Details of the water power plant on Coffee creek are given. The air-maker, the pipe-line and the effective work of the plant at the compressor are described. 40c.

1671—BOILER and Setting. An Improved Design for Use with Bituminous Coal. A. Bement. (Proceedings, Amer. Soc'y Mechan. Engrs., Nov., 1906; 10 pp.) Describes an improved design of boiler and setting for use with bituminous coal, giving special attention to the elimination of smoke and the full utilization of the boiler heating surface.

1672—BOILER EXPLOSION—The Fatal Boiler Explosion at Basset Mines, Redruth. (Engineering, Nov. 2, 1906.) A discussion by members of the Board of Trade of Redruth as to the cause of the above explosion. 20c.

1673—BOILER ROOM ECONOMY. E. L. Griggs. (Elec. Wid., Nov. 3, 1906.) Some suggestions for increasing the efficiency of boiler rooms by cutting down unnecessary losses, and giving suggestions for the care of boilers. 20c.

1674—BORE HOLE SURVEYING—Die Entwicklung der Stratometer. F. Freise. (Oest. Zeit. f. Berg-u. Hüttenw., Oct. 13 and 27, 1906; 10 pp.) Illustrated description of an apparatus to assist in the surveying of deep bore holes. \$1.00.

1675—CAGE—A Novel Double-Decked Man Cage. C. Trezona. (Mines & Minerals, Nov., 1906.) Illustrated description of a hoisting apparatus in use by the Oliver Iron Mining Co. at Ely, Minn., which serves the double purpose of hoisting men and raising and dumping ore automatically. 20c.

1676—CENTRIFUGAL PUMP—A Unique Centrifugal Mine Pump. F. C. Perkins. (Mg. Wid., Nov. 3, 1906.) A description of an electrically driven four-stage centrifugal pump used in Upper Silesia. 20c.

1677—COMPRESSED AIR Curves and Tables. L. L. Withard. (Compressed Air, Nov., 1906.) Mathematical discussion of the subject, accompanied by interesting formula and diagrams. 20c.

1678—CRUDE OIL BURNING—Ofenan-

lagen mit Naphtafeuerung. (Tonindustrie-Zeitung, Nov. 1, 1906.) A description and discussion of the methods of burning crude petroleum for the heating of industrial furnaces. 20c.

1679—DRILLS. Air-Drill Efficiency. E. C. Reybold, Jr. (Eng. & Mg. J., Oct. 27, 1906.) A continuation of the discussion now appearing in the Journal, with reference to the comparative efficiency of air and electric drills. 20c.

1680—DRILLS—Electric vs. Air Drills. H. F. Marriott. (Eng. & Mg. J., Nov. 10, 1906.) Continuation of the discussion as to the relative efficiency of electric and air drills. 20c.

1681—ELECTRIC MOTOR DRIVE. G. H. Schaeffer. (Amer. Machinist, Nov. 1, 1906.) Gives a short comparison between belt-driven and motor-driven machinery, and points out the advantages of the latter. 20c.

1682—ELECTRIC POWER—Adjuncts to the Power Load. C. J. Russell. (Elec. Age, Nov., 1906; 8 pp.) Describes modern methods for transforming electrical power into mechanical energy. The article also deals with electric welding and tempering, electric furnaces, and electrochemical processes. 40c.

1683—ELECTRIC POWER—The Necaxa—El Oro Plant. F. C. Perkins. (Mines & Minerals, Nov., 1906; 2½ pp.) Illustrated description of the equipment of the Necaxa plant of the Mexican Light & Power Co., which generates electric power by water-wheels under 1470 feet head, and transmits it 170 miles to operate the mines at El Oro. 40c.

1684—ELECTRIC POWER PLANT—The Necaxa Plant of the Mexican Light and Power Co. F. S. Pearson and F. O. Blackwell. (Proc. Amer. Soc'y of Civ. Engrs., Oct., 1906; 13 pp., 14 plates.) This interesting plant which generates the power for the mines at El Oro, is described in detail and the article is accompanied by exhaustive sketches and photographs.

1685—ELECTRIC TRACTION—Three-Phase Traction in the Simpon Tunnel. (Elec. Wid., Oct. 27, 1906; 2½ pp.) Describes in detail the equipment and operation of haulage in this great tunnel.

1686—ELECTRICITY in Mining. The Application of the Power. S. F. Walker. (Eng. Times, Nov. 1 and 8, 1906.) Treats in a technical manner the effect on motors when the load is increased or the speed changed, and gives various suggestions for the proper handling of electric motors. 40c.

1687—GAS ENGINE—Hydrogen in the Gas Engine. G. M. S. Tait. (Engineer, Nov. 15, 1906.) Various phenomena which take place when gas is used to generate power in a gas engine are discussed. 20c.

1688—GAS ENGINE EFFICIENCY. H. P. M'Elroy. (Engineer, Nov. 1, 1906.) Brief description of the efficiency of gas engines, with reference to the combustion of the mixed gases. 20c.

1689—GAS ENGINES—Progress and Experiences in the Construction of Large Gas Engines. H. Bonte. (Engineering, Nov. 2, 1906.) The governing of gas engines by quality and by quantity is taken up, the design of a large single-cylinder gas engine is described, and numerous drawings are shown. 20c.

1690—GAS POWER—The Evolution of Gas Power. F. E. Junge. (Proceedings, Amer. Soc'y of Mechan. Engrs., Nov., 1906; 32 pp.) Gives figures showing the wonderful growth of the use of gas as a power, and illustrates the author's reasoning by various diagrams showing working cycles of different engines.

1691—GAS PRODUCERS—Nouveaux Types de Gazogènes Aspirants. (Génie Civil, Oct. 27, 1906.) Description of some new types of gas producers recently introduced in France and Germany. 40c.

1692—LUBRICATION of Gas Engine Cylinders. W. H. Patton. (Engineer, Nov. 1, 1906.) A discussion relative to the care of gas engines, with regard to lubrication and the excessive use of oil. 20c.

1693—PETROL ENGINES—Apparatus for Ignition on Petrol Engines. D. S. Munro. (Pract. Engr., Oct. 19, 1906; 3 pp.) The problems of electric ignition for internal combustion are treated in a practical manner. Present practice is described and diagrams with a description of a new apparatus are contained.

1694—POWER AND EFFICIENCY TESTS—Some Suggestions for Carrying out Power and Efficiency Tests on the Mine. H. C. Behr. (Jl., Transvaal Institute of Mechan. Engrs., Oct., 1906; 12½ pp.) Suggestions to increase the efficiency and economy of plants, based on tests and experiments in the Witwatersrand district. 60c.

1695—PRODUCER GAS POWER PLANT. J. R. Bibbins. (Proceedings, Amer. Soc'y

of *Mechan. Engrs.*, Nov., 1906; 24½ pp.) An inquiry into the operation, efficiency and construction of a typical modern industrial plant.

1696—PUMPING ENGINES—Foundations for Pumping Engines. C. A. Hague. (*Cassier's Mag.*, Nov., 1906.) The description deals with the subject principally from an economic point of view, and embodies numerous suggestions for the practical and satisfactory construction of foundation settings for engines. The advantages and disadvantages of concrete foundations are discussed. 40c.

1697—PUMPING PLANTS—A Comparison of the First Cost and Cost of Operation of Pumping Plants Driven By Steam and Oil Engines. F. Head. (*Proceedings, Engrs. Club of Philadelphia*, Oct., 1906; 7 pp.) A brief discussion of the arrangement of pumping plants and comparative data relative to the cost of operation by steam and oil engines. Illustrated. 60c.

1698—PUMPING STATION—An English Electric Pumping Station. (*Jl., Elec., Power, and Gas*, Nov. 3, 1906; 2½ pp.) Illustrated description of the electrical equipment of an interesting pumping station recently installed at Blackhill, England, for the Cousett Iron Works to provide the plant with ample water supply. 20c.

1699—REPAIRS—Some Interesting Repairs to Machinery. J. H. Dodson. (*Jl., Transvaal Inst. of Mechan. Engrs.*, Oct., 1906; 12 pp.) Discussion of a paper on the above subject read by K. Schweder, discussing mathematically the strains and stressing of hoisting ropes. 60c.

1700—SKIP—The Lawrence-Oliver Skip. Frank Oliver. (*Eug. & Mg. Jl.*, Nov. 3, 1906.) Description of the skip in use at the Florence mine, Goldfield, Nevada, accompanied by drawings showing the construction. 20c.

1701—SKIPS—Safety Skips for Underlay Shafts. A. Montgomery. (*N. Z. Mines Rec.*, Aug. 16, 1906.) The article is taken up in describing a new self-dumping skip with safety catches, giving the location and the sizes of the various parts. 20c.

1702—SMOKE PREVENTION—The Suppression of Industrial Smoke, with Particular Reference to Steam Boilers. A. Bement. (Paper presented before the Western Soc'y of Engrs., Oct. 17.) Deals with the subject from a practical point of view and suggests improvements for overcoming the fault. 40c.

1703—SPRAYER—A Combined Air and Water Spray. B. H. Twaite. (*Instn. of Mg. & Met.*, Bull. No. 26, Nov. 8, 1906.) Further remarks on the subject, giving a brief illustrated description of an apparatus which is devised to remove the dust from boring or drilling operations in a mine, by sucking it away.

1704—STEAM TURBINE—Its Present Status and Future Development. A. H. Gibson. (*Cassier's Mag.*, Nov., 1906; 5½ pp.) A review of past practice, and a suggestion of the advantages to be derived from modern turbine construction. 40c.

1705—TESTING MACHINE FOR OILS, Bearings and Journals, Coopers Hill College. (*Engineering*, Nov. 2, 1906.) The machine described is built on new lines for testing oils and the friction of journals and bearings of different alloys. Contains illustrations and numerous diagrams showing the coefficients of friction for different kinds of journals. 20c.

1706—WATER-WHEEL—Pitman's High-Pressure Tangential Water-Wheel. P. Pitman. (*Mines & Minerals*, Nov., 1906.) Gives the dimensions and construction of the water-wheel, and deals with the method of operation. 20c.

INDUSTRIAL CHEMISTRY

1707—CALCIUM CARBIDE, ACETYLENE. (*Insurance Engineering*, Oct., 1906; 11½ pp.) Gives a historical review of the advance in the acetylene industry, and technically treats acetylene illumination and the apparatus in which it is used.

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