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THE GREENWATER COPPER DISTRICT, CALIFORNIA

An Outline of the Conditions Found to Exist in a Recent Tour of Observation

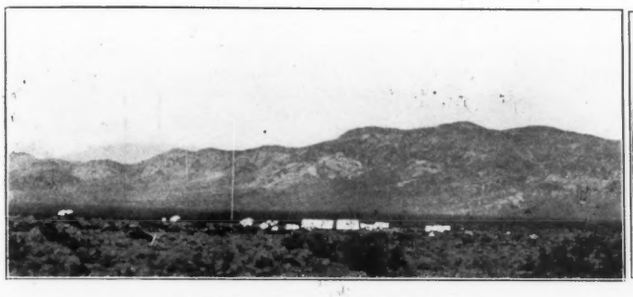
BY WILLIAM C. RALSTON*

On Oct. 7 I left Johnnie siding (now called Amargosa) on the railroad (elevation 2735 ft.) in a two-horse team with a friend and driver for the Greenwater district. Amargosa was then the passenger and freight terminus of the San Pedro, Los Angeles & Salt Lake Railroad. I could not get an automobile at Bullfrog or Goldfield, and therefore was obliged to take the slow way. We drove due south over the desert to Ash Meadows (elevation 2300 ft.) a distance of 12 miles, where we had dinner, and (more important) a bath in a small stream of 100 miners' inches, which has its source in two springs. The water is very good. After dinner we continued our trip 4½ miles farther to Kelly's well (elevation 2100 ft.), where we remained over night. There being no beds we slept on the ground. Having killed a side-winder snake within 30 ft. of the hay we slept in, our rest was somewhat uneasy.

On Oct. 8 we made an early start from Kelly's, driving nearly due west over the dry, hot plains. We soon crossed the line into the State of California, soon thereafter entered a cañon, where the going was very hard, it being sandy and a steady uphill pull for over six miles.

Long before we approached Ramsey, we could see monuments showing where locations had been made by the early arrivals.

We reached Ramsey (elevation 4315 ft.) at 3 p.m., and there found one of the neatest and cleanest lodging houses I have ever had the pleasure of patronizing in a mining camp. The floor was of wood and so was part of the sides, the top being of canvas.



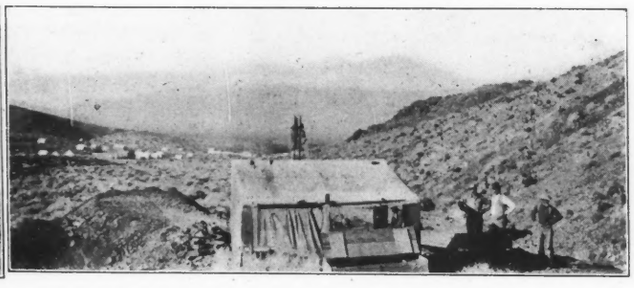
RAMSEY, GREENWATER DISTRICT

VIEW ACROSS AMARGOSA DESERT

PATSY CLARK SHAFT, NEAR KUNZE

KUNZE, GREENWATER DISTRICT

ASH MEADOWS, AMARGOSA VALLEY, NEVADA



SHAFT AT SCHWAB UPPER WORKINGS

RAMSEY CAMP

Ramsey is situated on the east slope of the Funeral range, and right in the heart of the new Greenwater district. The name of the district was taken from a small spring (about a mile southwest from Ramsey) the water from which has a greenish appearance.

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The whole country for miles has already been located. The formation is like that of a great deal of eastern California and western Nevada, being mostly granite covered with a large iron capping, in many places extending for miles. The general trend of the lodes traversing this district is northeast and southwest, the dip being both east and west in different localities. Near Ramsey very little work has yet been done, not even a shaft 20 ft. deep at the time of my visit.

KUNZE CAMP

Four miles north of Ramsey is situated Kunze (elevation 4700 ft.) The two camps are great rivals in every way. Both want the post office. As the result neither has one. At Kunze more work has been done than at Ramsey. Kunze is the headquarters for the Schwab properties, which extend clear to Ramsey on the south with their locations and to the north for a mile or two. One shaft was down 75 ft. with a fair showing of copper ore. Much float has been found carrying high percentages of copper, and where surface cuts have been made good ore, say 15 to 40 per cent. copper, has been opened. The ore carries no gold or silver to speak of. The same iron capping is found at Kunze as at Ramsey, but it is in larger quantity at the former, covering a wider area.

PATSY CLARK'S MINE

To the north of Kunze about three miles is Patsy Clark's property, upon which is installed a 30-h.p. gasolene hoist. A shaft has been sunk 250 ft. (elevation of the collar, 4940 ft.) However, no one was allowed underground, so I had to form an opinion from the surface and the dump. A 6-ft. vein of copper ore outcrops on the surface. The strike is northeast and southwest, and the dip 45 to 50 deg. east. The shaft passed through the vein about 60 ft. down. At the 150-ft. level a crosscut was driven to the east and found vein. When I was there they were crosscutting at the 250-ft. level, but had not reached vein. Since my return to San Francisco I have heard that they struck vein matter in a broken-up country rock, and that orders had been issued to sink to water level. The percentage of copper in the ore I observed was extremely variable, but I should judge that the 6 ft. of vein averaged about 6 to 15 per cent. copper.

PROSPECTS OF THE DISTRICT

In my opinion it is going to take much money and considerable time to develop any large quantity of ore which will pay to smelt in this district. If large capital is put in, a railroad built and smelters erected at some convenient place, the future will be indeed a rosy one. The miners from the Arizona copper mines like the country, which is significant. As indicative evidence of what I mean when I say it will take time to open up this country, I will mention a few items of expense.

COST OF SUPPLIES

It takes five days to make one trip with a freight team over a sandy road. It is one of the worst roads for a freighting team I have ever seen, nearly every inch being up hill. At present the freight rate from Amargosa to Ramsey (52.5 miles) is 3c. per lb. for small stuff, and 2.5c. per lb. for large stuff. Water sells for $10 to $15 per bbl. of 50 gal. At retail it sells at 30c. per gal. Flour is $6 per 50-lb. sack. Barley is $5 per sack. Alfalfa hay is 5c. per lb. Rough lumber, of poor quality, is $130 to $140 per M. Finished lumber, also of poor quality, is $155 to $165 per M. All meals are $1; beds $1 per night. The stage fare from Amargosa to Ramsey is $18.

THE WATER PROBLEM

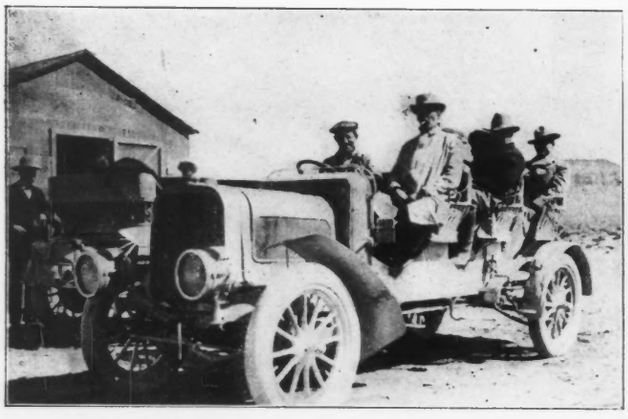
A well-boring outfit was on the ground about one mile northeast of Ramsey. If they can develop water there it will push the district three years ahead in a day. No camp can exist without water. Think of having to wait for the arrival of the water-wagon before you can cook your dinner. On the Ramsey side they had one team of four mules on the water-wagon; it took three days for the round trip. They start with 10 bbl. (500 gal.), use 2 bbl. on the road, and arrive with 400 gal. The average man in this district uses fully 4 gal. of water per day, so anyone can easily figure how far 400 gal. will go. They have more teams hauling water now.

THE BOOMERS IN FULL SWING

There are three rival camps in full swing for supremacy; by joining together they would make a town of fair size, but the town-lot boomers are hard at it; hence there must be separate camps. The large capitalization which the companies operating in the district have seen fit to put on themselves is also to be regretted. One million shares per company is bad enough, but when they make it three million shares they overstep the line a little.

THE NEW NEVADA

I believe there is a great future for the whole belt of country running from Greenwater north to Alpine and south through San Bernardino county. In fact the development of both Nevada and California has scarcely begun. We have had the mineral country, but not the money to develop it with. Two years ago I wrote a report on Tonopah and Goldfield for the San Francisco Stock and Exchange Board in which I stated that nothing in that district could be called a wild-cat, for development in a short time might make a mine of it. Also I said that the production of gold and silver from Nevada inside of five years would astonish the world. It is safe to say that the interest in mining in Nevada has only begun. It is one of the greatest mineral States in the Union. Few people realize what the Comstock did for San Francisco in her early days. I predict that the new mining districts in Nevada and California will do more to rebuild San Francisco than anything else.



AUTOMOBILE STAGE, GOLDFIELD TO RHYOLITE

WATER WAGON, CAPACITY 10 BARRELS

Two large deposits of molybdenite have recently been discovered in Maine, one in the town of Buckfield, the other in the town of Greenwood, both in Oxford county, in the western part of the State.

SHAFT SINKING THROUGH WATER-BEARING FORMATIONS—I

An Example of Modern Methods and Appliances Employed in German Mine

BY E. MACKAY HERIOT*

To sink a shaft through a flood of water, by boring, or through quicksand, by freezing, or through unstable rock of all kinds, by various mechanical means, is now almost an everyday occurrence in

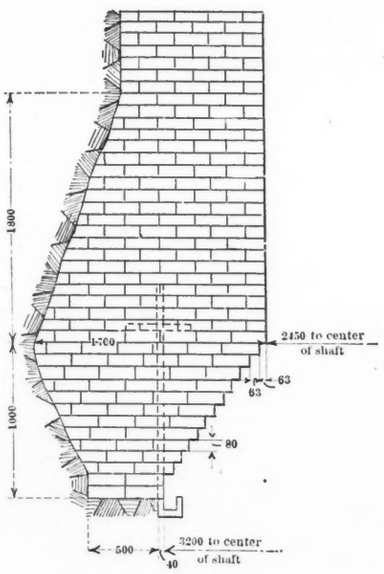


FIG. 1

some part of the world, but to be a master of any one of these processes, one must first know what it means to sink a shaft by hand. And yet the literature giving practical data on modern shaft sinking by hand is scanty and hard to find, so that, to help fill this gap, the following article will record the sinking of a large shaft, giving as much prominence as possible to practical details. I was one of those responsible for the work, having been installed in the position by the German mining authorities.

The strata through which the shaft was sunk comprise clays, shale and limestone, all of which are water-bearing. They belong to the *Bunt Sandstein* of the lower Trias, and dip 5 degrees.

PRELIMINARY WORK

The soft ground was excavated to a depth of 6 m. when it was bricked up to 1 m. above the surface. The thickness of the masonry is 1.05 m. From the supporting wall to the normal shaft cylinder there are twelve courses of bricks overlapped. (Fig. 1.) The naked shaft has a diameter of 7 meters.

On Sept. 5, 1905, work was begun in full force. We bored the rock with hand drills, making holes 4 m. deep, which were charged with No. 3 dynamite. The sides of the shaft were smoothed with the pick, but as this latter work consumed too much time, it was decided to blast here also, and in doing so, great advantages are gained. In the first place, much time is saved, and secondly, there are more irregularities in the walls which help to support the masonry. The disadvantage is, when the sides of the shaft are loosened, the water finds an outlet behind the brickwork. It is important that the side holes

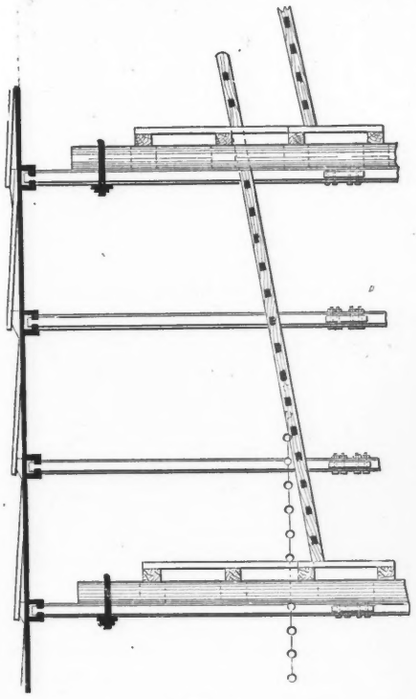


FIG. 2

be drilled around the circumference of the naked shaft, or in this case, with a 3.5 m. radius. The drill may be placed vertically and, if necessary, behind the iron ring of the shaft lining. On blasting, the rock is torn from the walls toward the center of the shaft and the walls are not damaged. This was found to be the case in fairly firm rock.

PLACING OF TEMPORARY LINING

In order to withstand the pressure of the strata and to guard the miners against falling rock, iron rings, 1½ m. apart are placed around the shaft. Each ring is made up of five segments, which are lowered with the hoisting rope. The ring is suspended by eight hooks, fastened to the next ring above, and the joints are bolted together. By aid of the center plumb bob and a measuring rod, the rings are centered and wedges are driven between them and the walls. The bare sides of the shaft are lined with boards, wedged in behind the rings. The method may be seen in Figs. 2, 3 and 3a. As the clayey formation is apt to swell, it is not advisable to hammer the wedges in too tight. Where the shaft sides have caved, the spaces behind the boards must be filled firmly with wood. The uppermost hooks are made fast in the masonry. Here the wedges of the shaft lining have to be driven upward and nailed fast; ordinarily they are driven downward.

Directly beneath the supporting wall the first two rings are somewhat under normal size; the diameter of ring No. 1 is 6400 mm.; of ring No. 2, 6550 mm.; and of ring No. 3, which is of normal size, 6700 mm. Every 4.5 m. a sollar is erected. A bearer, of round pine (200 mm. diameter by 5700 mm. long), rests on a ring and is secured at each end by an iron staple. Over the bearers four square pieces of wood are laid with their outer ends nailed to wooden blocks, resting on the ring. The platform is made of 40-mm. boards (Fig. 2). For boarding-in the ladderway 25-mm. planks are used. This work can be done without the aid of the bucket.

ARRANGEMENT OF PUMP AND PIPES

At 31 m. depth, a 400-mm. limestone

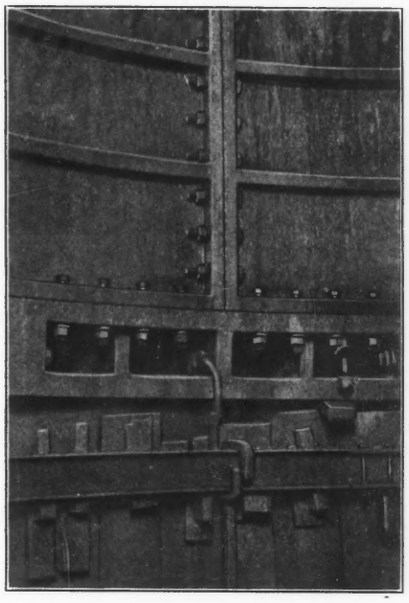


FIG. 3

stratum was encountered, admitting to the shaft 20 liters of water per minute. At 67 m. the quantity had increased to 96 liters per minute, so that a pump was necessary. A duplex hanging pump with a maximum delivery of 750 liters per minute to a hight of 115 m. was installed. It was suspended by a 40-mm. round steel rope with one end attached to a windlass. From this the rope passed over a pulley, at the landing stage, down the

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shaft to and around a pulley attached to the pump, and thence to the surface where the end was made fast to an iron girder. Eight men were generally necessary to operate the windlass.

The steam pipe leading to the pump is of 65 mm. diameter, that of the return steam, 80 mm., while the delivery pipe is 150 mm. Every 10 m. the pipes are secured by flat iron holders, which securely hold them, yet permit the cable to pass freely (Fig. 4). In order that the weight of the pipes may not come upon the pump, wooden clamps are put on them at some suitable place, as at the bucket guide bearers. The water pipes are worthy of special mention, owing to their practical construction. They are made of spirally masonry; further, a launder keeps the men from unnecessary dampness; and finally, it prevents the sides of the shaft from being loosened by the constant washing.

DRILLING AND BLASTING

It was decided to construct the foot of the supporting wall at 70 m. depth, at which point a limestone stratum containing water was encountered. The flow had then increased to about 245 liters per minute. From surface to 70 m. depth the diameter of the shaft was 7 m. Each meter contained 38.5 cu.m. of rock and filled about 80 buckets. The 63 m. from 7 to 70 m. were sunk in 44 working days, giving an average of 1.43 m. per day. The sump had been blasted 40 times; i.e., 512 847 caps. In the mine 1835 shifts had been worked, at the pit's mouth 629, and otherwise above ground 1056, a total of 3300 shifts for a crew of about 80 men. There were expended 13,833 marks in wages, 3935 for blasting and 2000 for 375 tons of brown coal. The 63 m. had then cost 16,786 marks, or 267 marks per meter.

CONSTRUCTION OF MASONRY LINING

Shaft masonry in water-bearing strata requires more care than ordinary bricklaying. For this reason masons are, as a rule, not adaptable to the work. Young miners learn very quickly what is essential for a water-proof bricking, and under constant supervision success can generally be attained.

Cement was always used liberally and

FIG. 3A

FIG. 4

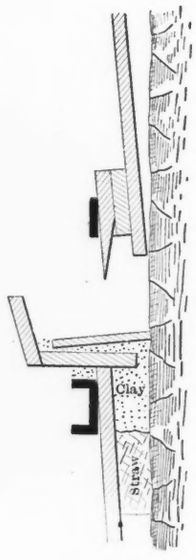

FIG. 5

wound wrought iron (without rivets), are 3 m. long and 4 mm. thick. A man can easily carry one section. Compared with the heavy cast-iron tubes commonly used, this form is a great improvement.

At a depth of 32 m., a few meters below the first water, a launder was put in. Between rings 16 and 17 a temporary flat iron frame was suspended on hooks, 1 m. long, from the ring above. The boards of the shaft lining are so placed that for some 200 to 400 mm. above ring 17 the wall was bare. On ring 17, the launder, consisting of 10 segments, is erected, great care being taken to make it water-tight. The details of a method that has proved successful are shown in Fig. 5.

Sufficient clay should be used and well tamped. For several meters above and below this point, no side holes should be shot. The advantages of the launder in shaft sinking are not to be underestimated, for instance: When water is not running down the sides of the shaft, it is much easier to construct a water-proof lining of sump holes with a total of 1058 m. were bored, and for each sump that was shot 1.57 m. advance was made in depth. As the holes were a good 2 m. each, the blasting had not given satisfaction. We found out later on that the holes were bored too nearly vertically. The operations were carried on in 3 shifts of 8 hours each, with the following men in each shift: Underground, 1 overseer, 1 miner, 1 assistant miner, 2 masons and about 10 laborers; above ground, 1 signalman, 4 trimmers and 3 engine-drivers—altogether, 23 men. On the surface for day and night work, in 10-hour shifts, were 3 blacksmiths, 2 carpenters, 2 stokers (with 3 trimmers), 5 men for miscellaneous work, 1 store-keeper, 2 servants, (in the mess rooms), 1 night watchman, and 1 overseer for surface work. Each 8-hour shift had a responsible foreman confirmed by the German government.

For the excavation of the 63 m., 682 kg. of dynamite were used, or 10.8 kg. per meter; 341 rings of safety fuse and well mixed with water, so that when poured on to the wall the bricks fairly swam in it. In this way one is certain that no joints remain open. The bricks are pushed sideways into position, thus pressing the cement through the joints. After two rows of bricks have been laid, cement and water are poured over them to fill up any spaces left open through carelessness. A new front row can then be begun, and at the same time the back rows filled in. Where the masonry and the walls of the shaft come in contact, the cement joint should be not more than 1 or 2 cm.; if there is not room for whole or one-half bricks, small pieces may be used, taking care that plenty of cement is applied. It is most important that the rock and wall be joined into one solid mass, so that the water can find no means of escape from behind. The courses and also the rows must break joints. The joints must not be more than 1 cm. broad in the front row, although at the back they may be somewhat larger. The

bricks should not be hammered into place, because this may cause an imperfect contact underneath.

If water is present, before any stoppages, such as for meals, or when taking down a ring or ladderway, iron gutters should be set in the wall. In this way the water is allowed to flow off without washing the cement away. In the case of much water, the gutters must always be employed and with every row of bricks their position changed. Again, after any pauses, let the top of the wall be well scraped and brushed. If the masonry is

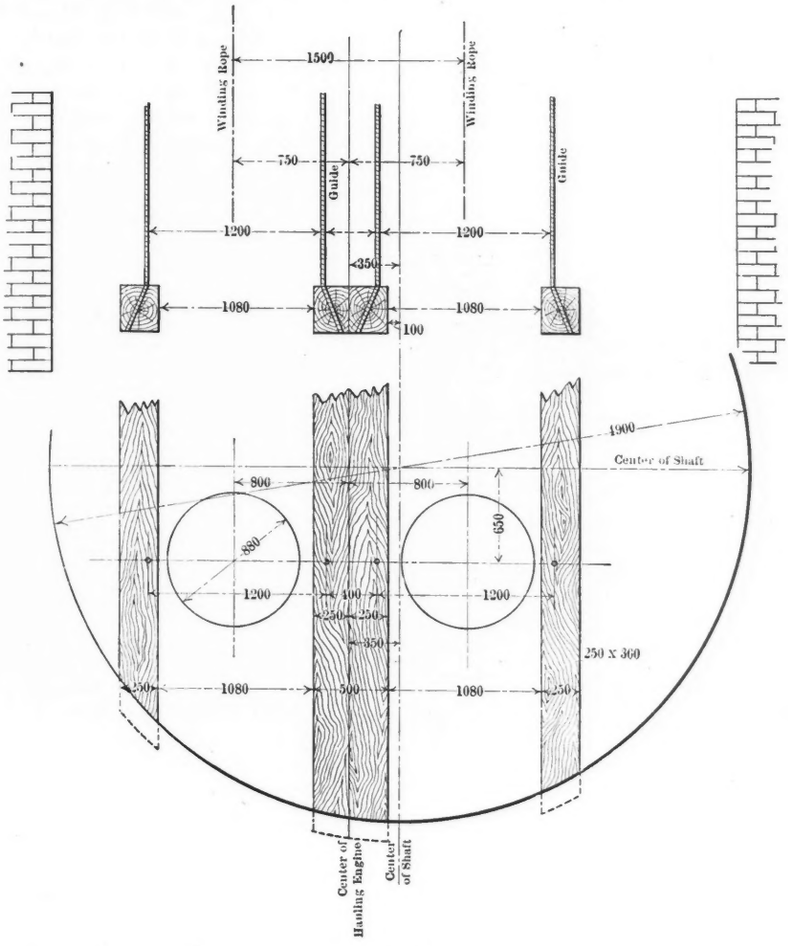

FIG. 6

much trampled on, it is best to take off the top row of bricks.

Cement without sand cannot bind, therefore care must be taken not to separate one from the other, which is often done by working the cement about on the wall when immersed in water.

During the bricking of the shaft from 7 to 70 m. depth, the suspended platform was not used. The work was done with two platforms resting on bearers made fast in the main bearer hitches. Every 1.5 m. the lower platform had to be lifted over the one above. This is a very unsatisfactory method, as the cement and sand hardens on the boards and cuts the hands.

The cement was mixed as follows: For the supporting wall, five wheelbarrows of sand to 2 bbl. of cement; for a few meters above, eight wheelbarrows of sand to 2 bbl. of cement, while for finishing, the proportion was five wheelbarrows of sand to 1 bbl. of cement. A wheelbarrow carries 130 kg. of sand and a barrel of cement weighs 180 kg. The sand and cement were mixed at the surface by two workmen, but the water was first added underground.

For transporting bricks to the pit's mouth two men were necessary and one man, aided by the signalman, to load the bucket—altogether, above ground, about 6 men; and underground, 15 men found employment, two or four for laying the front row of brick, six to eight for the back rows, and four to serve the buckets. Each shift had two masons. The bricks, 250 mm. long, 120 to 130 mm. broad and 65 mm. thick, were laid with short ends toward the shaft center. The diameter of the temporary shaft is 7000 mm. and when bricked in, 4900 mm., thus the wall is 1050 mm. thick.

Holes had to be cut out in the sump for the ring hooks, which are secured in the supporting wall. The hooks must be far enough out of the masonry so that the ring can be easily set in. (Fig. 1.) The bed of the supporting wall was not quite level so that one or two rows of bricks had to be laid before the overlapping began. The 12 rows of bricks overlap one another 60 to 65 mm. each.

PLACING OF BUCKET GUIDE BEARER

To determine the situation of the holes for the bucket guide bearers, the center and eastern plumb lines were hung (Fig. 6). The two outside holes are 350 mm., and the center ones 150 mm. deep. The hight is seven bricks for the former and five for the latter. For covering the holes we used pieces of flat iron. The hitches for the permanent bearers are 1.5 m. apart. For locating these another plumb line was hung near the south wall, which, together with the center plumb line, was constantly used. Plumbing from hole to hole is not advisable, as mistakes are easily made, which are apt to be increased. The best plan is to stretch a cord within a centimeter of the two plumb lines, then take a right angle and measure 1.61 m. and make a mark where this touches the inner circumference of the brick wall. A wooden pattern can be placed at the mark, and the outline of the holes drawn on the wall. It is always best to locate the deeper hitches where the wall is strongest. The holes are 260 mm. broad, 250 to 150 mm. deep, and four to five bricks high. It takes two courses of bricks to cover the deeper holes, in which case the seventh finishes. Every 4.5 m. the holes have to be specially constructed for the bearers of the temporary ladderway. The hitches of the main bearers are used only with a slight alteration as seen in Fig. 7. Three rows of brick above these, a recess is let in the wall, in which the planks of the temporary sollar are secured. At a distance of 470 mm., measured from the bottom of the ladder bearer hitches, are three holes for the angular pieces of timber of the permanent ladderway, and again two bricks higher is a recess for the planks of the latter. (See Fig. 8.) The water for mixing the cement was obtained from the launder at 35 m. depth, which also kept the sides of the shaft dry, and enabled us to make a good water-proof wall.

Every 3 m. the pump had to be lifted. At the water-carrying strata two cast-iron pipes were bricked in. All along the sides of the shaft, plates of zinc (1x2 m.) were laid, beginning at about 10 cm. below the limestone. Where the pipes were located, holes were made in the zinc plates, and, wherever any water was found, lead pipes were bricked into the wall.

On Nov. 21, the masonry work was finished to 7 m. below the surface. The 63 m. had taken 30 working days to brick up, being 2.1 m. per day. For the work, 392,000 bricks, 980,410 kg. of sand and 274,759 kg. of portland cement had been used. The above material cost at the pit's mouth 20,000 marks. In the shaft 121 shifts were worked, on the landing stage 532, and above ground 510, a total of 2163 shifts, at a cost of 9000 marks.

With the aid of a swimming platform the ladderway and air tubes were built in and the wall and hitches cleaned. The pump was lowered 9 m. and run at full speed. As the platform was often inundated, only 5 men could work at the same time; however, these were sufficient, as the pump could not lower the water more than 8 m. in a shift. The other men found employment at the surface.

ADJUSTMENT OF PUMP SUCTION

We exchanged the rubber sucking tube of the pump for a telescopic one of iron, which could be drawn out 1.7 m. and was a great improvement. For instance, if the rubber tube were to be handled properly the whole pumping apparatus would have to be lowered every 0.5 m. that the sump got deeper, or else, as was always done, to be lowered far enough to allow it to

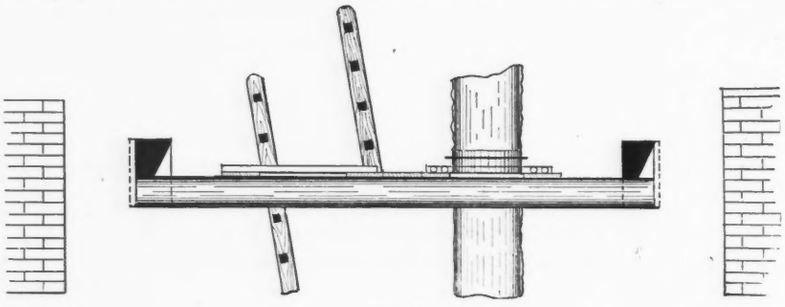

FIG. 7

lie horizontally. This often had the effect of preventing the shutters of the windball valve from closing and allowed the water to drain out; no doubt this was to blame for many stoppages. On the other hand, the telescopic tube could be drawn out while pumping. When blasting we raised the pump 1.5 m. and pushed in the windball 1.5 m.; thus the latter stood 3 m. above the pit bottom, which we found to be quite sufficient. With a telescopic tube it is an easy matter to clean the windball.

On Nov. 26, the sump was again clear and blasting could be resumed. The inflow of water was then about 0.5 cu.m. per minute. On Dec. 3, the water pipes, at 30 m. depth, were closed and the water was definitely shut out. One of these pipes was found to leak somewhat; most likely, when we were changing the platforms, it had received a shock. The harm done was inconsiderable, as at 30 m. depth the pressure is not great. The masonry around the pipe was picked away at the surface, and lead firmly tamped in.

In order to protect the supporting wall no side holes were shot in the 4 m. of limestone (from 70 to 74 m.) and in the few sump blasts, little dynamite was used. Boring in the limestone was very slow work, taking as much as six hours for a man to drill 1.5 m. This was chiefly caused by the clefts in the rock. As soon as a few meters had been sunk, side holes were again shot.

(To be continued.)

Alkaline Zinc Titration

BY EDGAR B. VAN OSDEL*

The chief source of error and delay in the ordinary method of zinc titration in hydrochloric-acid solution by potassium ferrocyanide is the tendency of precipitated ferric hydrate to occlude a considerable portion of the zinc in solution. The re-solution and precipitation of the iron consumes considerable time.

Somewhere I found a description of the following method, but am unable now to report the source of my information in order to give the proper credit here. I have used the method for some years.

After complete decomposition and solution of the ore as usual, a considerable amount of solution of tartaric acid or of rochelle salt, is added. Then the solution is made just barely alkaline by ammonia, and is ready for titration unless precipitation of manganese by hydrogen peroxide is required. In that

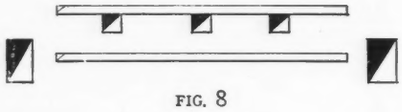

FIG. 8

case, the filtrate from manganese should be boiled to remove traces of hydrogen peroxide.

The solution may be titrated hot. The best indicator is acetic acid. Nitric and hydrochloric acids are not suitable, much less sulphuric. There should be no sulphates in solution. The reaction with acetic, however, is very delicate, the blue of ferric ferrocyanide appearing as soon as zinc is precipitated and there is an excess of standard ferrocyanide.

The standard by this method will be 1.4 to the standard by the acid method. A great excess of ammonia makes the process valueless, as it prevents the precipitation. Such an excess can be neutralized, however, and titration resumed. In standardizing by this method, it is necessary to add an iron salt to the solution in order to produce the end reaction with the indicator.

With ores containing no cadmium or manganese, the whole process is performed without filtration, and requires only five to ten minutes.

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A Hydraulic Mining Device

BY CHARLES G. YALE

Pierre Bouery, general manager of the La Grange hydraulic mine near Weaverville, Trinity county, California, has devised and put in operation a new style of deflector for handling the giants. It is electrically operated and so arranged that the stream may be accurately directed to any desired point without the pipe-man's being anywhere near the giant itself. The gravel banks at this mine are two or three hundred feet high and in order to insure safety to the pipe-man in case of caves, the giants have to be placed at some distance from the banks. In this position the full force of the water cannot be utilized as it feathers or breaks before striking the gravel, and the sprayed water is not as effective as a solid stream would be. With this device of Mr. Bouery's it is possible to set the giant as close as desired to the bank, and yet deflect the stream in any direction. In case of a cave the giant itself may be buried and subsequently dug out, but the man operating it is out of danger. The pipe-man is enabled to stand several hundred feet away from the bank, and by means of electric switches still maintain perfect control over the deflectors on the giant, directing the stream where he pleases. By this means, in utilizing the full force of the water under pressure, much more gravel may be washed with a given quantity of water, than where the stream is allowed to feather too much, and what is more to the point, there is no danger to be feared by the pipe-man.

Australian Smelting Corporation

This company has announced that owing to difficulties which have arisen in connection with the railway communications between Dapto and Port Kembla, and having regard to the opinion of its engineers that in the long run it would be more profitable to locate the company's smelter on the seaboard, it has leased a site of 61 acres with a deep-water front, at Port Kembla.

The Government of New South Wales has agreed to expend about £20,000 in the construction of a jetty, wharves, etc., for purposes of the new works. The dismantling of the Dapto smelter is now in progress, and the erection of the new works at the above site, on the most modern lines, is being pushed forward with all possible rapidity.

An excellent variety of asphalt is now mined in large quantities at Lobsann, Alsace. It is used mainly for paving.

THE MINES OF PLANCHAS DE PLATA

The Interesting Geology of an Historic Mining District of Sonora

BY F. J. H. MERRILL*

These mines are in the Magdalena district of Sonora, southwest of Nogales about 12 miles, which is the length of the trail by which they can be reached on horseback. They are also reached by a wagon road upward of 25 miles in length. The property includes 12 claims, comprising 94 *pertinencias*. These are distributed over a large area and are located among some hills south of a cañon about 400 ft. deep, known as the Arroyo de las Planchas, formed by a tributary of the Altar river flowing southwesterly past the mill. This camp is of especial interest on account of its early history, which dates from the Spanish occupation. In 1739, numerous large masses of native silver were found on or near the claim now known as Planchas Viejas, one of these weighing 525 lb. These masses attracted general attention and gave to the locality its name. Indeed, so much importance was attached to these deposits that they were claimed by the Crown of Spain, but that government never operated them. At an early date it was discovered also that the hills to the westward contained a network of veins or deposits of chloride of silver. Since 1878, several attempts have been made by American miners to work these deposits; but apparently without proper technical knowledge or sufficient financial resources.

About 1899, the property came into the hands of the present owners who operated it for three years with the 10-stamp, pan-amalgamation mill erected by the previous proprietor, a Texas company. This mill was not well designed and yielded an extraction of only 65 per cent. of the assay values, so that only ores containing upward of 30 oz. of silver could be worked, and it was necessary to leave in the drifts and stopes a large tonnage carrying 30 oz. of silver, or less. Since that time the property has been idle.

GEOLOGY OF THE DEPOSITS

The geology of the deposits is of much interest. The surrounding country is mainly composed of volcanic rock and the ore lies in a formation of fragmental material, volcanic in origin, but of which the distribution and arrangement may have been due to marine action. The portion of this sedimentary formation which contains the orebodies is a quartz-porphyry conglomerate. Its thickness, apparently, is not more than 400 or 500 ft. at the maximum, while near the Bonanza and on the Planchas Viejas property, as well as in the vicinity of the Colorado, there is a development of red sandstone intercalated with the quartz-porphyry and varying from 50 ft. to 100 or more in thickness. On the Planchas Viejas claim the quartz-porphyry conglomerate is underlaid by coarsely crystalline andesite, while east of the mill a similar rock appears to rest upon red sandstone. About a mile east of the camp the quartz-porphyry conglomerate, after showing a large development in the walls of the cañon, seems to be gradually succeeded by red sandstone coarsely stratified and containing a small percentage of pebbles, 3 to 6 in. in diameter, which is capped by andesite, 100 ft. or more in thickness, deeply weathered and oxidized and at some points vesicular and amygdaloidal.

In the north wall of the cañon immediately oposite the mill and apparently at the base of the conglomerate, is an exposure of massive quartz-porphyry. This is probably an area of the rock from which the pebbles of the conglomerate have been derived.

In size the pebbles vary greatly. Where the mineralization is most intense they range from 1 to 4 in. in diameter and are for the most part in close contact, the interstices being filled with a paste of material similar in composition to the pebbles. Eastward along the cañon, at some points, the pebbles are farther apart and the spaces between them are filled with a red rock flour, which suggests the probable stratigraphic continuity of the red sandstone with the porphyry conglomerate. No doubt the relation can be easily traced, but the time at my disposal did not permit a detailed geologic study of so large an area.

On and near the Planchas Viejas claim, a 50-ft. bed of red sandstone is capped by about 15 ft. of white tufa which has been traced northwest for many miles. This is also well developed at a point along the wagon road to Nogales, 8 or 10 miles from the camp. These fragmental beds strike north 60 deg. west and dip about 60 deg. northeast. They have been faulted at several points and occur in monoclines from half a mile to a mile wide.

CHARACTER OF THE OREBODIES

Planchas Viejas takes its name from the "old plates" of silver which were found at this point in the loose wash of the mountain side. Apparently they were derived from the erosion of the red sandstone, and perhaps also, from the tufa, both of these being here cut across by a small *arroyo*. At the present day small nuggets are occasionally found. No native silver has been found on any of the other claims, and no one has yet worked the sandstone here in search of silver nuggets.

On all the properties which have been worked, the orebodies are impregnations of chloride of silver with a very small amount of carbonate of copper, along shear zones in the quartz-porphyry conglomerate.

The shearing has been most complete and minute; but the fragmental character of the rock has caused it to yield to the shearing strain along the surfaces of the pebbles. Nowhere did I observe that any of the pebbles had been sheared across.

While these impregnated shear zones can, on many of the properties, be traced in some general direction for several hundred ft., and have sometimes a width of 200 ft. or more, the orebodies, commercially considered, are extremely irregular. The old stopes show that the ore removed for treatment occurred in the form of lenses, egg-shaped bodies and shoots or chimneys. Some of these attained as great a width as 200 ft., but the majority are less than 100 ft. in greatest measurement. They are, however, of frequent occurrence.

These orebodies carry no gossan. The miners, who have worked in this district for years, locate the zones of impregnation by the decomposed character of the rock at the surface, its stains of iron oxide, manganese-oxide and carbonate of copper and perhaps by other indications which they are unable to describe.

In the underground workings, the evidences of mineralization which have guided the miner are of similar character. In certain zones of the conglomerate, where the shearing has been especially close and extensive, the rock has been leached to an ashy-gray color, its iron contents have been deposited at numerous points in minute brown spots of limonite, and oxide of manganese in numerous small blackish spots occurs. A faint green stain of carbonate of copper usually pervades these zones.

The richer ore is easily recognized by abundant specks and flakes of chloride of silver which occur here and there on the surfaces of the pebbles, sometimes in sheets as large as 2 cm. wide and 0.5 mm. in thickness.

The richest specimens of the ore, which carry several hundred ounces of silver, are also usually richer in stains of carbonate of copper and often show on their surfaces finely fibrous incrustations of malachite.

The tonnage of ore in sight is large and its contents run from a fraction of an ounce to 350 oz. of silver per ton, with a trace of gold and a fraction of a per cent. of copper.

TREATMENT OF THE ORE

As previously stated, for about three years the ores were treated by crushing in a stamp mill and pan amalgamation, with a recovery of only about 65 per cent., due apparently to the imperfect character of the equipment, which would not permit the ore to be reduced to a fineness greater

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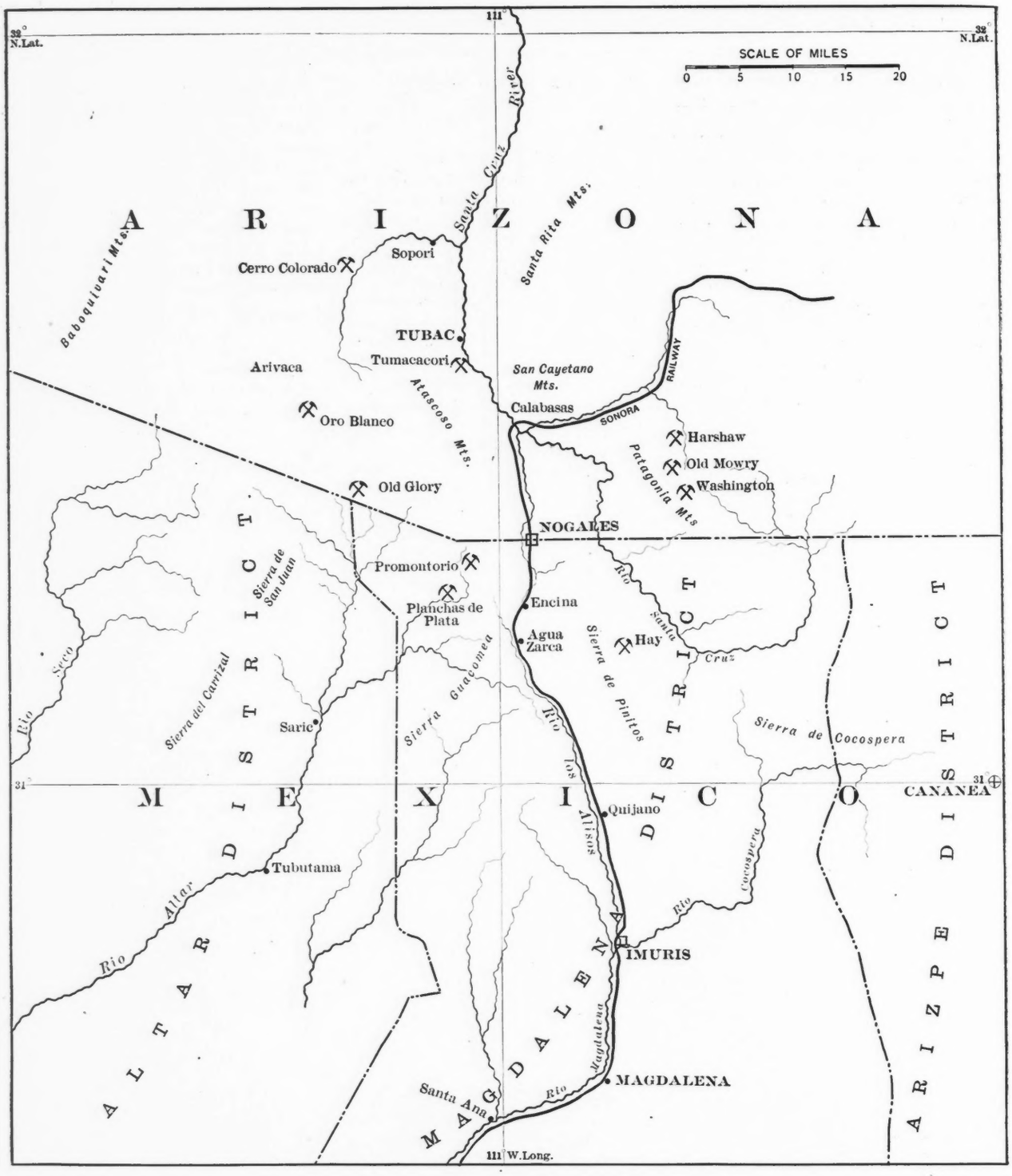


MINING DISTRICTS IN ARIZONA AND SONORA

than about 30-mesh. The loss in the tailings is said to have averaged 12 oz. of silver per ton. A sample of them taken by me assayed 16 oz.

The chief problem in the future operation of the property is a metallurgical one, and it seems probable that fine crushing with rolls and treatment by lixiviation with hyposulphite or cyanide solution will afford a satisfactory method.

The quartz-porphyry conglomerate is a formation of wide extent, occurring over several hundred square miles. It was observed in the Pajarito mountains, about nine miles southeast of Old Glory, Arizona. The white tufa is also well developed, at some points, a thickness of nearly 100 ft. being observed north of Planchas, near the national boundary.

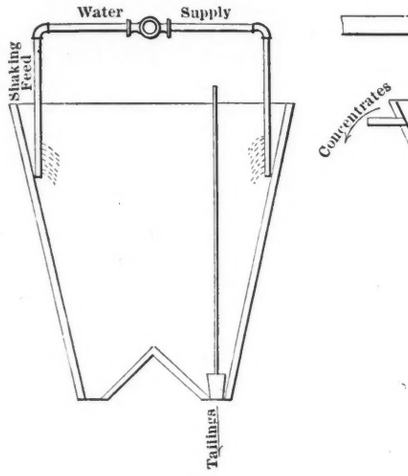
The Planchas de Plata mines are in an area of silver mineralization. On the north side of the Planchas *arroyo* is the Mejia mine, which carries native silver in the crevices of a much decayed volcanic rock. Another rich silver deposit is at Promontorio about six miles north. A little northwest the mineralization changes and crossing the Arizona line we find ourselves near the mining camps of Old Glory and Oro Blanco, Arizona. The latter is notable for an abundance of gold-bearing quartz lenses, which nowhere seem to form a deep or extensive vein. A region more varied in its general geology and its ore deposits is difficult to imagine and seldom seen.

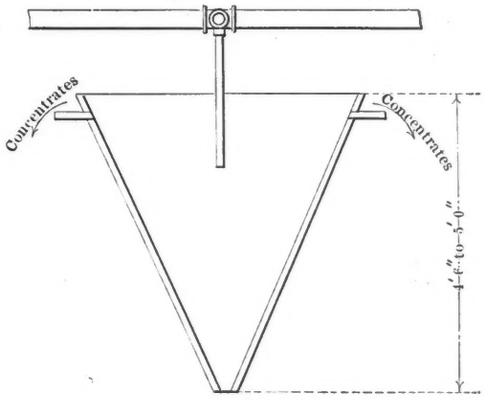
THE FLOTATION PROCESSES

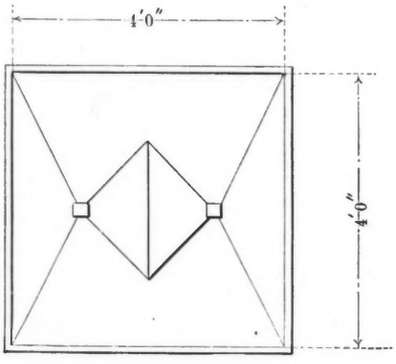
Details of the New Method of Ore Separation at Broken Hill

BY W. R INGALLS

This article is based partly on my report as a member of the Canadian Zinc Commission, and partly on information contained in private communications from Broken Hill. The flow-sheet, illustrating the system of treatment at Broken Hill, is from the annual report of the Department of Mines, of New South Wales, for 1905. The theory of the flotation processes, of







FIGS. 1A, B, AND C

which there are several, has been discussed in several articles in the JOURNAL, during the current year, including an article by Prof. Donald Clark, which appeared in a recent issue. At the present time it is sufficient to say that the true theory has not yet been determined. The flotation processes are of great interest in ore concentration, and doubtless will in the course of time find extensive application in North America. One plant employing this process is already in operation at Marion, Kentucky, and it is interesting to note that this, besides being the pioneer plant of the United States, is making a separation of resin blende, which, according to Australian ideas, is a class of mineral not capable of separation in this way. This is merely another example of how practice may upset an imperfect theory.

PRINCIPLES OF THE PROCESSES

In the Potter and Delprat processes, the ore, finely crushed, is charged into an acidulated bath of water in a vessel similar to the ordinary spitzkasten employed in dressing works. An action takes place, however, which is precisely the reverse of what happens in the ordinary spitzkasten. Instead of the heavier minerals settling to the bottom, and the lighter minerals passing off, unsettled, with the overflow, in this new class of processes the heavier minerals are floated to the surface, while the lighter minerals sink to the bottom of the spitzkasten, whence they are drawn off.

This extraordinary result is effected by the action of the acid in the water upon certain minerals in the ore, leading to the evolution of gas, chiefly carbon dioxide, the bubbles of which selectively attach themselves to certain minerals of the ore, giving them a buoyancy which causes them to float to the surface, where they accumulate as a scum, readily removable, and in this way enable a separation to be made.

In the Potter process the bath contains commonly 2 per cent. acid.

The Delprat process was originally known as the "salt cake" process, because of the use of sulphate of soda in the bath, but in its latest application this has been abandoned, and common salt (sodium chloride) is now used instead. The function of these salts is supposed to be to densify the bath, but this appears to be of doubtful, if any, advantage. In the Potter process the bath naturally becomes densified to some extent by the iron and other impurities which are dissolved from the ore. There has been litigation between the owners of these patents, which is not yet settled, but there is apparently no question that Potter was the real inventor of the flotation process, and his patent will probably be upheld, covering broadly the flotation process in which an acid bath is employed.

The temperature of the solution in any case is maintained at about 80 deg. C. Under these conditions, certain of the metallic sulphides (especially blende and galena) are floated up by attached bubbles of gas and form a coherent scum, which can be removed, leaving behind the earthy and silicious matter. When carefully carried out, the separation is practically a quantitative one in the case of certain ores.

Besides the Potter and Delprat processes, the de Bavay process has recently attracted a great deal of attention, having been tried on a large scale with promising results. In this process no acid is used, the ore simply being gasified with carbon dioxide, which may be derived from chimney gases, and then fed suitably upon a surface of water, whereon the zinc blende floats while the quartz sinks to the bottom. The phenomena of this process are even less understood than are those of the Potter and Delprat processes. However, the de Bavay process is much slower in its action than either of the others, and is more costly, both in plant and in operation.

RESULTS IN PRACTICE

Considering these processes solely from the technical point of view, it appears that in the treatment of the zinky tailings of Broken Hill, they have clearly beaten the process of magnetic separation, producing a higher grade of concentrate, and at less cost per ton. Valuable information as to the efficiency of the Potter process is contained in a recent report by A. L. Queneau to the Zinc Corporation. After a great number of tests, the final one treated 1300 tons of tailings and yielded 348 tons of concentrate, assaying 44 per cent. zinc, 8 per cent. lead and 8 oz. silver. The recovery was 81 per cent. of the zinc, 55 per cent. of the lead and 55 per cent. of the silver contained in the 1300 tons of tailings. This concentrate was further treated by mechanical separation, producing a zinc concentrate containing 50 per cent. zinc, 4.3 per cent. lead and 8 oz. silver per ton, which consisted of about 88 per cent. of the first concentrate; and a lead concentrate (amounting to 12 per cent. of the first concentrate), containing 45 per cent. lead, 10 per cent. zinc, and 20 oz. silver per ton. Mr. Queneau added that with certain improvements he could increase the extraction of all three metals by another 5 to 10 per cent.

These figures show that the flotation of the blende in the acid bath is more active than the flotation of the galena. The latter is fairly easy to float if finely ground,

but owing to its high specific gravity, finer pulverization is perhaps necessary to float it completely. The chief separation that is made in the Broken Hill ores is between the blende and the gangue of the ore. As between the blende and the galena, the separation is less sharp, both being capable of flotation, but the galena to less extent than the blende, because of its higher specific gravity. Because of the different behavior of lead in the non-acid bath, the de Bavay process appears to be able to make a concentrate of considerably higher tenor in zinc than either of the other processes, the de Bavay concentrate rising to 50 per cent. zinc. My own experiments have shown that blende, galena and pyrite under certain conditions may be floated nearly equally well.

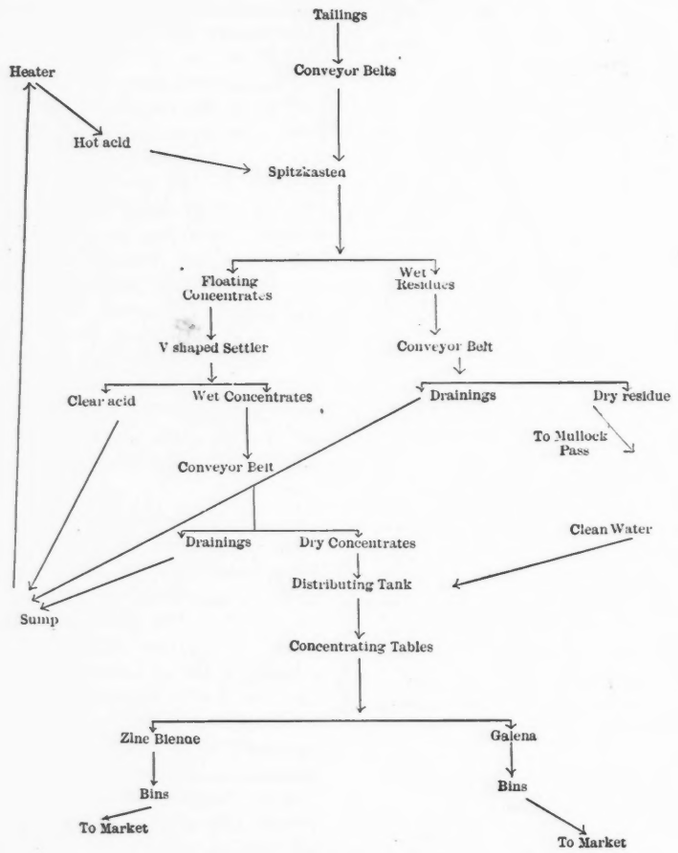


FIG. 2

PLANT REQUIRED

The plant required for either the Potter or the Delprat process is of simple design, the essential apparatus resembling an ordinary spitzkasten. The form used at Broken Hill in connection with the Delprat process is sketched roughly in Figs. 1, a, b, and c. It is built up of 3x3-in. timber, lined with 1-in. boards (dressed smooth) and 6-lb. sheet lead. The ore, slightly moist, is delivered by a shaking feeder at one side of the spitzasten and passes down into the bath. The heavy sulphides, which under ordinary conditions would sink to the bottom, in the flotation process, because of the buoyancy of the bubbles of gas which become attached to them, rise to the top and flow off for collection, the spitzkasten being arranged for overflow both on the right- and left-hand sides. The supply of acidulated water is derived from a main passing over the line of spitzkasten, from which branches project down into the latter. The main leads from the storage tanks, into which the clear solution from the settling tanks is pumped for further use. In the storage tanks it is reheated to 80 deg. C. by blowing steam into it. The gangue escapes continuously from the bottom of the spitzkasten, the flow being regulated by an adjustable valve, and is received on a belt conveyor, which transports it to the dump.

MANAGEMENT OF THE PROCESS

The manipulation of the process is a delicate operation, because the adhesion of the bubbles of gas to the sulphide particles is not by any means a strong one, and in fact is maintained only so long as the bath is free from vibration; this necessitates an arrangement of the spitzkasten that will be absolutely steady; the slightest shock is sufficient to detach the gas and sink the sulphide. This fact is taken advantage of in the collection of the valuable minerals, the overflowing concentrate being dropped suddenly into a collecting tank. The gas bubble is thus disengaged, and the sulphide particles, being no longer buoyant, sink immediately and are caught for further treatment. The clear supernatant solution, drawn off from the concentrate, is returned to the storage tanks for use in the treatment of further quantities of crude ore. The output of each spitzkasten is, comparatively speaking, very large, as the size ordinarily used at Broken Hill is about 4 ft. 6 in. square and 5 ft. deep, and the capacity is approximately 6 tons per hour.

COST OF PERFORMANCE

The flotation process is comparatively cheap. One man attends to six spitzkasten, his duty being merely to see that the scum is floating off regularly and that the tailings-discharge does not clog up. The rise of the scum is very rapid. It should accumulate in a dense mass about 1½ in. thick on the surface of the bath. Holes in the scum are evidence of irregular working. Mechanical skimming, or indeed any kind of skimming, is disadvantageous, the best result being obtained when the scum quietly floats off. The consumption of sulphuric acid in the Potter process is 30 to 35 lb. (computed as 100 per cent. H_2SO_4) per 2240 lb. of ore. The acid solution loses about 30 deg. F. in a circuit. The pumping and reheating of this solution, together with acid and labor, constitute the chief items of expense in the process. The total cost at Broken Hill, including loading the ore at the tailings pile (tailings being the material treated) and transporting it to the flotation plant, is only about 50c. per 2240 pounds.

DEGREE OF CRUSHING REQUIRED

As in the cases of magnetic separation and electrostatic separation, in flotation the treatment of very fine ore is also a difficult problem. Neither the Potter nor the Delprat process will treat slime; similar difficulty has probably been experienced in the de Bavay process, though it has not been definitely reported. This is because of the entanglement of the particles in rising in a muddy bath, the finest gangue failing to settle rapidly enough, the result being a dirty, low-grade scum. On the other hand, it has been found at Broken Hill that these processes will not give good results on particles larger than 0.5 millimeter, or such as will pass a 28-mesh screen. In these respects the de Bavay process appears to be similar to the Potter and the Delprat. De Bavay recommends material of 40- to 80-mesh size. Experiments and practice have, moreover, shown that in order to secure the best results there must be a certain ratio between the floatable and the non-floatable material. In some cases, blende which alone would not float, became buoyant after a certain proportion of quartz had been mixed with it; in other cases, an ore which alone gave a very good flotation, upon the mixture with it of a large quantity of sand gave a very bad flotation.

GENERAL CONDITIONS

In experiments on various ores from British Columbia, I found that those which contained siderite gave good flotation; the ores which lacked siderite behaved very unsatisfactorily. In the cases of the ores which could be floated well, there was clearly no advantage in crushing it to finer size than would pass a 40-mesh screen. Indeed, on the whole the ore of 60-mesh size gave results inferior to those of the 40-mesh ore. The first experiments were made at a temperature of 65 deg. C. Later ones were made at 80 deg. C. Increase in temperature improved the flotation. Densification of the bath (up to 1.35 specific gravity) was tried but did not appear to be of advantage.

Especially in the case of the Blue Bell ore, the separation of metallic minerals from the non-metallic was excellent, the tailing being a pure, white granular quartz, with only a few specks of blende

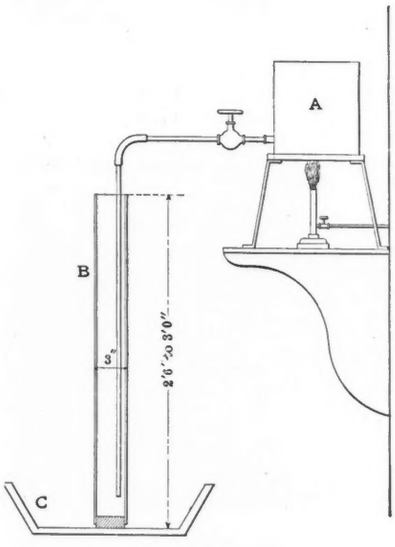


FIG. 3

and pyrites intermixed. The concentrate also was very clean, showing scarcely any particles of gangue. The high degree of perfection attained in the separation of this ore suggests a promising line of treatment, namely flotation of the metallic minerals, which then should be subjected to washing on Wilfley tables to separate the galena, both the concentrate and the tailings from these tables being caught in filters to avoid slime losses. The tailing from the Wilfleys, consisting of blende and pyrite, might then be roasted and submitted to magnetic separation for enrichment in zinc. This is substantially the process now practised at Broken Hill, as is shown by Fig. 2.

EXPERIMENTAL TESTS

Flotation experiments may be performed in ordinary beakers, but it is found that the depth of the bath is an important factor in the process, and the experiments are best performed in a glass tube, standing erect, about 3 in. in diameter inside and 3 ft. in depth. This tube should be supplied with acidulated water from a vessel at a higher level, a glass tube passing down from the latter into the separating tube, and extending to about 10 in. above the bottom of the latter. The separating tube should stand in a basin to catch the overflow. The arrangement is shown in Fig. 3. The acid water is heated to about 80 deg. C. in the supply vessel. The separating tube being about half filled with the acid water, the latter is allowed to run in slowly, and at the same time the ore to be separated is fed, slightly moist, into the separating tube. The scum immediately rises to the surface, and when the level in the separating tube has become flush with the top of the latter, the scum begins to overflow, running down the outside of the separating tube, and being caught in the basin in which the latter stands. This method closely approximates the conditions of practice.

Copper Mining in Ontario

BY PHILLIPS THOMPSON

Copper mining and smelting have for some time been going on steadily at Eldorado, in Hastings county, Ontario. The mine and works are operated by the Medina Gold Mining Company, James B. Cook being superintendent. The Eldorado was originally an iron mine, from which large quantities of hematite were shipped. In one of the workings copper was discovered. The shaft of the copper mine is now down 140 ft. No drifting has yet been done, the ore extracted in sinking the shaft furnishing sufficient material for the smelter at present. The ore is chalcopyrite, averaging 7 per cent. of copper. The width of the vein is from 7 to 8 ft. The daily output runs about 30 to 35 tons.

The plant comprises, in addition to the smelter, a 110-h.p. return-tubular boiler, a three-drill air compressor, dynamo of 90-light capacity, and a large boiler and engine for pumping and hoisting. A five-drill air compressor is being installed. Shipments of matte have been made to the Delamar works in New Jersey.

The success of the Eldorado mine and smelter has stimulated prospecting for copper deposits in the Hastings mineral area. Two discoveries of good promise have recently been made. James Best has found a 3-ft. vein, widening as it is followed downward, at Bancroft, and has begun development work. The other discovery was made near Queensboro. The ore is reported as being rich and of such a nature as to smelt well as a mixture with that of the Eldorado mine, lessening the cost of reduction operations.

The De Bavay Process

In the treatment of ore by the De Bavay process, at Broken Hill, says the London *Mining Journal*, the rough material is first introduced into an elevator outside the building, and carried up to bins situated above the gassing tank, into which the tailings are passed and subjected to a charge of carbonic acid gas. A 6-in. pipe leads from this closed-in tank to an "A.Z." agitator, a machine invented by A. Z. Clark, of Melbourne, and, at regular intervals, gassed tailings from the lower tank are forced up and into the agitator by pressure. Propeller blades, fixed in the center of the bottom of the agitator, revolve rapidly, and by means of these and of a pair of fixed parallel plates what is regarded as perfect mixing and cleansing are effected. Each charge amounts to from 8 to 10 tons of tailings. Each charge is subjected to three successive washings, and after each washing the agitated mass is allowed to settle, when a thick scum—consisting of waste material—forms on the surface. This, with the other refuse, is drawn off through a valve, which allows only the slimes and refuse to pass out into settling tanks.

San Francisco and Nevada Trade

San Francisco business men seem to realize that the city has got to make an effort to enable it to obtain and keep the mining-machinery trade of the new Nevada mining camps. The existing freight rates are more favorable to other centers. Salt Lake City has a lower rate to Goldfield on mining machinery than San Francisco has, and consequently is gaining a large volume of trade with the new country. Los Angeles has taken steps to organize a chamber of mines with the avowed purpose of capturing the trade. Los Angeles is nearer to the southern Nevada mines by the lines of railroads under construction than is San Francisco It is now proposed by the mining men and machinery dealers of San Francisco to hold a meeting and make an organized effort to secure lower freight rates—or at least to secure equal rates with their rivals.

Mining at Broken Hill

At the end of September the number of men employed at Broken Hill was as follows: Proprietary, 2824; South, 1030; Central, 898; Block 10, 669; British, 668; Block 14, 512; North, 490; Zinc Corporation, 369; South Blocks, 140; Junction North, 107; Junction, 120. Total, 7827. Outside mines, 200. Total, 8027. The total number employed on the surface was 3636, and the total underground 3822. Included in the Proprietary's total were 93 men employed at the sintering works. The Proprietary also employs 1100 at Port Pirie, 50 at Iron Knob, 50 at Point Turton, and 70 at Bellambi coke works, or a total of 1270 men outside Broken Hill. The company thus gives employment to 4094 men.

HISTORY OF THE SCHUYLER MINE

The First Copper Mine Operated in the United States

BY J. H. GRANBERY

What is probably the first copper mine operated within the limits of the original thirteen States is in Bergen county, N. J., just north of the town of Arlington, about eight miles from New York.

EIGHTEENTH CENTURY

The mine is on property secured by Capt. William Sanford of the British army from William Kingsland. The present town of Kingsland, named for the old proprietors, is situated upon a part of the estate. The patent to Captain Sanford was issued July 4, 1668, and conveyed approximately 10,000 acres of meadowland and 20,000 acres of upland, lying between the Hackensack and Passaic rivers, and from their intersection to a point 7 miles above; it was known in those days as "New Barbadoes." Shortly after its acquirement by Sanford, he transferred to Kingsland the upper portion of the tract, and in 1710, Arent Schuyler purchased from Kingsland a large tract of land comprising the lower portion of Kingsland's property; upon this tract the mine was located.

The scanty literature of those days makes mention of the mine; it was evidently of considerable importance for Brig. Gen. Robert Hunter (governor of the Colonies of New York and New Jersey), writing from New York, Nov. 12, 1715, to the Lords of Trade, states: "There being a copper mine here brought to perfection, as you may find by the Custom House books at Bristol, where there was imported from this place about a Tonn in the month of July or August last, of which copper farthings may be coined."[1] In April, 1721, there were 110 casks of ore from this mine shipped from New York to Holland.

This shipment excited the apprehension of the Lords of Trade, who suggested that it should be prevented by act of Parliament. Governor Montgomerie conferred with Colonel Schuyler in relation to the matter, but could only secure from him the promise that the English Copper Company should have first option on his ore when his ships arrived in England.[2] Curiously, the New Jersey legislature came to the relief of the English manufacturers in 1734, by imposing a duty of 40s. per ton on all copper exported from the province not directly to Great Britain; and still more strangely, the first complaint against this measure came from Bristol, England, where were extensive brass and copper factories. It was found in practice that the law was evaded by shipping the ore to New York and thence to England or other countries; but the Bristol traders feared the act would discourage mining operations in the province.[3]

For many years the mine yielded large quantities of rich ore, until it was worked as deep as hand- and horse-power could clear it of water; of this period we learn much from the following extract from a book of that time: "Schuyler's copper ore is from a Mine in Jersies, but exported from New York. The Cartage to Hudson's River is short, and their first Agreement with the Miner, was to allow him one-third of the Ore for raising and laying it above Ground; it was done up in quarter Barrels whereof six made a Tun."[4]

In the meantime Arent Schuyler had died, the mine being left to his three sons, of whom Col. John Schuyler had the management of the mine for himself and his brothers. Benjamin Franklin visited the mine in 1749, and on Feb. 13, 1750, N. S., he writes to Jared Eliot from Philadelphia: "I know of but one valuable copper mine in the country, which is that of Schuyler's in the Jerseys. This yields good copper and has turned out vast wealth to the owners. I was at it last fall, but they were not then at work. The water has grown too hard for them, and they waited for a fire-engine from England to drain their pits. I suppose they will have that at work next; it costs them one thousand pounds sterling."[5] The engine, ordered in 1748 or 1749, was not shipped from England until four years had passed.

FIG. 1. THE GEOLOGICAL FORMATION

FIG. 2. THE VICTORIA SHAFT

Joseph Hornblower and his sons were engaged in the construction of "fire engines," and to him Col. John Schuyler sent for the machine. Colonel Schuyler also asked that an experienced engineer should accompany it and set it in position. Josiah Hornblower, then only 24 years old, built this engine in England and left home in May, 1753. The engine arrived at New York, in September; it was landed at Second River (now Belleville, N. J.), and was carted thence to the Schuyler mine, where Hornblower set it up.

The shaft to which the engine was taken was that now known as the Victoria; the engine house was built about 300 ft. northwest of the shaft, and the machinery was installed. It was sufficient to keep the flow of water down for many years. There were then no facilities for engineering work in the colonies, and the

[1] Thos. F. Gordon, "Gazetteer of New Jersey," Trenton, 1834.

[2] "New Jersey Archives," Vol.V, pp. 7, 9, 267.

[3] "New Jersey Archives," Vol.V, pp. 376-406.

[4] "A Summary, Historical and Political, Of the first Planting, progressive Improvements and present State of the British Settlements in North America." By William Douglass, M. D., Boston, 1753. Vol. 2, pp. 257, 258.

[5] Works of Franklin, edited by Jared Sparks. Boston, 1838. Vol. 1, p. 107.

pipe, as well as large numbers of duplicate pieces, was brought with it. The pipe was of cast iron, made in lengths of about 8 ft.; each individual length having a pair of trunnions cast upon it, by which means it was kept in a vertical position while being lowered into place.

The boiler was 8 or 10 ft. in diameter, and of about the same hight; it was placed directly beneath the cylinder, and was connected to it by a short pipe fitted with the valve by which the admission of steam was regulated. The cylinder was 3 ft. in diameter and 8 ft. long, and the stroke about 6 or 7 ft., the piston making 10 or 12 strokes per minute. The safety valve was simply a heavy lid, resting on an opening in the boiler; the valve movement was of the simplest description—a narrow board connected to the walking beam, and holding pins for adjusting the point of cut-off. Small tanks, holding water for condensing the steam, were supported on a frame several feet higher than the cylinder, and the condensed steam drained into a hotwell alongside the furnace. The space above the piston was open to the atmosphere, and the pressure on it was just a little more than was necessary to lift the water from the required depth.

The pump cylinder was 10 in. inside diameter; the pump rod was 6 in. square, the original pipe being about 6 in. diameter. The pump had a capacity of 134 gal. per min. (eight hogsheads per hour as given in the old records).

Many of the account books and other records were consumed by a fire which destroyed the residence of Arent H. Schuyler, on Nov. 15, 1870. Enough remains, however, for us to learn that the engine was probably started some time in March, 1755. The shaft was 100 ft. deep at this time, and was carried deeper as the work of mining progressed, until, owing to the increasing flow of water, the engine was no longer able to keep the mine dry. This shaft was then abandoned and other shafts were worked to some extent; but within a few years, operation was entirely abandoned.

FIG. 3. MIDDLE QUARRY, THE SCHUYLER MINE

Up to the time when this shaft was sunk (about 1735), the mining had been done by drifts into the side hill; some of the other shafts upon the property were undoubtely sunk between this time and the arrival of the engine.

In 1761, Hornblower and John Stearndall leased the mine from the Schuylers—agreeing to pay one-seventh of the ore as rent, for 14 years, the lease being afterward renewed for 10 years. On March 25, 1765, Stearndall & Hornblower assigned one-half their interest to Philadelphia parties, who worked it until 1768. During 1768 and 1769, it lay idle, but it was started again by New York operators and kept going till 1773 when the engine house was burned.

After this, no work was done for twenty years, except surface digging. For the following named years the account books of Hornblower show that the receipts from the mine were: 1765, £670 7s. 9d., New York money, or, in dollars, $1676; for 1766, $4358; for 1770, $4785; for 1771, $787; for 1772, $1237; for 1773, $2855. Ore brought from $8 to $10 per 100 pounds. In 1770 only 41 tons of copper ore were exported from America, being valued at £853 13s. sterling, or less than £21 per ton.

When first worked the yield averaged about 100 tons per annum, and the mine was highly profitable. Gordon's *Gazetteer* says: "From the books of the discoverer, it appears that before the year 1731 he had shipped 1386 tons to the Bristol Copper and Brass Works."

England did not permit the smelting and refining of ore in the Colonies, and there were no facilities for doing machine work, so that the mine lay idle during the Revolution. On Feb. 4, 1793, however, the New Jersey Copper Mine Association, headed by Jacob Mark, Philip A. Schuyler, and Nicholas I. Roosevelt, leased the mine from Arent J. Schuyler, son of Col. John Schuyler, now deceased, for a term of 21 years with the privilege of renewing it for 21 years more. The

rental was fixed at one-tenth of the ore for the first term, and one-seventh for the second; the lessees being required "to erect and rebuild a sufficient steam engine within eighteen months and to keep at least eight men at work for not less than eight months in the year."

They agreed "that the works shall be carried on under the name and firm of the New Jersey Copper Mine Association, property represented by 640 shares divided among those interested, 3 directors to be elected annually. The first Election for chusing directors shall be on the first Monday in January after the first steam Engine is Erected, untill which time the whole management of the Company's concerns shall remain with the Lessees."

The directors were authorized to reserve not more than $8000 annually until $20,000 should be accumulated which was to be invested as capital, and used for the betterment of the company. Mr. Hornblower was employed to take charge at a salary of $60 per month, with the promise of a one-sixteenth interest in the concern.

Roosevelt, Mark and Schuyler, directors in the New Jersey Copper Mine Association, bought from Hornblower, Aug. 29, 1794, six acres of land on the brook known as Second river, with the privilege of erecting a dam and coal house. Here they established a foundry and machine shop, and here Josiah Hornblower built for them a stamp mill, the first one in this country, as the shaft where the original engine was set up was also the first to attain any considerable depth or produce ore of commercial value. Both the mill and shop were operated by water power, and to this mill the product of the mine was taken for stamping and concentrating. The walls of the old mill are still standing, and a portion of the water wheel (which was used for driving) as well as the dam, which was built by Hornblower for the needed supply of water power. Roosevelt named these shops "Soho," after the large establishment in the old country; and it was in this machine shop that the first steam engine built in this country was made.

The smelting works were in charge of one Smallwood; and John Hewitt[6] and a German named Rhode were employed here, the former to make patterns, and Rhode to make castings for the engine for Robert R. Livingston's steamboat, the "Polacca." This boat started on her trial trip on Oct. 21, 1798, was 60 ft. long, and was operated by a jet of water forced out of the stern by a powerful centrifugal pump. The engine had a cylinder 20 in. diam. and of 2 ft. stroke.

The management under the new arrangement was not satisfactory to Mr. Hornblower, and in 1794 he retired. The company introduced German miners because of the low wages, but the work was abandoned early in the nineteenth century; the old engine was broken up and the material disposed of. The boiler, a large copper cylinder with a flat bottom and dome-shaped top, was carried to Philadelphia as a relic.

In a chapter devoted to "Mines, Minnerals, Stones and Fossils" of an early history of the United States, occurs the following: "A copper mine, on the Pasaic, a few miles north of Newark in New Jersey, has been wrought to advantage, and an association by the name of the Soho company, has been incorporated for the purpose of prosecuting the business."

NINETEENTH CENTURY

An effort to work the mine in 1833 (when an English company took hold) is referred to by I. Finch[7] as follows: "The mines are now reopened, a steam engine erected to drain them, and the works are proceeding with spirit. It is the only copper mine worked in the United States."

The mine was at this time under the supervision of William Tregaskis; the Victoria shaft was reopened to a greater depth and a more powerful engine installed. It is supposed that Tregaskis gave the shaft its name, for in later operations it is always so referred to. It is not known how long this company operated, but it is supposed that it found the ore of less value than represented. "In 1833, when this company was forming to work the mine, it was represented that 'the ore of the principal vein yields from 60 to 70 per cent. of copper, and the vein will produce, it is supposed, from 100 to 120 tons of ore annually, which yields from 4 to 7 oz. of silver to the hundred pounds; and, like most copper ores, a small portion of gold. When pure copper was sold in England at £75 sterling the ton, the ore of this mine was shipped from New York for that market at £70 the ton.' (£70 New York currency = $175.)"[8]

The mine was worked in 1855 and 1856 by a Philadelphia company for which Theodore Moss was engineer; but the work done between 1833 and 1859 was but little. Some parts of the mine were worked by a man named Cathuey, on a contract basis, for unknown parties.

In 1859, the Brisk company acquired the mining rights and property, but it sank no shafts. All the shafts upon the property were sunk at some time previous to this. It did, however, open some of the old shafts and operated the mine from 1859 to 1865 with much of the old machinery. At this time it was known as the Victoria copper mine and there were about 200 men employed as miners, laborers, and workers in the mills. In 1865, presumably in February, an accident happened to the pump; before repairs could be made, the water rose so high that the proprietors stopped work, thinking that improved processes would enable them to treat the ore in this country instead of sending it to Swansea, Wales, where much of the ore was formerly sent. The mine was abandoned and many tools were left in the lower drifts, as the water began to rise before the miners had an opportunity to collect them.

The Victoria shaft is reported to be 347 ft. deep, but all is mud below the 240-ft. level and difficult of access. The old Cornish pump is still in position at the bottom of the shaft, buried in mud and fallen timbers. It is said that there are three drifts from the bottom of the shaft; one toward the northwest about 180 ft. long; one running southwest 180 ft. long; and the third running north about 210 ft. The mill at this time was near the mine and had 25 stamps of the old Cornish type with wooden stems. The ore as it came from the mine was cobbed and hand-picked. The high-grade material was shipped without further treatment, and the lower grade was concentrated by jigs and buddles. When the Brisk company ceased operations, their engine house caught fire and burned down. The machinery, antiquated even for that time, was inefficient, and the company quietly passed out of existence. They worked, however, too near the surface in one portion of the mine and in 1866 a cave-in occurred.

In 1892, the New York & New Jersey Mining Company endeavored to work the mine, but its capital was not sufficient. It robbed the pillars where some of the best ore had been left, brought the surface down in another cave-in, and ceased operations.

In the fall of 1899, an option was secured upon the property; three interested parties made examinations and cleaned out two of the old shafts. They unwatered the lower levels, and promoted a company to operate the mines. This company built a reduction plant which has been described in this JOURNAL,[9] but in its operation it was found that the material was not as susceptible to the proposed chemical treatment as was expected. "The money was expended under the direction of an 'expert' in the installation of a plant of unique design, with good machinery, but no local metallurgical value. When run on the ore it was found that the tanks would not hold the solution and the copper would not precipitate."[10]

Part of the older portion of the mine is, at this writing, being worked as a stone quarry; the sandstone has a commercial value as building material.

PRESENT CONDITION

The geological formation is Triassic gray and red sandstone and shale, with intrusive trap dikes. The sandstones are inclined at an angle of about 9 deg. from

[6] An ancestor of ex-Mayor Abram S. Hewitt, of New York City.

[7] "Travels through the United States and Canada." London, 1833, p. 277.

[8] Gordon's *Gazetteer*, p. 12.

[9] Feb. 3, 1900, p. 135; May 25, 1901, p. 661.

[10] "Annual Report of the State Geologist," Trenton, N. J., 1902.

the horizontal; the trap is partly brecciated and often forms, with the sandstone, a metamorphic conglomerate. The ore is chalcocite with carbonates. Small quantities of cuprite, or red oxide, and of copper silicate are also found, as well as minute particles of native copper. The ore itself is not in any vein with well marked boundaries, but occurs in pockets, or bunches, and seams which ramify through two thick layers of sandstone and a thin bed of shale. There are numerous faults in the deposit, and it is at these points and in connection with small trap dikes that some of the richest ore is found. There is considerable shaly slate which assays from 6 to 7 per cent. The ore also occurs as finely scattered particles, or as thinly diffused coloring matter.

The geological formation is shown in Fig. 1. The illustration represents the face exposed by some years of quarrying for the sandstone. In the illustration, *C* refers to the quarry floor; this is the top of a bed of red sandstone and shale; the gray sandstone lies in two layers, the lower extending from *C* to the lower edge of the seam *B*, and the upper extending from the upper edge of the same seam to the shale and brecciated trap at *A*. The two layers are, at the point shown, each about 11 ft. thick; the seam *B* is a shaly slate that runs about 6 per cent. copper; it is about 6 to 9 in. thick. The opening *D* cuts through the two beds of sandstone, and through the seam *B;* it extends for a part of its length into the roof of shale and trap. At the points shown, the white streak is a discoloration due to the presence of calcite in that particular spot. The shale and trap below it carry considerable copper.

In Fig. 2 is shown an old ladder, found below the water line, in the Victoria shaft; this was made of oak and had been submerged for 35 years; it was very heavy, due to the water it had absorbed, but strong and still capable of hard usage. At the foot of the ladder is shown a section of piping of a form that is unusual at this day; this is the pump valve of the old Cornish pump. The flanges shown were used for attaching the valves. The old pipe was joined, not by flanges or screwed connections as in present practice, but by a method somewhat similar to the bell and spigot connections used for water mains. The joints were not leaded, but were packed with rope and tar, and then a sleeve was driven on to hold the pipes and the packing in place.

Fig. 3 shows the general appearance of the quarry face and the entrances, through drifts, into the mine workings. This is taken from a later photograph than Fig. 1. and the quarry floor is buried under about 10 ft. of ore.

Forty-two shafts in all have been sunk at various times and places, many of them connecting with passages of the most tortuous character; eight of them connect with the three drain tunnels, which have been run for unwatering the mine. The longer of these tunnels is 1300 ft., and connects through a drift with three large chambers that have been stoped out. One of these measures 670 ft. in perimeter.

For the past three years, the entire establishment has been idle, the prey of the speculator and the cause of much disappointment and legal quibbling. It may be that the days of its usefulness as a producer of copper are over, and it is certain that where 150 years ago teamsters were carting "fire stone" to the historic engine, a settlement of the distinctly modern suburban type is fast obliterating the last traces of the old landmarks.

Acknowledgments are due for much of the information contained in the foregoing, to various reports of the state geologist of New Jersey, to a paper on "Josiah Hornblower," read by William Nelson before the New Jersey Historical Society, at Newark, May 17, 1883, and to Mrs. Cortlandt Van Renssallaer.

Notes from Cobalt

EDITORIAL CORRESPONDENCE

The recent upheaval among Cobalt stocks is looked upon here as being a stock-jobbing scheme and everybody in this camp voices the opinion that Nipissing is sound both in title and property. The rumor reaches here from New York and elsewhere that vein 49 has pinched out and has run into slate. The best posted men discredit this statement absolutely, and there seems to be no foundation for the report.

There has been considerable snow and trains are many hours late. In spite of climatic conditions visitors are arriving every day and the prospectors leave for the outlying claims each morning, returning at dusk. Open-cut work continues as usual, but this method of working is being superseded by shaft sinking as soon as the owners are in a position to make the change. The reasons for open-cut work are (1) because the owners wish to realize quick returns in order to pay for development work; (2) the vein is not proved sufficiently to warrant the expense of a shaft; (3) the owners are looking for an opportunity to sell their claims rather than work the prospect themselves.

There seems to be a strange idea of the value of money. A claim holder will calmly put a price of from $30,000 to $150,000 upon property which might possibly be worth $5000 to $10,000. There is considerable litigation over claims, and some properties have been tied up for a long time. Others have just been straightened out, and are being operated, but must pay a royalty to the crown.

There are many men here who have been sent to Cobalt to acquire properties for New York, Toronto, and Ottawa capitalists and good claims seem to be very scarce except at very high prices.

The New Smithsonian Secretary

Prof. Henry Fairfield Osborn, of New York, has been elected secretary of the Smithsonian Institution to succeed the late Prof. Samuel P. Langley, and doubtless will accept the position. For several years Professor Osborn has been at the head of the department of vertebrate paleontology of the American Museum of Natural History, and he is a vice-president and trustee of that institution. He is also Da Costa professor of zoölogy at Columbia.

He was born in Connecticut in 1857, and was graduated from Princeton in 1877. Three years later he was appointed assistant professor of comparative anatomy at Princeton. Since 1900 he has been the paleontologist of the United States Geological Survey, and from 1901 to 1903 he served in the same capacity for the Canadian Geological Survey.

Australasian Gold Production

Gold production in Australia has shown a small decrease this year, owing to a smaller output in western Australia and Queensland. The official figures for the more important States for the nine months ending Sept. 30 are as follows in ounces of fine gold:

	1905.	1906.	Changes.
New South Wales....	189,288	195,885	I. 6,597
Queensland.....	436,286	391,244	D. 45,042
Victoria..... ...	526,167	570,447	I. 44,280
W. Australia....	1,469,352	1.345.653	D. 123,699
Total.....	2.621.093	2,503,229	D. 117,864
New Zealand....	374.836	391.536	I. 16,700
Total.....	2,995 929	2,894.765	D. 101,164
Value.... ....$61,925,852	$59.834,793	D. $2.091,059	

The decrease in Western Australia is due chiefly to the outlying districts, the large Kalgoorlie mines showing little change. In Queensland the loss is chiefly in Mount Morgan, which shows a lower gold output, with a large gain in copper.

Returns have not been received from South Australia and Tasmania. Allowing for those States the returns indicate a probable total for Australasia of not far from $85,000,000 for the current year.

A new process invented by Sig. Conedera, manager of the Fenice Massettana & Capanne Vecchie Mines (Massa Maritima), for production of sulphate of copper direct from ore leaching, having given good results in industrial experiments, the Societá di Montecatini, owner of the mines, has decided to construct a plant to produce 500 tons of sulphate of copper per annum, says the London *Mining Journal.*

COAL MINING AT HOLDEN, W. VA.—I

The Location, Development and Operation of a Great Enterprise.

BY R. H. LYMAN*

In Logan county, West Virginia, about 75 miles southeast of Huntington, capital, genius and industry have combined to create what is probably the model coal-mining operation in the United States, if not in the world. This is a broad statement, but made advisedly, and for proof I would recommend a visit to Holden to see its perfectly developed mines, its beautiful and substantial buildings, its shops, mills and railroad.

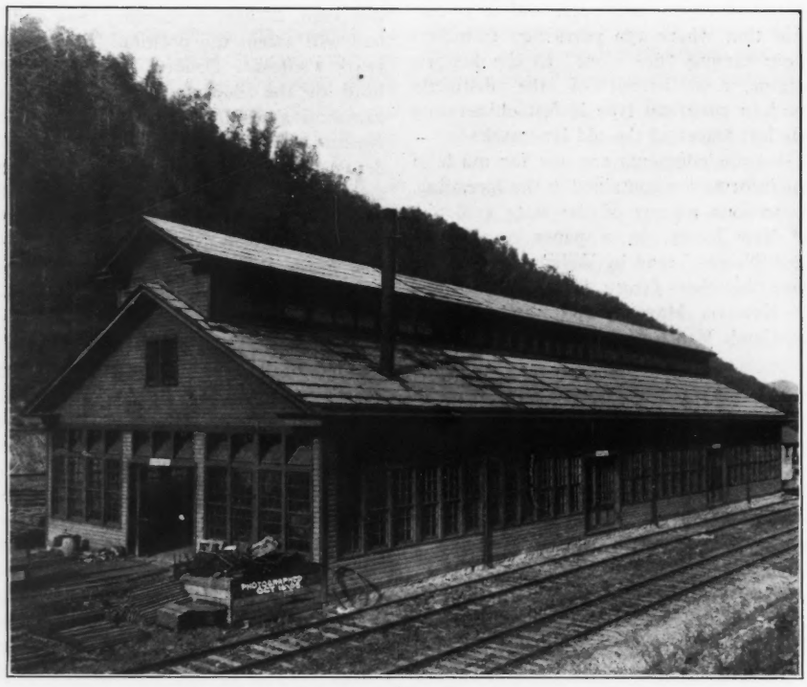


FIG. 1. MACHINE SHOP

PRELIMINARY WORK

In 1902 the United States Coal and Oil Company, with head offices in Boston, officered by A. F. Holden, president, with E. A. Clark and W. H. Coolidge associated with him on the executive committee, and F. W. Batchelder, treasurer, purchased approximately 30,000 acres of land in Logan county, on Middle fork of Island creek, four miles from Logan Court House, and eight miles, as the crow flies, from Dingess. Ground was broken in September of the same year and work begun in building the town of Holden, opening the mines, etc. The surveys were made and plans drawn by the W. G. Wilkins Engineering Company, of Pittsburg, with R. F. Carson as resident engineer, while the direction of the work, purchase of supplies, general management, etc., was under the supervision of E. P. Merrill, superintendent, and now general manager in charge of all the West Virginia interests of this and allied companies.

During the early construction period the employees were sheltered by tents pending the erection of houses. A large force of men was at once put to work in all departments. An average of 100 mules and oxen, about equally divided, were employed in logging, grading and transporting supplies from Dingess, on the Norfolk & Western Railroad, 16 miles distant by mountain road which at times was almost impassable, it requiring, in the winter months, three days to make the round trip with a five-yoke ox team.

LUMBER AND STONE RESOURCES

Almost the first work was the installaton of a portable sawmill. A tram-road was built up Trace fork and logging operations commenced. In a short time sufficient buildings were up to shelter man and beast. The portable mill was soon succeeded by a modern band mill of a daily capacity of 25,000 b. m., and has been running to its full capacity ever since. A complete planing, lath and shingle mill is also in operation. This equipment furnished all the lumber and mill work for the entire plant and is now busy on orders for the open market. Over 10,000,000 ft. have already been cut and there are probably 50,000,000 ft., mostly yellow, poplar and oak, of merchantable sizes, still standing. The Bureau of Forestry had a surveying corps on the property for some weeks two years ago, which made a complete report and recommendations, with the result that no timber under a certain size is being cut. Careful attention is also paid to methods of logging, forest fires, etc. This policy should insure a constant growth for all time.

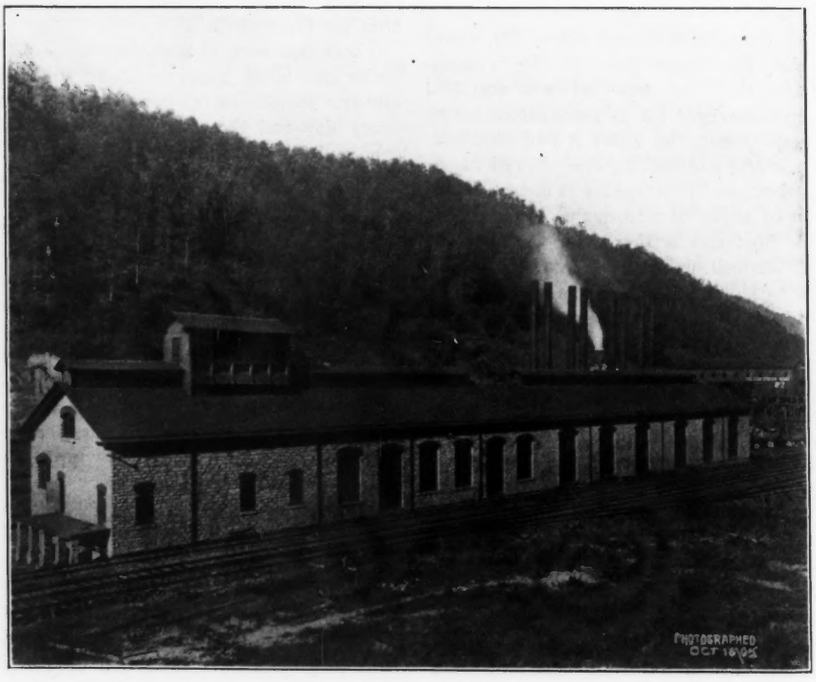


FIG. 2. POWER HOUSE

*Mining engineer, Huntington, W. Va.

All the stone required for foundations, power house, store building, etc., was obtained from the quarries of blue sandstone on the property. Owing to the great expense of transporting over the mountain the several million brick required for chimneys, etc., a search was made for a suitable clay bed in the neighborhood and a plant with a daily capacity of 10,000 brick was put into successful operation, effecting a saving of over $20 per thouand.

FIG. 3. INTERIOR OF THEATER FROM REAR OF AUDITORIUM

The original plan of the company was to build a railroad to connect with the Norfolk & Western at Dingess. This involved a tunnel 1700 ft. long through the mountain. The Chesapeake & Ohio Railway Company, however, having decided to extend their Guyan Valley branch from Midkiff to Logan, a distance of 40 miles, it was decided to connect with the latter road at that point, which was accordingly done. The Island Creek Railroad Company was duly incorporated and the road built. It has substantial bridges and a pefect roadbed conforming in every way to the Chesapeake & Ohio specifications. Besides moving all the coal mined by the company a regular passenger service is in effect, connecting with all trains arriving at and departing from Logan.

GEOLOGY

There are several well defined seams of coal on the property, only two of which, locally known as the 7-ft. and 5-ft. seams, however, have been opened, the latter being about 40 ft. below the former. The company is working the 7-ft. seam exclusively, and from it has been mined all the famous Island Creek coal, which, though only a little over one year on the market, has already taken rank with the highest grades of steam and domestic coal mined in West Virginia.

This seam varies in hight, but approximates 7 ft. as follows:

Slate	
Coal	26 in.
Slate	1 in.
Coal	57 in.
Slate	

It will be noted that there is both a slate roof and floor, making the coal mined unusually clean. The parting, a hard slate, is practically uniform in its position, but varies from ½ to 1½ in. in thickness. The coal breaks freely from the parting and roof.

The following two analyses, taken from widely different points, indicate the average composition of the coal:

Moisture	0.17	0.23
Vol. matter	37.14	37.93
Fixed carbon	59.37	58.62
Ash	3.32	3.22
	100.00	100.00
Sulphur	0.82	0.76

By the West Virginia Geological Survey the seam is described as identical with the Campbell's Creek or No. 2 Gas of the Kanawha series. Many coal men, however, believe it to be of either the Stockton or Coalburg bed of the same series, owing to its close resemblance to the well known Thacker coal mined on Tug Fork of Big Sandy. In appearance the coal is very hard, with the exception of near the floor, where in places it mines soft, with the characteristics of the ordinary Kanawha gas coals.

MINES, TIPPLES AND YARDS

Two mines have been opened on opposite sides of Island creek, known as No. 1 and No. 2. The room and pillar system of mining is used, and headings are driven 12 ft. wide with ample barrier pillars left to protect the main headings. Four main entries are driven on butts of the coal, the two outside headings being the return air courses, one being overcast to the other at the fan; the two inside entries are used as light and loaded haulways.

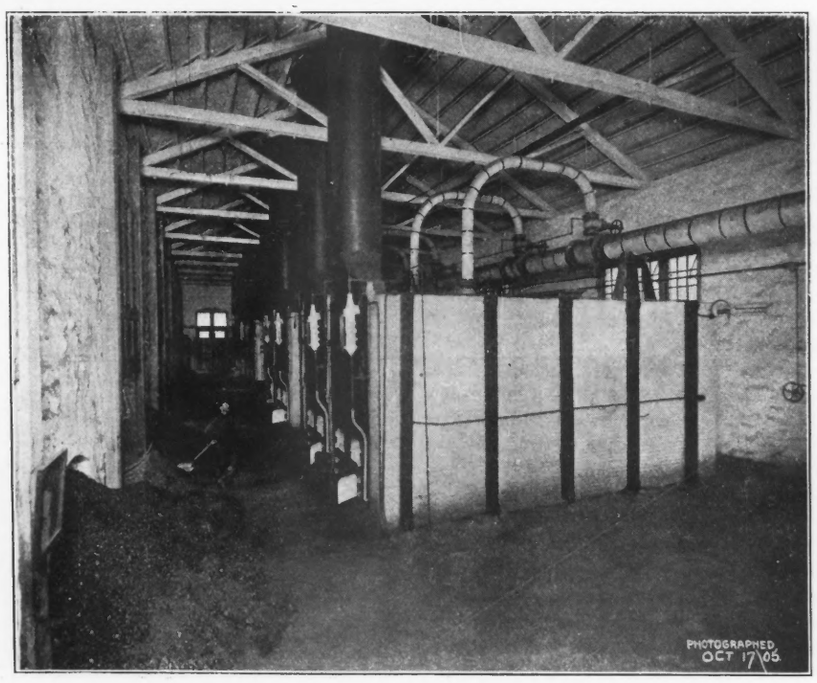


FIG. 4. BOILER ROOM

Double-face entries are turned both right and left every 1000 ft., and double

butt entries are turned one way every 550 ft. on the face headings. Rooms are turned both ways on the butt headings on 62-ft. centers, and driven 36 ft. wide with 40-ft. necks.

FIG. 5. THEATER BUILDING

As to ventilation, the two main haulways serve as intakes; the air is split for each pair of face entries, when a continuous current is used to ventilate the respective butt entries. At no time is the velocity of the air allowed to fall below 200 ft. per minute.

A 10-ft. Stine fan is used at each mine, driven by a 35-h.p. motor. They are run at 180 r.p.m., producing 80,000 cu.ft. of air against a 2-in. water gage, but the development is rapidly outgrowing their capacity, necessitating the early installation of heavy-duty centrifugal fans in their place.

Mine cars of two tons capacity are in use. They are made in the company's shop and equipped with 18-in. Watt wheels. The loaded cars are mule hauled to the siding at each butt entry, then hauled by 10-ton motors to bottom of slope, whence they are carried to the tipple by a chain haul, a distance of about 175 ft., on a 25 per cent. grade. It is proposed to install gathering locomotives at once. As to drainage, the seam has a slight raise to the northeast. Mines Nos. 1 and 2 are self-draining, and only sufficient water for sprinkling is obtained.

Both mines are equipped with the leading makes of electric chain coal-cutting machines which are giving excellent satisfaction. While mine No. 2 is considerably further developed than mine No. 1, both are in excellent condition and ready at any time to produce coal up to the estimated capacity of the tipple to handle it.

The tipples are 140x32 ft. and each equipped with two Phillips automatic cross-over dumps, automatic kickback and two sets of Akron bar screens. Each tipple is designed to handle 2500 tons of screened coal per day of ten hours and to load any hight of car now in use. An Ottumwa box-car loader, motor driven, is also installed at No. 2 tipple.

The railroad yards are extensive; there being room for fifty empties both above and below each tipple. The tracks are built on a 1½ per cent. grade, permitting the cars to reach the tipple by gravity and, after loading, be dropped down into the yard, from where they are hauled over the Island Creek Railroad to Logan and delivered to the Chesapeake & Ohio Railroad for delivery to destination and connecting lines.

FIG. 6. CLUB HOUSE

POWER PLANTS

The power house is built of blue sandstone and covered with Huntington Roofing Tile, making a very handsome and substantial appearance. The dimensions are 302x43 ft. Under the same roof are the power, boiler and ice plants, each being separated by thick stone walls. The boiler room is 160x40 ft., and has a battery consisting of eight return tubular boilers 6x18 ft. with room for four more. The water is heated before entering the boilers to 1210 deg. F. by a Pittsburg heater, the waste water from the ice plant being fed directly to the heater. Fuel coal is dumped into a row of stone bins directly in front of the boilers from hopper-bottom cars elevated on an incline. The boiler room is well lighted and ventilated by glass panel doors, with transoms, behind the boilers in addition to ventilators in the roof.

The engine room, 40x90 ft. is perfectly appointed; the electrical equipment was furnished by the General Electric Company, and consists of two 300-kw. direct-current generators, one 200-kw. alternating-current generator and one 100-kw. motor generator. There is ample room to increase the equipment when necessary. The direct-current and alternating-current generators are connected respectively with two 24x27-in. and

one 18x24-in. Ball & Wood Corliss engines.

A ten-ton Maris Bros. traveling crane with a 38.5-ft. span and 18-ft. hoist, is also part of the equipment.

There is also located in the engine room an Arctic ice machine of 15 tons daily capacity, while tank room and cold-storage room are in the west end of the building, separated by an 18-in. stone wall. The plant not only supplies ice for local consumption, but meets a large demand from various points along the Guyan.

(To be continued)

Mining Peat Bogs

BY RICHARD LEE

Peat mining in America is but an infant industry. There are extensive peat bogs in Florida, Massachusetts, Michigan, Wisconsin and Minnesota, many of which are now undergoing a preliminary development. In Maine, where nearly all fuel has to be imported, the mining of peat has proved a fairly profitable industry.

The two most important producers of this fuel are Germany and Ireland. In the former country the peat is made into briquets, while in Ireland the product is burned in its crude state, like firewood.

FUEL VALUE

Peat is not the equal of coal as a heating agent. Its greatest claim to popularity is due to its cheapness compared with coal. As a producer of gas, it is said to have qualities equal to coal, and actual tests along this line at St. Louis developed the fact that 2.4 lb. of peat would produce as much power when utilized in a producer-gas plant as 5.8 lb. when utilized under a steam boiler. This fact shows that its gas-producing properties are nearly twice its heating power. It is also cheaper and cleaner than coal.

When placed in a furnace, peat burns slowly and with little smoke. In Canada, where it is extensively used as a fuel, the average price is from $2 to $3 a ton.

Peat bogs are of three kinds: Grass, moss, and salt-water bogs. Up to the present time no important difference has been noticed in the three kinds.

METHOD OF PREPARATION

Peat when taken from the bog is nothing more or less than muck. It is principally formed of decayed vegetable matter and in many instances the plant structure is still evident. It holds a great deal of moisture and this element cannot be forced out by pressure alone.

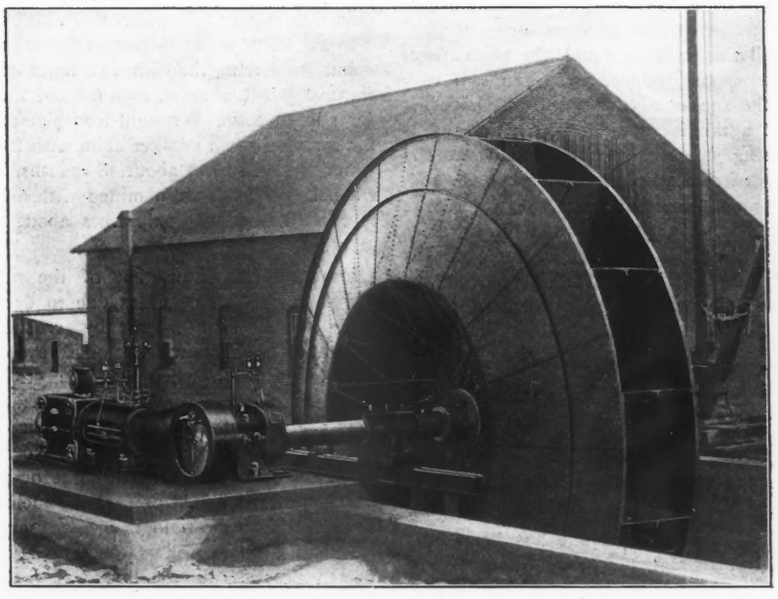
Before being manufactured into briquets, the peat must be run through a machine which tears it up and removes the moisture; this operation prepares it for molding and compression, after which the briquets are dried by the sun.

A New Steel Ventilating Fan

During recent years the practice has been to install larger ventilating fans. The 35-ft. fan here illustrated is manufactured by the Allis-Chalmers Company, and is of the double-intake center-draft type. These fans are built of sheet steel and angles, the blades being rigidly fastened to sheet-steel arms, which are in turn clamped between two cast-iron centers, so shaped as to present the least possible resistance to the air as it enters the fan; the blades are also well braced to insure their running true. The sides of these fans are inclosed, from the periphery of the intake to the periphery of the outside or top of blades, by steel plates reinforced by angle rings on the outside, and by angles on the sides of the blades on the inside.

This construction not only insures a strong, rigid fan for heavy duty, but it prevents loss of air due to clearance between the fan and the side of the housing, and also for the same reason reduces the friction. The fan is usually mounted upon a hammered-iron shaft secured to it by heavy keys. Then large set-collars in halves are placed one upon either side against the fan centers and clamped in recesses turned into the shaft; these prevent the fan from working upon the shaft. A bronze bushed water-jacketed bearing is placed upon either side of the fan, and these bearings, braced by suitable columns, are supported on long sole plates, the ends of which rest on the foundation and are securely bolted to it.

These fans may be arranged for direct connection to the motive power or provided with pulleys for belting, but in either case the apparatus is made exceptionally compact, and combines maximum efficiency and durability with minimum bulk and weight. When the fans are required to be placed in damp and dirty passages, the direct-connected unit has many advantages, for the use of belting under such conditions is far from desirable. The limited space available in such cases is also another argument in favor of this arrangement. The fans may be driven either by small Corliss engines or by motors, preferably induction motors, where alternating current can be supplied.



35-FT. FAN, WITH TAPER BLADES, CONNECTED TO REYNOLDS-CORLISS ENGINE

Government Mining at Cobalt

SPECIAL CORRESPONDENCE

Prof. W. G. Miller, provincial geologist, who has been in charge of operations on the Gillies timber limit in the Cobalt district, which is owned by the Province, reports that the shaft on the first vein is nearly completed to the depth of 75 ft. The shaft has been sunk at the side of the vein instead of in it, according to the general practice, as sinking beside the ore renders work easier in the winter season. Drifting on the vein will shortly be commenced. The sinking of the shaft on the second vein has been begun. This shaft will only be sunk to a depth of 25 ft. at present. Specimens from the first vein are rich in silver, but none have been assayed, as Professor Miller regards assays of ore promiscuously taken from a vein as unsatisfactory and deceptive, and prefers to await the more conclusive test afforded by the treatment of several carloads, at the smelter. The veins so far discovered by the staff on the limit have all been found within an area of some two square miles at the northern apex of the territory. The vein opened by the first shaft is within a few hundred feet of the Nipissing property. A force of 35 men is now employed and operations will continue throughout the winter.

COLLIERY NOTES

Details in the Operation and Development of Anthracite and Bituminous Mines

One progressive mine manager is preventing the formation of dust along his haulage by loading lump coal and slack coal in separate cars, and covering the cars which contain the fine coal.

In firing a furnace the workmen should moisten the coal before throwing it on the grate. This method of wetting the coal is advisable, as it prevents the small particles of fuel from being carried away by the draft. It is necessary, however, to proportion the water used, in order to limit the expenditure of heat required to evaporate it. As a general rule, about 6 per cent. of water is sufficient for the purpose.

All things being equal, the pressure or water-gage produced by a fan will vary as the square of the speed. Considering that a fan is running 200 r.p.m., and is passing 30,000 cu.ft. of air with a water-gage of 1 in., the same fan when running 300 r.p.m. would increase the water-gage to 2¼ in. Since the quantity of air varies directly as the speed, the volume due to the increased speed would be 1½ times 30,000, or 45,000 cu.ft. per min.

An unique arrangement is provided at an English colliery where each car of coal as it passes into the main haulway, operates a lever and receives a shower bath which is regulated by means of a valve, so that a proper supply of water is discharged. The operators of this system have met with no difficulty in weighing the coal, and the scheme has been generally successful in lessening the amount of coal dust in the entries.

It is interesting to remember that the power necessary to produce different quantities of air in a mine is not directly proportional to the volumes, but rather to their cubes. If 3 h.p. produced 15,000 cu.ft. of air per min., and it is desired to increase the volume to 45,000 cu.ft. per min., it will be seen that this increase is to treble the initial volume, which means that the horse-power necessary must be 27 times as great, or 81 h.p.

When it is desired to increase the rapidity with which an entry or other piece of development work is being done, it has in some cases been found more economical to adopt a six-hour shift, with one workman always commencing at the middle of a shift and remaining until the middle of the succeeding shift. This man is familiar with the work that has just been accomplished and can see that the succeeding shift is not handicapped by trying to find out where to begin.

In building a dam in a gangway or entry to hold back a body of water, it is best to build an arch of stone or brick laid in cement with the convex side facing the pressure. If the gangway is wide in proportion to its hight, the arching should be from the bottom to top. If the entry is high in proportion to its width, then the arching should be from side to side. In building such a dam, the skew from which the arch springs should be cut with a pick, because blasting is apt to open cracks in the strata and cause a leak.

In flushing culm into a mine to fill old workings so that the pillars may be removed, it has been found that on a level or down grade, 1½ lb. of water are required to deliver 1 lb. of breaker culm, and 2 to 2½ lb. of water to flush 1 lb. of bank culm. In forcing the culm to a hight of 90 ft., up a 300-ft. slope, it took 6 lb. of water for 1 lb. of culm. Wrought-iron pipe used for carrying small breaker culm with fresh water is said to last about 18 months, but when larger bank culm mixed with ashes is carried, the pipe only lasts about six months.

Investigations show that of the mine timber lost, 65 per cent. is due to decay, while 35 per cent. is lost by crushing. Wood that is constantly wet or always dry lasts longer than when subjected to an alteration of these conditions. When insects are present in mine wood, their destructive work does not seem to be in any way affected by the lack of light or the presence of gases. At present the method of immersing mine timbers in a perservative bath is favored rather than the former practice of painting the timber with creosote or carbolinium.

When fire-damp is present in mine air so that there is one volume of gas to five of air, the mixture will not explode. If ten volumes of air are present to one of gas, a violent explosion may take place. Again, if there are fifteen or more volumes of air to one of gas, the mixture is considered non-explosive. In this connection, however, one fact should be borne in mind, viz., when the mixture in a mine air is just above or below the explosive point, the discharge of a heavy shot or a sudden fall of roof may so compress the mine air, and raise the temperature that the mixture will become explosive.

The formation of gases from the oils used by lubrication in the cylinders of air compressors is likely to occur and cause an explosion when the pressure exceeds 60 lb. per sq.in. To overcome this fault, we must avoid all pockets or blind ends in the pipes leading the air, and only sufficient oil should be introduced into the cylinder to lubricate the piston, the valves being oiled separately. If the compression is to be more than 60 lb. per sq.in., compound compressors with intermediate cooling are generally favored.

In ventilating an anthracite coal mine, the law requires that for every man employed, 200 cu.ft. of air per min. shall be sent in the mine, and in bituminous mines, the quantity is 100 cu.ft. per man per min. To show the difference of opinion regarding this subject, we call attention to the laws existing in foreign countries; for instance, in Belgium, the minimum quantity of air is regulated by the output of fuel, and is specified as 70 cu.ft. per min. per ton of coal produced. Each system is so inadequate to meet all conditions that it is difficult to tell which of these laws is most defective.

In the manufacture of coke one of the serious problems is the prevention of black ends. To prevent this objectionable feature, which is caused principally by the charge coming in contact with the lower temperature that exists near the front of the oven, a new style coke-oven door has recently been designed. These doors are constructed from specially designed fire-clay blocks, which are flued on the inside, and can be readily built in by any ordinary brick layer. Into the flues, which run through the doors, a small amount of gas maintained at such a temperature that the coal is coked completely up to the oven door, is sent.

Of the three conditions which have led to the formation of various grades of coal, heat has played a more important part than either time or earth folding. In certain Western fields we find coal which has been formed in the early Tertiary age, having the same general composition and characteristics as coal formed in the Cretaceous system in another locality. As to crustal movements, it is well known that such action produces considerable heat, but not sufficient to affect materially the character of the coal, as is shown in the case of the Pennsylvania anthracite, and West Virginia bituminous, where the folding has been similar. The action of heat is now considered the active cause of the changes in coal; this theory being strengthened by experiments, which have proved that changes in atmospheric conditions and temperature not only affect the moisture content, but also the volatile hydrocarbon in any coal. The theory that heat is responsible for the changes in coal is more readily accepted when it is remembered that our present deposits which are near the surface, were once buried by thousands of feet of overlying strata, and consequently, were in a region materially affected by the earth's interior heat.

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**Illustrated*

The Cause of the Courrieres Disaster

The commissioners who investigated the recent catastrophe at the Courrières colliery, in France, say in their final report that it was due to an extensive dust explosion, without the presence of any considerable quantity of gas. The greater part of the workings were considered so free from fire-damp that naked lights were used. Among other facts, it was noted that the explosion was particularly violent in many of the intake airways, where it is unlikely that fire-damp would be.

The positions in which the bodies of the victims were found seemed to indicate that none had been alarmed before the explosion by any unexpected appearance of inflammable gas, and no fire-damp has been found anywhere in the mine since the disaster.

It is agreed that most of the entries where the destruction was greatest contained much inflammable dust, and the fact that the explosion ceased when it arrived at places where dust was either absent or of a slaty nature is significant. Nearly all parts of the mine showed a deposit of partially coked coal, which affords good evidence of the passage of flame.

The former belief that the Cécile fire, which was discovered in a return airway, was the cause of the explosion has now been entirely discredited. The stoppings which were built to shut off the fire were completed the night before the explosion, and of the five stoppings on the return side, three were left intact, while the other two were blown inward, which would not have been the case if the fire had caused the accident.

In attempting to arrive at the origin of the disaster, the direction of the blast was traced, which eventually led the inspectors to a large district of working in the Josephine seam. At the face of one of the entries in these workings, a blown-out shot hole was discovered which has led many to believe that this point was the origin of the explosion. No living evidence remains to verify the theory, for this working place contained only broken cars and the charred remains of the three miners who were there employed. Naked lights were used in this heading, and much dust was said to exist. The hole, which was about 5 ft. deep, was enlarged at the end to nearly 6 in. in diameter, while the coal forming the inner surface was shattered. It is said that the hole was charged with Favier No. 1 explosive, and the coal face near the hole shows the mark of a pick, which seems to indicate that the men were attempting to remove the charge which had failed to explode.

It is probable that the true cause of the accident will never be determined. However, it is certain that even though the initial cause of the disaster was due to a blown-out shot or an explosion of fire-damp, this does not interfere with the main conclusion that it was through the agency of coal dust that the explosion was propagated.

The Courrières disaster brings forth once more the fact that coal dust is a dangerous factor in working our mines, and emphasizes the necessity for preventing the accumulation of dry coal dust in the roads and gangways of our workings. Safety lamps alone will no longer protect the miners from this destructive agent, while the quality and character of the explosive we permit miners to use is a matter of much importance. One other lesson we may learn is the danger that attends our practice of often connecting the workings of different mines. The advantages of better ventilation, more convenient haulage, and the necessity of fewer extra shafts this method insures are overbalanced by the possibility of a more extended and more destructive explosion.

A Relapse of Vigilance

Familiarity may not always breed contempt, but in the greater number of cases it certainly is the cause of indifference. If we were to review briefly the list of casualties occurring in our coal mines each year, and then investigate in detail the causes responsible for them, we should disclose that a large number of accidents have occurred because proper precaution had not been exercised. It would also appear that the ignorant employee is hardly as often the transgressor as the more intelligent mine foreman or superintendent.

Coal mining is attended by many dangers, and there is no room for the faint-hearted among men engaged in this industry. With all respect to the hardy, courageous men who are developing our metal mines, it is safe to say that nine out of every ten will openly acknowledge their timidity when it comes to entering a coal mine.

When an explosion occurs in a colliery, it is not a matter of hunting for rescuers to form the exploring party; the question principally consists in selecting a few from the many who offer to go. Whatever mistakes are made by these parties, and whenever their lives are lost, we may, and do condemn the act; but the spirit of fearless self-sacrifice and heroic effort is nevertheless present, and we must bare our heads to the brave fellows who do the deed, knowing, as they must, that failure means censure, and success silence. In work of this sort there are no bands to welcome the grimy workers home, nor cries of "well done" by the multitude.

A week or two ago, at the Central mine, near Scranton, Penn., Evan Williams and Benjamin Evans closed their creditable careers in a faithful pursuance of duty underground. Believing that there was some derangement of the ventilating current in the Clark vein, the two men went into the mine to determine the nature of the trouble. It seems that Williams, the fire boss, was in the lead, carrying a safety lamp, when he suddenly detected a pocket of gas. He turned to give warning to his companion, who was carrying a naked light; but Evans was too close, and the explosion resulted. Both men were badly burned.

As is always the case, our after-sight is better than the preliminary view, and we can then usually discover how the undesirable might not have happened. Only too often the verdict might read, "A relapse of vigilance." Some will say that Evans should have carried a safety lamp, and others that he should not have followed so close; it is probable that he had been through these same workings many times before, and found no necessity for such extra precautions. One fact, however, is emphasized; that is, the necessity for a safety lamp that will not only show a satisfactory gas test, but will give sufficient light to make it unnecessary for a miner to carry any other illuminant to show the way.

We attempt to draw no moral from the episode, and trust only that statements and re-statements of the facts leading to such unfortunate occurrences, will make their imprint on the memories of our brother miners, and present themselves for consideration at a time when courageous impulse has blinded the sense of reason and precaution.

Withdrawal of Coal Lands

"It is not wise that the nation should alienate its remaining coal lands. I have temporarily withdrawn from settlement all the lands which the Geological Survey has indicated as containing, or in all probability containing coal. The question, however, can be properly settled only by legislation, which, in my judgment, should provide for the withdrawal of these lands from sale or from entry, save in certain special circumstances. The ownership would then remain in the United States, which should not, however, attempt to work them, but permit them to be worked by private individuals under a royalty system, the Government keeping such control as to permit it to see that no excessive price was charged consumers. It would, of course, be as necessary to supervise the rates charged by the common carriers to transport the product as the rates charged by those who mine it; and the supervision must extend to the conduct of the common carriers, so that they shall in no way favor one competitor at the expense of another. The withdrawal of these coal lands would constitute a policy analogous to that which has been followed in withdrawing the forest lands from ordinary settlement. The coal, like the forests, should be treated as the property of the public, and its disposal should be under conditions which would inure to the benefit of the public as a whole."

The above is from the President's message, and is the first step following his recent order of withdrawal of the unoccupied coal lands from entry. The next step in the execution of this policy, if it be adopted, must be legislation by Congress. We hope that Congress will enact such legislation.

The time has come when the Nation should cease to give away its natural resources, which are the property of all the people, except when such gifts may be to the general advantage of all the people. The throwing open of the national domain to the prospectors for ore was such a policy, and probably still is, though perhaps less so now than formerly. The location of coal seams does not require the same patience, hardship, and individual skill as does the discovery of metalliferous veins. The value is more directly dependent upon transportation facilities, and the low price at which the coal lands have heretofore been sold has given certain interests, especially the railway companies, unfair advantages in securing large tracts.

There have been grave abuses in the acquisition of these lands. Many large areas have been secured by fraudulent entries, and gross violations of the public-land laws. It will be the policy of the Government to recover such lands as can be proved to have been improperly entered. In the meanwhile it is wise to reserve for the benefit of all the people the remaining coal lands, estimated to amount to 50,000,000 acres. That the President's action was taken none too soon is manifest from the fact that the coal-land grabbers were beginning to encroach upon the forest reserves.

The Patent Office

The necessity for a reorganization in the Patent Office is exciting considerable discussion, which is of general interest, because almost every thoughtful American is an inventor. A large proportion of them, including many engaged in mining and metallurgy, have at one time or another filed applications for patents. We feel sure that the expressions of Mr. Benjamin, printed elsewhere, will strike a corresponding chord in the minds of many of our readers.

There are many able and earnest men among the examiners at the Patent Office, and when an application comes before them, it is a pleasure to carry on the correspondence, and perhaps meet them personally to discuss the nature of the invention and the phraseology of the claims for it. However, there are many among the assistant examiners who first excite the amusement, and finally arouse the ire of the serious applicants. Many cases of that character have come under our observation, as have also many cases of patents allowed, which have caused us to wonder what sort of an examination the application had been subjected to. Indeed, it sometimes appears that the more truly a thing is an invention, the more difficult it is to run the gauntlet of the Patent Office, while for ease and comfort, it is necessary only to claim a patent on something as old as the hills.

Mr. Benjamin and other critics have accurately called attention to the fundamental cause of the trouble. It is to be hoped that Congress will do its obvious duty in providing means for putting the Patent Office upon an improved basis.

American patents already rank high, in general, in the public estimation. They ought to rank higher, even as high as the German. At the same time the inventors, not only of this country but also of all others, who apply for American patents, ought to be able to get a square deal.

The Nipissing Mystery

The mystery as to the reasons of the Guggenheims in withdrawing from their Nipissing contract continues as deep as it was last week. Daniel Guggenheim will give no explanation; the principals on the other side will give no explanation. Both parties are silent even to intimate business associates. The air has been full of rumors and surmises, but they are rumors and surmises, nothing more. The only thing that appears to be certain is that several of the original promoters sold out their holdings when the stock rose above $25; but on the other hand some kept them.

The further weakness of the stock, it having sold down to $12 or thereabouts on Dec. 10, betrayed the continuance of suspicion as to the future of the company. There appears to be no lack of confidence at Cobalt, but of course that is not the place where the facts are most likely to become known. The only satisfactory development of the week is the manner in which the Nipissing disaster has been localized, so to speak, there having been little or no weakness in the other mining stocks, while even in the outside Cobalt group prices have been well sustained, and the prospects for the mines are regarded hopefully.

The break in Nipissing caused the loss of a great deal of money, but it was largely a rich men's affair, and the small investors do not appear to have suffered heavily, for which they may be truly grateful. The criticism of the Guggenheims on the ground that they were merely carrying out a stock-jobbing transaction has become more severe. We are disinclined to believe that their motive was anything like that. We think it would be their best policy to make a frank explanation.

The Metric System

The persistent agitation for the compulsory use of the metric system in the United States has brought us practically to a choice among three procedures, namely: (1) The retention of our present system unchanged; (2) the retention of our present system, modified and improved in its details; (3) the adoption of the metric system. Few of the partizans, pro-metric or anti-metric, can find fault with the appeal of Henry R. Towne before the American Society of Mechanical Engineers, last week, that a technical commission be created to investigate and report upon the whole subject of weights and measures. Certainly this proposal is distinguished for its sanity. Coming from an engineer and manufacturer of the eminence and attainments of Mr. Towne, it has especial weight. The appointment of such a commission would, or at least ought to, remove the subject from the domain of academic discussion, of which there has been too much.

Coal and Iron in the Emerald Isle

The Irish miners of the United States, of whom there are many, mostly fine men, will be interested to learn of good news from the old country. Immense beds of coal of good quality and black-band ironstone are reported to have been discovered in the Ballycastle district in North Antrim. Professor Cole, whose name appears to be highly appropriate, estimates that there are at least 55,000,000 tons of coal in the district, while the borings for iron ore are said to justify the estimate of 150,000,000 tons. As if this were not enough, it is regarded that there are, moreover, great deposits of fireclay, well suited to the manufacture of brick. The old saying is that "everything comes to him who waits." The old country has waited for prosperity a long time. We hope that at last good times are really going to come through the development of a great mining industry.

The Advance in Wages

Several more important advances in wages have been made during the last fortnight by mining and metallurgical companies, the United States Steel Corporation, and the Calumet & Hecla Mining Company both having announced an increase of 10 per cent., while the Quincy and other Lake companies have given 5 per cent., and the wages at Globe and Jerome, Arizona, have been raised to $3.75, which is the same basis that now prevails at Bisbee. The increases already announced amount to a large sum per annum, and are a direct bid for labor in a market of insufficient supply. As we forecasted at the time of the initial advances, all of the copper producing companies are having to fall into line.

WE ARE GLAD to be able to present this week some reliable information as to the new Greenwater copper district. Heretofore, reports have varied from the statements of the existence of bonanzas to the contemptuous summaries that there was only a wide-spread area of copper stain. There appears to be no question that the district does actually contain some lodes of ore that will be promising when working conditions are developed more favorably,but at present the conditions are decidedly severe, and it must be a matter of considerable time before they can be improved. Persons who are thinking of buying Greenwater stocks should take this into their consideration.

THE FLOOD at Clifton, Ariz., last week, caused by the breaking of a dam, which damaged the various smelting works of the camp to an extent that will interfere with their operation this month, or even check it entirely, is another instance of how the unexpected often upsets estimates of future production. Other events of the same character this year have been the caving in of the Atlantic mine and the riot at Cananea. The official reports of copper production in the first eleven months of 1906, that we have received so far, do not indicate any great increase in production over 1905.

IT IS CURIOUS that the engineers of the three companies that are now building great dressing works for the concentration of disseminated copper ore should each have decided upon a different system of ore crushing. The Nevada Consolidated is to have rolls and Huntington mills; the Utah Copper Company, rolls and Chile mills; and the Boston Consolidated, Nissen stamps. The ore is so nearly alike in all the cases that a comparison of the results, two or three years hence, ought to be highly instructive.

ACCORDING TO an authoritative correspondent, Johore, which is one of the independent states of the Malay Peninsula will prove to be a large tin producing country. At present, the region lacks development.

Unnecessary Loss of Life in the New York Tunnels

BY R. W. RAYMOND

In the JOURNAL of June 2, 1906, I published an article on "Blasting in New York City," calling attention to the dangerous character of the method of rock-excavation commonly pursued by contractors in the tunneling now in progress under this city. My protest has received fresh emphasis from the recent loss of several lives, as a direct result of the system I condemned.

As I explained in the article referred to, the usual present procedure is to drill deep converging holes in the face of the tunnel, explode in them heavy charges of dynamite, and thus produce an irregular cave, with shattered sides and roof. After removing the displaced rock, the desired section of the tunnel is perfected by further and less violent operations. This method is unquestionably objectionable from an engineering point of view, because it leaves the rock outside of the tunnel-section more or less fissured. It is objectionable also by reason of the annoyance and injury which it inflicts upon overhead buildings and their occupants. And to these grounds for its condemnation, we must add the further consideration that it is unnecessarily dangerous to workmen. The cave produced by violent large blasts must be entered, in order to remove the fallen and the loosened rock. During this operation there is great danger of the fall of part of the shattered roof. The work is consequently recognized as extra-hazardous, and men of special skill and courage are employed in it, and receive high wages on account of the risk they assume.

Thus, the other day, a workman who "knew no fear" and received on that account $7 per day, was killed by a fall of rock in one of the caves created by big blasts in a New York tunnel; and other lives, not thus paid for beforehand, were similarly sacrificed.

It cannot be too strongly declared that all this danger and destruction is unnecessary. It is perfectly practicable to run a rock tunnel by drilling a vertical center cut, and blasting with light charges in holes parallel thereto, so as to avoid injury to persons or property, or even the annoyance of miniature earthquakes, now suffered by New York citizens whose lodgings are undermined by the progress of subterraneous public improvements.

I have recently heard from transient guests at the Waldorf-Astoria, and from permanent residents of that part of the city, vigorous complaints of the shocks received from tunnel-blasts. Such parties are hereby notified that I cannot help them, except by publicly declaring, once more, that the nuisance of which they complain is wholly unnecessary. I do not even believe that the quieter and safer method of tunneling would be more expensive, if it were carried out with intelligence, and with loyalty on the part of subordinates and workmen.

But it is useless to argue that proposition, so long as specifications in contracts do not require the reform, and contractors are unwilling to introduce it, at the risk of a quarrel with labor. The only immediate remedy I can perceive is public opinion, such as is created by much talk, and especially by writing to the papers. Let my aggrieved friends say in these ways what they vainly say to *me*, and something may come of it! For instance, juries may be led to grant heavier damages against contractors who persist in employing a method involving unnecessary risk of injury to person and property, and official boards may hereafter require of contractors the use of the safer method. Moreover, if the sufferers should make noise enough, even the present contractors may be scared into mending their ways. So, my advice to my correspondents is: Go on, and talk and write as often and as much as you can—only not to me!

Tricks in Ore Buying

BY DAVID WALLACE

In a previous article I mentioned some tricks, coming under my observation, that have been tried by the sellers of ore. That chicanery and questionable practices do not belong exclusively to those who sell ores has long been the opinion held by the outsider. Some one, in speaking of those engaged in the business, described it thus: "There are thieves, unmitigated thieves and ore buyers."

Here, let it be observed that while the smelters will no doubt take every advantage possible in the way of rates and conditions, the majority may be relied upon to report fair assay results; at the same time it must be borne in mind that the "unhappy agent" is between two fires. He must satisfy his customer and also be prepared for a "wigging" from the smelter, which always seems to obtain lower results than the agent.

Nowadays there appears to be very little to teach the shipper when he wishes to dispose of his ores; not so, however, a few years ago. As in my former article, I am referring especially to conditions in Mexico.

One particularly astute agent, finding that the ore contained 3 per cent. moisture, actually insisted upon deducting the same percentage from the assay results, which he assured the shipper was the customary rule. Before the metric system came into operation in Mexico it was not an unheard of thing for the ore buyer, whose schedule of rates was based on American pounds, to receive the ore in Mexican pounds, thus gaining 29 pounds to the ton.

Again, there were some whose ideas of cleaning the bucking-board needed to be drastically reformed, seeing that no inconsiderable portion of the broken-up crucible still remained on the board when the sample was placed thereon. The "metallics" from very rich ores and sulphides were seldom taken into account, to say nothing of leaving out "corrected" assays.

The matter of taking moisture samples has frequently been the cause of friction between the buyer and seller. There is such a thing as, not only "drying" the ore, but also "roasting" it, and it is just as well to know when the former operation is finished and the other begins. On one occasion some cyanide precipitates were delivered to an ore buyer. Weight was properly taken, tare of sacks deducted and then the product being very dry the employee began to sprinkle the pile, after doing which he proceeded to "take the moisture."

Perhaps one of the worst cases of barefaced swindling happened some years ago. The buyer would receive a lot and weigh it, telling the shipper or his representative to come the following day to watch the sampling. In the meantime he would take a "grab" sample, having sufficient bucked for three samples, at the same time adding 10 to 20 per cent. of valueless pulp to the sample. One of these he sealed, leaving the envelope blank as to writing. The next morning the buyer would be prepared for his customer, the sealed sample being in his hip pocket. The lot would be handled in the proper manner and sample sealed in presence of shipper. There being no writing materials in the sampling room, the customer would be asked to accompany the agent to the office to have the name and lot number written on the envelope, the agent meanwhile slipping the sealed sample into his hip pocket. Arriving at the desk the sample would be produced; not the one just finished, but the sealed "grab" sample, and the necessary particulars were written thereon and the packet duly handed to shipper. If not satisfied with results, the shipper—who could not take his ore away, because of money having been advanced on it—might call for a resample, in which event the second "grab" sample was sealed and the same process repeated.

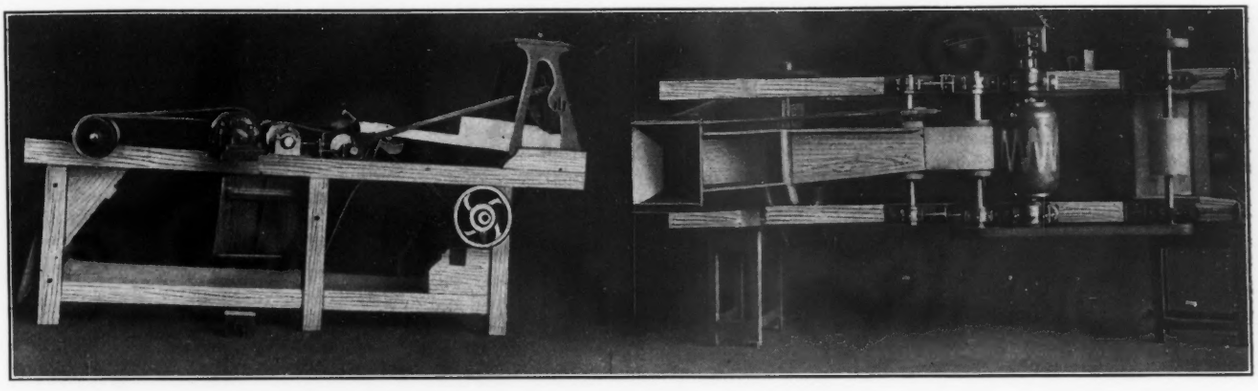
After all is said, there is no reason in the world why the business of ore buying cannot be conducted successfully in a legitimate manner. Where rates and conditions have been agreed upon, then there should be no great difficulty in the settlement of assays. It will generally be found that by "splitting" results obtained (not reported) by the buyer and seller the figures are approximately correct, provided the sample has been carefuly taken.

At recent boiler tests, firemen have proved unable to clean water gages or replace the old glasses when broken.

The Ferraris Magnetic Separator

Erminio Ferraris, director general of the Societé di Monteponi, of Sardinia, Italy, was one of the pioneers in the electro-magnetic separation of zinc and iron ores. He invented and put in operation at his works first an electro-magnetic wheel which was replaced later on by an improved machine, the latter being of the cross-belt type. About two years ago he invented a third form of machine, intended to be an improvement on that previously in use, and since that time it has been running regularly at Monteponi. It is the third Ferraris separator which is the subject of the present article.

The machine is shown in the accompanying reproduction of photographs, one view showing the machine in normal position, and the other view showing it turned over on its side, in order to illustrate better the peculiar construction of the magnet.



FERRARIS MAGNETIC SEPARATOR

The magnet of the new Ferraris separator has multiple pole-pieces, the positive and negative being arranged so as to alternate with each other around the periphery of a drum mounted to revolve around its horizontal axis, the drum being supported by trunnions to one of which the motive power is applied, while the electrical connections are made through the other trunnion. Inside of the drum, and rotating with it, is a suitably wound bobbin, constituting the core of the electro-magnet. The electric current which circulates through the winding of this bobbin is conveyed by wires passing through one of the trunnions of the cylinder, these wires terminating with disks, which dip into cups of mercury, whereby constant connection is made with the positive and negative wires from the dynamo. These pointed pole-pieces are turned back on the surface of the drum, being set in zinc, so that the drum has a smooth surface. The pole-pieces are first adjusted in position and molten zinc is then poured around them, a sheet of zinc being put around the drum before pouring in the metal. The way in which these pole-pieces dovetail is clearly shown in the accompanying engraving.

The material to be separated is fed upon an endless belt, which presents it to the magnet drum, over which another endless belt passes. Non-magnetic material falls immediately, while the magnetic jumps across to the belt passing over the drum, and is then carried forward by the belt, finally being dropped off at the end of the machine.

The strength and homogeneity of the magnetic field depend very much upon the spacing of the pole-pieces. The best results have been obtained when the distance from the point to the opposite concavity is about 2.5 to 3 in. The separator, which has a belt 16 in. wide, operating with a current of 1.5 amperes at 110 volts, treats about 500 kg. of roasted ore per hour.

The Goat as a Prospector

The *Alaska Prospector* vouches for the following incident: "Recent arrivals from Landlock bay report that Joe Bourke has made a new copper strike of promising proportions, the result of a unique accident. Mr. Bourke had missed considerable quantities of blasting powder, and started to investigate. After ascending the mountain for some distance he saw three sticks of dynamite on the trial ahead. Just as he started toward them a mountain goat emerged from the brush and started to eat the dynamite. As the last stick disappeared down the goat's throat, Joe yelled that that was his dynamite. The goat, which was a billy goat about eight months old, started to run, when the powder exploded with a roar which was heard at the camp a mile and a half below. The billy goat had swallowed a dynamite cap with the rest of his strange meal. The explosion of the goat dug a shaft in the mountain side seven feet deep, exposing a rich vein of the finest kind of cuprum ore. Mr. Bourke landed in a snow bank 40 ft. away and fortunately was unhurt."

"Danger Signs"

According to the New York *Evening Post,* M. Neymarck, the well known French economist, warns the public in the *Rentier,* of Paris, that trouble is brewing in the market for mining and industrial shares. Recalling what happened in gold-mine shares in September, 1895, when an average inflation of nearly 300 per cent. in Transvaal values ended in an overwhelming and disastrous crash, M. Neymarck declares that other sorts of mines are now passing through a similar inflation.

The *Journal des Débats* agrees with M. Neymarck, but is skeptical as to the value of warnings in a speculative fever. The *Débats* follows this up by citing a summary of what have been classified as the "premonitory signs" of a financial crisis. They are:

"(1.) Rise in prices, first of particular commodities, then, to a less degree, in all merchandise, and, finally, in unimproved property and real estate generally.

"(2.) Increased activty in existing enterprises, formation of new companies; notably those which provide for increase of production in manufacture; by this floating capital becomes fixed.

"(3.) Active demand for money at a rising rate.

"(4.) Demand for labor, at rising wages.

"(5.) Extravagance and waste in public and private expenditure.

"(6.) Development of a speculative mania, accompanied by dishonest methods in business and by credulity among investing capitalists.

"(7.) Great expansion of bank loans; severe money squeeze; strikes for still higher wages by laborers."

Commenting on the list the *Débats* remarks: "Many of these phenomena are natural indications of prosperity; they do not become forerunners of finanical trouble until the tendencies noted are recklessly exaggerated."

Stoping over too great a width is one of the surest ways of reducing profits.

The Mining Stock Market

In commenting on the slump in Nipissing, the *Evening Post* brings up the question, Why should curb stocks suffer such violent declines? Why are they in that respect different from issues dealt in on the Stock Exchange?

It goes on to say the answer lies chiefly in the fact that there is no "short account," and practically no possibility of "selling short," in curb stocks. On the Stock Exchange, a decline in prices is often checked by the so called "covering purchases" of traders who, believing that the market was going lower, had previously sold stocks short at the high prices and are under the necessity of buying them in again on the decline. To sell short they had to borrow the stocks in the first instance, so as to make deliveries, taking the risk of buying the securities cheaper later on. This sort of buying affords emphatic support to the stock market, but is wholly lacking on the curb, for the reason that the outside market has no "loan crowd" and stocks can never be borrowed in large quantities. It is sometimes possible for traders on the curb to make "sellers' thirty" contracts, which means that the seller has 30 days in which to deliver the stocks sold at a stipulated price. Such selling rarely assumes large volume, as it is sure to attract attention, and in the case of Nipissing, where the incentive was most apparent, it cut little figure. For these reasons there is no way of checking a decline in curb stocks except through bona-fide purchases by insiders or actual investors.

As the curb is an open market, with no admittance fees and no restrictions as to membership, the questions are often asked: Can anybody trade there? How is the trading done? None but recognized brokers buy and sell securities on the curb; outsiders seldom if ever attempt to execute their own orders. If they do, the regular brokers often concoct a scheme, as they themselves laughingly admit, to make the uninitiated wish that they had not attempted to gain the commissions that the curb brokers charge. The curb has no listing committee, so new issues can be added any time without formality or much of any knowledge of intrinsic values. When the mining craze was at its hight a month ago a new Cobalt or other mining stock was added almost every day, some of which have scarcely ever been traded in yet. It takes considerable manipulation to create much of a market for a curb stock, however, and to make a new issue really active one or more specialists have to be employed.

When the promoters of a mining property whose issues have since become active on the curb launched their enterprise in this market two months ago they elicited the support of some of the most prominent banking and Stock Exchange interests. This was done by giving all an option to buy the stock in 10,000-share lots at $1.50 for shares of $1 par value. Definite promises were made that well-planned manipulation would probably bring about a 100 per cent. rise in the price of the stock within a few days. The options were given out on a Saturday and within 48 hours the stock became one of the most active features of curb trading. It touched $3 before the week was out and has since sold at $4. This campaign was remarkably successful, and owing to the fact that it was launched at the physchological moment, the public took the stock in such large blocks that it was distributed broadcast throughout the country.

Evils in the Patent Office

In a recent communication to the *Evening Post,* Park Benjamin, who is well qualified to express an opinion on the subject, discussed the existing defects in the procedure of the U. S. Patent Office as follows:

The conditions in the Patent Office are little different in kind from what they have been for the last quarter century. Every patent attorney and every patentee of experience fully understands them. Every commissioner of patents in every annual report has with more or less emphasis protested against them. Over and over again the facts have been pressed upon Congress, and occasionally some small measure of relief has been obtained. But at no time has that body been willing to devote from the ample surplus now lying in the treasury to the credit of the Patent Office, and paid by the inventors and patentees for service not rendered, a suitable amount to meet the fundamental difficulties of inadequacy of force, inadequacy of pay, and inadequacy of the most ordinary and necessary facilities for carying on the work.

The particular exacerbation now is the extreme delay in acting on filed applications. For some years past the Patent Office has been little else than a law school. A boy goes in there under a mild civil service examination and stays until he thinks he knows enough to start practice as a patent attorney for himself. If he shows any particular ability his chances of offer of employment in the "patent department" of some big industrial concern at a much higher salary are good.

As the best men are constantly drained from the Patent Office, because the Government is steadily outbid by the private employer, the residuum of the examining corps is composed of the "green" learners and the old officials who have been too long in the harness to be willing to face the world. A principal examiner is paid $2500 a year. The position is a very responsible one and should command at least $5000 per year, and the salaries of the assistants should be proportionately increased.

The working force is about one-half what it should be. There are no digests of the granted patents. An applicant cannot find out for himself what is new and what old, except at an excessive expense. If he could do so at moderate cost in advance of making his application, a large percentage of the official work of examination would be saved.

The statements that the office is catching up with its work—disposing of so many extra cases a week, etc.—does not tell the whole story. It is quite true that more "actions" are being made, but what actions? So far as my observation goes, eight out of ten are in persistent disregard and violation of the rule which requires the examiner to give his reasons for his decisions. That would take time. He contents himself with making rejections or objection on a string of earlier patents noted merely by number and date. leaving the applicant to find out what they have to do with the invention best way he can. Sometimes he rejects on one old patent "in view of" another old patent, or several of them, and then the guessing capacity of the applicant is still further taxed to imagine what "view" is revealing itself to the hidden recesses of the official mind. It will easily be understood that the present vigorous application of the prod, coupled with "keeping in" the school until five o'clock every day, is more conducive to quick decisions than to particularly thoughtful ones, and besides as every "action" counts as progress, we are also getting some that are rather amusing.

We are also now getting the "actions" of the young gentlemen admitted last July. Attorneys who were in practice before these jurists were born silently hand copies of them to the applicants, and the applicants' criticisms are seldom printable.

Of course, all this throws more work on the attorneys and more expense on the applicants. One can protest, and have an examiner's action reviewed by the commissioner, but that means only still more delay and still more expense.

The present commissioner is in very much the position of the organist in the Western church, at whom the congregation was requested not to shoot "because he is doing the best he can." He is a very capable man—one of the ablest we have ever had in the Patent Office. He has been there longer than any previous incumbent, and he has stayed there *con amore,* for the miserable pay is of no importance to him. If Congress would do what is glaringly necessary, no one better able than he to reorganize the office on the new basis could probably be found. But the responsibility is squarely on Congress, and the only hope of relief is a steady onslaught on that body by the people who are directly suffering from its persistent and inexcusable neglect.

A New Cast-Iron Pipe for Mining Use

A new type of joint, designed to overcome or minimize the troubles experienced with ordinary cast-iron pipe, has been introduced by the Central Foundry Company, Newark, N. J. It has been found to possess many advantages over the common hub and spigot joint. It is known as the Universal iron joint and is formed by the rigid contact of iron on iron without packing of any kind. It consists simply of a true, slightly tapered spigot end which is inserted into a corresponding taper, slightly smaller, in the hub end of the pipe, and drawn together by means of steel bolts inserted through lugs that face each other on two sides of the pipe.

This joint has been practically tested in mining work under all manner of conditions, with water, steam, gas, and compressed air, and has given general satisfaction. The Glenwood Colliery Company, Penn., is using a line of 5-in. cast-iron pipe carrying a pressure varying between 75 and 90 lb. per sq.in. of compressed air. The bend in the line is in some places over ½ ft. in 6 ft. The leakage is very low.

In addition to keeping tight and free from leakage, the new joint is easily fitted and requires less trouble than a common packed joint. It can easily and rapidly be laid under water. A line of pipe fitted with it was placed on the bed of a river at a depth of 30 ft. below the surface of the water, when the water was so dirty that light did not penetrate more than 5 ft. under the surface. The divers laid the pipe at an average rate of 6 ft. per 20 minutes.

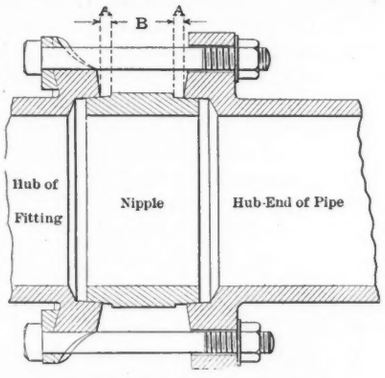
There is also a considerable saving both in time and labor in laying it in the ground, in comparison with the old systems. At Tahlequah, I. T., 6½ miles of pipe fitted with the universal joint and tested in the trench to 125 lb. per sq.in. hydraulic pressure before the trench was filled in, were laid at the rate of 600 ft. per day. The loss of pipe in fitting amounted to only 118 ft. per 16,000 ft. or a little over one per cent. The trenches were chiefly cut in solid rock, and the pipe-laying crew consisted of only a foreman and three laborers. The total cost of laying the line did not average over 2c. per foot.

The joint is plainly illustrated in Fig. 1, which is a section showing a loose lug, hub-end fitting, space nipple and hub-end of the pipe. The nipple is simply a ring or sleeve, the ends of which are of exactly the same size and taper at the male end of the pipe. The length of the nipple is twice that of the finished joint on the end of the pipe, and nipples are used between the female pipe ends and between pipe and fittings.

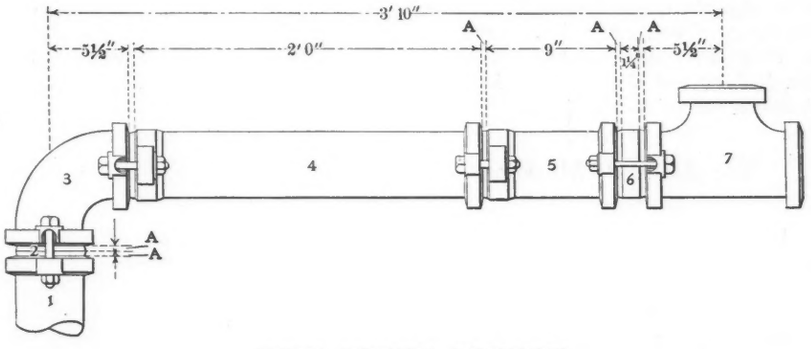
Fig. 2 gives a general view of a typical pipe line fitted with the joint. It will be noticed that (1) represents the hub-end of a pipe; (2) a 4-in. close nipple; (3) a 4-in. elbow; (4) a 4-in.x2 ft. pipe; (5) a 4x9-in. pipe; (6) a 4x1¼-in. space nipple; (7) a 4-in. tee; and *A* the exposed part of the joint, which measures ¼ in. and which is not "made up."

Pipe lines fitted with the joint are easily adaptable to vertical, horizontal or inclined curvature. In Colorado a water service fitted with the joint was laid with curves having a departure from the tangent of 1/12 the length of line laid. The line withstood a test of 120 lb. active pump pressure without exhibiting evidence of any leakage.

The pipe has given good satisfaction as column pipe in shafts, especially where the water is acid and the pipe has frequently to be replaced.



SECTION OF NIPPLE CONNECTION



TYPICAL UNIVERSAL CONNECTIONS

Flat aluminum bars are used, instead of cable, for conductors between the plant of the Pittsburg Reduction Company, at Massena, N. Y., and the power-house of the St. Lawrence River Power Company. These conductors are about 1500 ft. long and carry 17,600 amperes, direct current, under a pressure of 500 volts. The bars are carried by a double-pole line, connected by cross timbers on which the bare aluminum bars rest, there being no other insulation. Up to the present time, says the *Engineering News,* no trouble has developed from this line construction; the wood directly beneath the conductors shows no signs of charring.

Cobalt Mining Titles

SPECIAL CORRESPONDENCE

The break in Nipissing stock and its effect on other Cobalt stocks has been the general topic of discussion in Toronto. One effect has been to direct special attention to the question of mining titles. There have been all sorts of statements, speculations and rumors as to the true inwardness of the Guggenheim's failure to fulfil their option. It is not necessary, however, to look for any dark and insidious designs in order to account for their withdrawal; in fact anyone reading between the lines of the official statement made by Attorney-General Foy, of the Ontario Government, respecting the title to the Nipissing properties, and conversant with the legal situation and the history of past mining litigation, can very easily understand why any man of ordinary business prudence, let alone an astute financier, should hesitate to accept the security. "I am not aware," said Mr. Foy, diplomatically, "of any protest having been presented to the Government as to the title of the Nipissing Mines Company; nor do I know of any intended application for a fiat." It may here be explained that when a grant has been made by the Government no action can be taken to upset the title until a fiat has been obtained from the attorney-general. Mr. Foy's disclaimer that any such application has so far been made, by no means disposes of the possibility that it may be made at some future time; which, remote as it may seem, could hardly be overlooked in a transaction of such magnitude, and in view of repeated instances in which Government titles have been attacked on the ground of informality, or fraud, by the original locators. Rumors have been persistent as to the grounds for such action in regard to some of the Nipissing holdings. Quite likely the recent decision in the case of the O'Brien mines, in which the Government settled the matter after a protracted suit by confirming the title of the holders, on condition of their agreeing to pay a royalty of 25 per cent. on the output, may have influenced the decision of the Guggenheims. It is obvious that under exist-

ing conditions the validity of many Cobalt titles is largely dependent on the disposition or policy of the Government of the day. Without wishing to cast any reflection on the present administration in particular, it is not at all inconceivable that a Government having such powers might—as it certainly could—search for, or exaggerate, defects in the process of location, as a means of exercising pressure or driving a hard bargain with a mining company.

The foundation for an unlimited number of lawsuits and disputes over titles similar to those that have occurred in the case of Cobalt is being laid in connection with the recent discoveries of gold at Larder lake. As was recently stated, although over 300 claims have been staked in that area, none of them has as yet passed the inspector, or is likely to do so until spring on account of the inacessability of the region in the winter. Yet these properties are rapidly changing hands at high figures, and joint stock companies are being organized and projected, and will doubtless be selling shares on the New York curb months before there is any possibility of their securing a valid title. American capitalists are in the field buying up claims, and it is reported that as high as $500,000 has been offered to Dr. Reddick and his associates for seven locations and refused by them.

Weights and Measures

"Our Present Weights and Measures and the Metric System" was the subject of an address by Henry R. Towne, president of the Yale & Towne Manufacturing Company, of New York, before the American Society of Mechanical Engineers, Dec. 6. Mr. Towne asked for the appointment of a national commission to consider the whole subject. He said that while his argument was addressed primarily to engineers, it was intended to appeal also and equally to all other professions and interests.

"The questions at issue are national, not local," he said; "they affect all classes, not simply a few interests; above all they concern the plain people in their industries, commerce, agriculture, and everyday affairs, not merely those whose work lies chiefly in the domain of science; they are intensely practical, not theoretical. The issues thus involved should be understood by all the people, and any laws affecting our weights and measures should be based, as all legislative enactment of universal application should be, on the intelligent and unequivocal demand of an unquestioned majority of the electorate.

"Although the metric system has been lawful, for more than 40 years, for anyone who so desires to use the metric system of weights and measures in the United States, the people have not seen fit to avail themselves of the permission, but in their industry and commerce, have adhered, with absolute uniformity, to their established standards.

"France, Germany and each of the smaller states which have adopted the metric system did so to obtain unity of weights and measures in place of a chaos of old units. We have absolute unity now, but would lose it by attempting to change to a new system—a change which, as proved by the experience of France, would not be completed in 100 years.

"Decimal notation is possible with any system, but although desirable for computation and scientific work, is unacceptable for the daily uses of the people, who invariably resort to binary division. Our present 'tables' can be simplified and improved without changing our units, the grain, the inch, and the gallon, which are as good as, if not preferable to, the metric units. Measures of length in many respects are immutable.

"Out of the 39 so called civilized nations, 36 have adopted the metric system. The remaining three are the United States, Great Britain and Russia. The combined population of these three countries is 567,000,000, while that of the remaining 36 countries is 445,296,000. A larger population exists within a radius of 50 miles from the town hall of Manchester, England, than in any one of the first 25 of the 36 nations referred to. The combined population of 24 of them is only equal to that of the United States. The essential question is, What system is best for us?

"Unquestionably there is needless confusion in the English system of measure. We have, all told, 10 tables of measure. In the matter of measures of volume we have 'liquid measure,' 'beer measure' and 'dry measure.' It would seem that possibly these three might be merged into one and might be so standardized as to conform to the British imperial measure of the bushel. The British and American units of weight and of volume could be brought into perfect harmony, and could be simplified into practically two tables or scales, one for weight and the other for volume.

"The metric units as a whole are no better than ours, and those relating to length and area are inferior. Although the manufacturers of the United States were authorized in 1866 to use the metric system, not one in ten thousand has found it necessary or even expedient to do so, and if appealed to they would oppose overwhelmingly a proposition to coerce them in this respect.

"The subject of our national weights and measures is one which concerns every citizen, and which has a direct and important relation to our national industry and national welfare. President Washington, in his first message to Congress, dated Jan. 8, 1790, said: 'Uniformity in the currency, weights and measures of the United States is a subject of great importance and will, I am persuaded, be duly attended to.'

"His expectation was realized long ago as to our currency. Practically it has long been realized also as to our weights and measures, in which we already enjoy absolute national uniformity. We are confronted, however, by the fact that a substantial number of our people honestly and sincerely believe that we should abandon our present system of weights and measures, and should substitute in their place the metric system. These have urged, for many years and with great persistence, the change thus implied.

"Others, with equal sincerity and earnestness, oppose such change, although some at least of them believe that it may be possible, without changing even our units of length and of weight, and perhaps without changing even those of volume, greatly to improve our system of multiples and sub-multiples of these units, and at the same time possibly to bring about changes, either in our own system or in the British system, or both, which shall bring into complete and perfect harmony the weights and measures of both branches of the Anglo-Saxon race.

"Surely, the trifling expense involved in the creation of the proposed commission, whether national or international, is abundantly justified by the promise it would hold forth of useful accomplishment in a wise and permanent solution of the problem of our national weights and measures. If so, it is to be hoped that all citizens to whom this plan appeals as the best mode of solving this important problem, will unite in approving and urging the creation of the proposed commission.

"If a commission is appointed, there is good reason to believe that the British Government, if invited thereto by the President, will participate in the proposed work, either by creating a like commission or by appointing delegates to ours to make the latter international, as in the case of France in 1790, when five other nations were represented on the commission, which finally reported in favor of the metric system. If the commission is appointed, and pending its final report, it may also be hoped that all further agitation of this subject, either in Congress or elsewhere, may be suspended. Let us have light and then a lasting peace."

Mr. Towne drafted a bill embodying his suggestions, which was introduced in the last Congress. It was referred to the house committee on weights and measures.

In the province of Khorassan, Persia, the most important mines are the turquoise diggings near Nishapur, the concession for which is sold annually by the government. In 1905, the concession was sold for 35,000 tomans (about $30,000). The mines are worked in an unscientific and reckless manner. Profits are reported to be large.

CORRESPONDENCE

Discussions by Our Readers of Various Topics of Interest

Mules vs. Electric Locomotive

I read with much interest the article by W. F. Murray on this subject in the JOURNAL of Nov. 24, 1906. I beg to be allowed to call attention to an error in it, which causes electric locomotives as compared with mule haulage to appear in an improperly unfavorable light. Mr. Murray has taken 1500 tons per day, operating for 245 days per year, or 367,500 tons per year, as the basis for a haulage cost of 1.8c. per ton, which is practically correct. A little further on he reckons 1500 tons per day, or 245 days as being equivalent to 365,700 tons per year, which is an error, the correct figure being 367,500 tons. The cost of this haulage with electric locomotive is figured out as 12.7c. per ton, whereas it should be 1.25c.

JOHN S. JEMISON, JR.

Birmingham, Ala., Nov. 28, 1906.

Depreciation of Smelting Plants

The question of depreciation is of great interest to all who operate metallurgical works and also to directors and stockholders of metallurgical and mining companies. Though much may be learned from a discussion of this subject, there is little possibility of fixing the proper rate to allow for depreciation of plant, since in all industries, but particularly in mining and metallurgy, each case must be considered on its merits, a condition which makes it impracticable to lay down any arbitrary rule. Nevertheless, advantage may result from discussing this question in the JOURNAL; for, although no definite conclusion can be arrived at, the attention of operators will be directed to the necessity of providing for depreciation, a precaution too often neglected, such neglect usually ending in loss and frequently in disaster.

Before attempting to determine the rate to allow for depreciation it may be observed that every business (whether private or incorporated) should be thought of as a separate entity, and its interests take precedence of those of the owner; i.e., works and equipment must be kept in repair, provision made for depreciation so that plant may be replaced when worn out or obsolete, and sufficient funds reserved to insure the existence and prosperity of the business before any profit is available for distribution. On the other hand, if an excessive sum is applied to amortization, etc., profits are unduly depressed and the proprietors, in whose interest the business was instituted, suffer; perhaps this is not clearly perceptible, and it may be contended that stockholders gain in increased security; but that conclusion is fallacious, because, after contingencies have been sufficiently provided for, the rate of dividend ultimately fixes the value of a stock.

Repairs and renewals form part of the current expenses and should not be confused with depreciation; since, however well a plant may be maintained, it ultimately wears out and must be replaced. This point being missed by some operators, no provision is made for depreciation and consequently the business gets into difficulties. A repairs and renewals equalization fund may be set aside when this account fluctuates greatly in amount, otherwise the cost should be charged directly to operating expenses.

Generally speaking the cost of renewing wearing parts of machinery, etc., and of maintaining the plant as a whole in efficient working order should be charged to repairs and renewals account, while the expense of replacing those parts on which wear is only incidental should be charged against the depreciation fund. It is not suggested that where equipment is repaired or replaced the aim should be to restore it to its former condition; on the contrary, every opportunity of effecting improvements should be seized, but where units of greater capacity replace discarded plant, the extra cost is chargeable to capital account, though in certain circumstances it may equitably be written off from profits.

In attempting to fix a rate of depreciation for metallurgical plants, many aspects of the question require consideration, and although no two cases are alike, the conditions that always present themselves are: The probable life of the plant; duration of ore supply; possibility of invention or advance in methods necessitating new plant, and in certain cases the likelihood of competition. The first two factors can be estimated with some degree of certainty and so may be provided for; the third cannot, yet it is undoubtedly a question of depreciation, not of new construction.

Mr. Mathewson premises (and the assumption is reasonable) that if properly maintained the expectation of life of a modern smelter is 20 years; still it does not follow that a depreciation allowance of 5 per cent. on the original cost is sufficient, and not unless it is assumed that finality has been attained in metallurgical art, and that 17 years' supply of ore is assured, would such meager provision be safe. Possibly Mr. Mathewson overlooked the necessity of providing for other contingencies besides wear and tear when forming his estimate.

With regard to ore, it must be obvious that unless there is reasonable probability of the supply lasting at least five years the erection of treatment plant is not justifiable. Though many successful smelters have been established with less than five years' supply of ore in sight, the question is not in the slightest degree affected thereby, since it is not suggested that a certainty of that quantity being available is essential, but only the probability of it.

In the editorial, cases of plant becoming valueless in two years, presumably through failure of ore supply, are cited, but in these instances there was clearly no justification for erecting a plant, because if the ore was rich enough to provide for amortization in that limited period, it could have borne the expense of shipment to a customs work, and unless the proposition was an exceptional one, the adoption of the latter course would have proved more profitable. It must not be too hastily concluded, however, that the management was inefficient as probably they had reason to believe the deposit more extensive than it proved to be. It is seldom necessary to make such great provision for depreciation as in the instances quoted, for though numerous smelters, mills, etc., require to close down shortly after starting, owing to ore becoming exhausted, the majority of such plants are erected (often to serve the ends of unscrupulous promoters) where there are but slight prospects of success.

In the case of custom plants the possible effect of competition, especially that arising from shippers establishing treatment works, is worthy of consideration, since through this cause the works may be rendered valueless or nearly so.

The breaking-up value of metallurgical plant varies greatly, being in some districts practically nil, while in others scrap and old material is readily salable, and though Mr. Mathewson's estimate of 5½ per cent. probably represents pretty accurately the average salvage recoverable when a smelter is dismantled, it should be noted that many items (e.g., foundations)

which possess no realizable value may be utilized in rebuilding the works.

It is evident that, as observed in your editorial and Dr. Raymond's article, the effective life of the plant is not of chief importance in deciding the depreciation allowance. After weighing the different factors bearing on the subject against each other, it might reasonably be concluded that if from 8 to 10 per cent. of the original cost of equipment were written off annually, the requirements of most metallurgical works would be amply satisfied; assuming that 3½ per cent. interest is earned on the accumulated funds, the outlay for plant would be replaced in 11 years at the lower rate, and in nine years at the higher.

Dr. Raymond's reasons for advocating the establishment of a new construction fund by every metallurgical company can be appreciated, but as properly speaking this fund provides for extensions of plant, not for depreciation, it is outside the subject under discussion. However, since the question has been raised, it may be pointed out that directors (unless authorized by the stockholders) are not justified in appropriating profits for this purpose, nor is it a company's province to hoard wealth for problematical extensions; besides money can be obtained when required by the issue of stock should there be good prospects of extensions proving profitable.

The reserve fund before mentioned is available for every purpose of the business except the payment of dividends; it forms an additional safeguard against undue depreciation in the value of plant through advance in the art, and at the same time it provides for such moderate extensions as must inevitably be made by all progressive business.

It seems superfluous to add that depreciation and reserve funds must be kept separate from unappropriated profits; otherwise they are mere delusions, since the money might be applied to any purpose, including the payment of dividends.

JAMES DARROCH.

Pollocksshields, Glasgow, Scotland,
Nov. 29, 1906.

[The case in which a two-years amortization was reckoned, to which we referred, was that of a custom plant erected at a time when the ore market was highly favorably to the smelters, and promised so to continue for a considerable time to come. The short amortization period was based on uncertainty of the fuel supply, which was natural gas. There were various reasons for making the investment, which are not pertinent to this discussion, the only point of interest being that so quick an amortization is occasionally reckoned.—EDITOR.]

Channeled spikes have about 11 per cent. more holding power in ties than the ordinary railway spike.

Coal Mining in Indiana

SPECIAL CORRESPONDENCE

A dust explosion in the Rosebud coal mine, near Seelyville in Clay county, on Dec. 6, caused injury to 32 miners, three of whom were fatally burned. It was the most serious accident that has occurred in the Indiana coal field during the year. The explosion came as the miners were getting their holes ready for firing, and were preparing to leave their rooms. A few shots had already been fired, when the dust was ignited, and the explosion followed. Had it occurred 10 minutes later, when all the miners would have been in the entries, the result would have been far more disastrous. The explosion took place in what is known as the main entry west, but the flames rolled into the adjoining entries, striking 180 miners as they emerged from their rooms.

The Rosebud mine is owned by the Vandalia Coal Company, and 300 miners are employed. The injured miners said a huge ball of fire rolled through the mine and all they had time to do was to throw up their hands to protect their eyes and face. The mine was not seriously damaged.

State Mine Inspector Epperson made an investigation of the dust explosion the next morning, and has announced that the accident was caused by an illegal shot fired by William Yemm, one of the miners who was seriously burned. The inspector says that the shots put in by Yemm were drilled into the solid wall over a depth of one foot and the result was that the shot blew out, causing what is known as a "windy shot." He also asserted that Yemm used more than 8 lb. of powder, which is the limit set by law for a shot, and the fact that the shot was placed too deep in the solid wall beyond the cutting caused the flash to blow out, igniting the dust with which the air in many portions of the mine was filled. Mr. Epperson said the explosion was not due to an explosion of dynamite, although dynamite was used in an adjoining entry. The shots were fired 11 minutes before the regular time, 3:20, for blasting. Mr. Epperson's finding places the blame for the explosion on the miner and this relieves the company from all liability. The finding is not satisfactory to the miners, who take the stand that it was the duty of the company to sprinkle the entries so that there would be no danger from a dust explosion.

There have been several attempts to employ shot firers in this mine because of the danger of a dust explosion, but the majority of the miners opposed it and defeated the movement, as they are required to pay the shot firers out of their own pockets. It is now believed that the miners will consent to the introduction of shot firers and the enactment of a law making it incumbent to do so.

Suit has been filed by the Indiana Railroad Commission against the Big Four Railroad for failing properly to handle coal delivered to it by tributary roads. The commissioners ask for a permanent injunction forbidding the Big Four from misappropriating, diverting or misusing any of the equipment of the connecting roads; from failing and neglecting to transport or haul cars loaded with coal delivered to it or the returning of said cars when empty to the connecting lines within a reasonable time.

The output of the Indiana coal mines has not only been seriously retarded for lack of cars and speedy shipment, but the demand for coal is so great that the Indiana Manufacturers' and Shippers' Association has called a meeting for Dec. 12, in this city, to inaugurate a movement calculated to strengthen the railway commission law so that the commission will have power to eliminate existing evils and to furnish better transportation facilities. The conference will deal especially with a plan to force the railroads to haul and deliver coal promptly. It is stated that several large industries have been driven from the State because of inability to secure coal in quantities sufficient to keep the plants in operation. Other factories have been compelled to shut down while the railroad companies quarrel between themselves about petty rules and allow coal to accumulate in the distributing or receiving yards and refuse to move the embargo.

The meeting this week will determine a method to be pursued in appealing to the General Assembly, soon to meet, for an extension of the powers of the railroad commission so that the commission may enforce its rulings and cope effectively with questions pertaining to demurrage, car shortage, discrimination and long and short hauls.

Two new coal-mining companies were incorporated during the week. The Minshall Smokeless Coal Company, with headquarters in Rockville, capitalized at $50,000, will mine coal in Park and adjacent counties. The Princeton Mining Company, of Princeton, capital $35,000, has been organized to open new mines in Gibson county and do a general mining business.

Hundreds of acres of land are being leased daily by oil men in the Terre Haute field, and scores of drillers are busy drilling wells. Ohio, Pennsylvania, Illinois, and Michigan men join with the Indiana investors and the oil fever is reaching the old-time stage.

A new law passed by the legislative council of New South Wales simplifies the existing mining laws and enlarges the opportunities for mining on crown and private lands.

Diamond Mining in South Africa

According to a correspondent of the London *Mining Journal,* considerable money is being made and lost at the present time in diamond ventures in the Cape and Orange River Colony, and, from all appearances, the public is still eager to furnish money for prospecting, which is being carried out upon solid lines. The belt of country between the Vaal river at Klerksdorp and to the south of Kimberley is now being investigated. It is said that several distinct diamond fields have been discovered. The Roberts Victor mine is opening up in a promising manner, and the stones are worth from 60s. to 90s. per carat. Vorspoed mine is now being developed in a businesslike way, and the owners state that their diamonds are worth 36s. per carat, and the average returns to be about 20 carats to the 100 loads.

It is stated that the DeBeers company is going to treat as much of its old dumps as possible, and swamp the world with cheap and poor diamonds; if this is done, then all the poor mines that are producing stones worth about 30s. per carat will have to close down, as it is well known that this class of diamonds is unsalable, and the dealers have their safes full of them. Only the mines that produce first-class diamonds will survive the competition during the next few years.

Great things are reported from the Vaal River Company, which has discovered payable wash, the value of which has been estimated at several millions sterling. This company and its tenants are likely to increase the output of diamonds in the near future.

Tin Smelting at Launceston, Tasmania*

BY J. D. MILLEN

The ores received at the Mt. Bischoff works average about 70 per cent. tin, and as a rule are fairly pure. The plant consists of reverberatory furnaces, the ore being charged into them through side doors, the charge consisting of 50 cwt. of ore and about 10 cwt. of small coal, more or less, according to varying circumstances. After charging, all the doors are luted up. The time required to reduce the charge is eight hours, during which it is subjected to several rabblings. When the smelting is complete, the slags are skimmed off and reserved for further treatment, and the metal is tapped into a brick-lined receptable, and allowed to cool somewhat. Another charge is then thrown in, and the operation repeated.

The metal, after cooling, is ladled into a large kettle, where it is refined by a kind of poling, billets of green wood being sunk under the surface. The oxide or dross, which rises to the surface, is skimmed off. Dip samples are continually taken, and when the metal is sufficiently refined it is ladled into molds holding about 80 lb. The refined metal assays 99.89 per cent. tin.

The slags from the ore furnace are broken up, and mixed with small coal, lime, and, if necessary, iron, and again smelted.

A few small parcels of ore, which is pyritic in nature, are received. These require a thorough roasting before the ordinary process of reduction is proceeded with. Further extensive alterations to the present works are under consideration, and when these are complete the character of the ores that the plant will be capable of treating will be much more varied.

*Abstract from the annual report of the Zeehan School of Mines and Metallurgy; through the London *Mining Journal.*

Patents Relating to Mining and Metallurgy

UNITED STATES

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

Published Week Ended Dec. 4, 1906.

FURNACE FOR SULPHATING ZINC-BEARING ORES—George O. Angell, Philadelphia, Pa. No. 837,273. Filed Dec. 30, 1904.

CARRIER—August Klinzing, St. Cloud, Wis. No. 837,306. Filed April 9, 1906.

ROCK DRILL — Clark J. Smith, Ottumwa, Iowa, assignor to The Hardsocg Wonder Drill Co., Ottumwa, Iowa. No. 837,347. Filed July 5, 1906.

COKE-LEVELING MACHINE — George T Wickes, Covington, Va., assignor to Covington Machine Company. No. 837,364. Filed March 29, 1906.

ROTARY DUMP — Allen F. Blair, Crafton, and Lewis J. Robb, Pittsburg, Pa., assignors to Heyl & Patterson. No. 837,379. Filed Nov. 27, 1905.

OIL-WELL DERRICK — William Heckart, Bradner, Ohio. No. 837,402. Filed March 22, 1906.

MEANS FOR SURVEYING BORE HOLES—Hugh F. Marriott, Parktown, Transvaal. No. 837,415. Original application filed Aug. 30, 1904. Divided and this application filed April 29, 1905.

METHOD OF WELL CONSTRUCTION—David M. Swain, Stillwater, Minn. No. 837,433. Filed Oct. 23, 1905.

MEANS FOR CARRYING OFF GASES FROM RETORTS WHILE BEING CHARGED—Martin Ziegler, Beuerberg, Tsartalbahn, Germany, assignor to Oberbayrische Kokswerke und Fabrik chemischer Produkte Aktien-Gesellschaft, Munich, Germany. No. 837,446. Filed Aug. 1, 1906.

VENTILATING APPARATUS FOR CHEMICAL DESKS—L. B. Altaffer and Florence A. Altaffer, Cleveland, O. No. 837,448. Filed Oct. 14, 1905.

GUIDE FOR ROCK DRILLS—William C. Stephens, Carn Brea, England. No. 837,515. Filed Feb. 12, 1906.

COMBINED CONTINUOUS KILN AND DRIER—George Curley, Salt Lake City, Utah. No. 837,547. Filed June 22, 1906.

TUNNELING MACHINE — John E. Ennis, Chicago, Ill. No. 837,552. Filed June 15, 1905.

PROCESS OF TREATING COPPER ORES—Edward H. Hamilton, Anaconda, Mont. No. 837,562. Filed Dec. 19, 1905.

MECHANISM FOR OPERATING DOORS AND OTHER HINGED CLOSURES—Arthur M. Spink, San Francisco, Cal. No. 837,591. Filed March 30, 1906.

MANUFACTURE OF STEEL — Herbert H. Weaver, Upper Yoder township, and George E. Thackeray, Westmont borough, Pa. No. 837,598. Filed June 18, 1906.

PROCESS OF DEODORIZING PETROLEUM DISTILLATE — James Armstrong, Baltimore, Md. No. 837,655. Filed Dec. 30, 1904.

METALLIC PILING — Friedrich W. Lang, Hamburg, Germany. No. 837,692. Filed Sept. 5, 1906.

SEPARATOR — Orville M. Morse, Jackson, Mich. No. 837,705. Filed March 6, 1906.

MANUFACTURE OF METALLURGICAL VESSELS—Augustin L. J. Queneau, South Bethlehem, Pa., assignor to New Jersey Zinc Company, New York, N. Y. No. 837,724. Filed Jan. 3, 1906.

GAS PRODUCER—Friedrich Thiele, Hildesheim, Germany. No. 837,755. Filed July 7, 1906.

SAFETY DEVICE FOR ELEVATORS—Martin J. Delaney, Silver Creek, Pa. No. 837,804. Filed Act. 24, 1905.

AMALGAM TRAP—Charles F. Hawley, Portland, Oregon. No. 837,829. Filed Jan. 21, 1905. Renewed July 18, 1906.

METAL-DEPOSITING APPARATUS—Wilbur A. Hendryx, Denver, Colo. No. 837,832. Filed May 18, 1906.

METALLURGICAL VESSEL—Augustus L. J. Queneau, South Bethlehem, Pa., assignor to New Jersey Zinc Company, New York, N.Y. No. 837,883. Original application filed May 21, 1904. Divided and this application filed April 18, 1905.

GREAT BRITAIN

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

Published Week Ended Nov. 24, 1906.

THORIUM FILAMENT — General Electric Company, Schenectady, U. S. A. A method of making thorium filaments for electric incandescent lamps, consisting in incorporating it with magnesium and then driving the latter off by heat. No. 14,972 A of 1905.

METALS RECOVERY—J. G. Slater, Toronto, Canada. Recovering gold and silver from sulphides by grinding fine, mixing with niter, seasalt and copper, and heating in crucibles in a furnace. No. 21,549 of 1905.

CENTRIFUGAL ORE SEPARATOR—W. H. Peck, Chicago. Improvements in centrifugal ore separators chiefly for the purpose of making the internal rotating deflector more easily adjustable. Nos. 21,634 and 21,635 of 1905.

CENTRIFUGAL ORE SEPARATOR — P. H. Adams, Chicago. Improvements in centrifugal ore separators with the object of introducing water jets at the lower end for helping the removal of the heavier particles. No. 21,639 of 1905.

CENTRIFUGAL ORE SEPARATOR—W. H. Peck, Chicago. In centrifugal ore separators, method of slowing down the rotation in order to facilitate the removal of the heavier particles. No. 21,650 of 1905.

CENTRIFUGAL ORE SEPARATOR—P. H. Adams, Chicago. In centrifugal ore separators, improvements in the arrangement of the feed and discharge openings. No. 21,663 of 1905.

METALS RECOVERY—H. Baker and A. T. Smith, Runcorn. Treating finely ground sulphides of lead, zinc, etc., with aqueous solutions of ferric chloride, thus forming chloride of the metal, ferrous chloride, and free sulphur. No. 22,235 of 1905.

SAFETY APPLIANCE — J. A. C. Robinson, Sheffield. Safety suspending apparatus for mine cages. No. 1375 of 1906.

LEAD SOLVENT—Kings Norton Metal Company, Birmingham. A mixture for removing lead from steel surfaces, such as the lead-fouling in rifles, consisting of a solution of a caustic alkali and an ordinary agent such as persulphate of an alkali metal. No. 2506 of 1906.

ALUMINUM ALLOY—A. Chambaud, Paris. An aluminum alloy which is more readily workable than pure metal, consisting of 99.02 Al, 0.31 Fe, 0.01 Zn, 0.04 Mg. and 0.61 Cu. No. 9750 of 1906.

VENTILATING GATES—N. K. Bowman, Lawrence, Ohio, U. S. A. Improvements in the inventor's system of ventilating gates for mines, with the object of making them open and shut easier for the passage of cars. No. 15,025 of 1906.

FLOTATION PROCESS — G. A. Chapman, Broken Hill, N. S. W. Improvements in the Sulman-Picard-Ballot process for flotation of sulphides by adding fatty acids and agitating in water, consisting in adding to the ore acidified water in one vat and adding the fatty matter subsequently in another vat. No. 17,328 of 1906.

Personal

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

A. E. Keables, of Denver, is in Silver City, N. M., on mining business.

R. Z. Adams, of Georgetown, Colo., has gone to Tonopah, Nev., on a mining deal.

R. B. Lamb, mining engineer, has gone to Montana to examine mining properties.

Washington B. Vanderlip has returned to New York from Honduras, Central America.

F. Augustus Heinze has been visiting his mining interests in Utah, and is now in New York.

W. E. Wilson, of Boulder, Colo., is in Goldfield, Nevada, looking at some mining properties.

W. E. Hidden, geologist for the Nipissing Mines Company, arrived in Cobalt, Nov. 5, from New York.

T. R. Miller, of Breckenridge, Colo., has gone to the Black Hills district, in South Dakota, on mining business.

B. G. Granville, a Cripple Creek operator, has been looking after interests in Gilpin county, Colo., recently.

Philip L. Foster, consulting engineer for the Exploration Company, arrived in New York from London last week.

George Hardy, of Carnegie, Penn., has been examining iron-ore deposits in Georgia for Pittsburg capitalists.

David H. Lawrance, of Denver, has just returned from making examinations in the Black Hills district of South Dakota.

Hiram W. Hixon, manager of the Victoria mines, Ontario, passed through New York this week on his return from England.

Edward C. Davis, of the American Investment Company, Boston, has returned to that city from a trip to Cobalt, Ontario.

C. D. Wale, of Excelsior Springs, Mo., has been at Idaho Springs, Colo., looking after interests in the Alamaden mines property.

N. G. Hills, of Hills & Willis, Cripple Creek, Colo., has been examining mining property in Boulder and Gilpin counties, Colorado.

G. P. Goodier, mining engineer of Gilpin and Clear Creek counties, Colo. has returned from a business trip to eastern points.

J. Crowther, of Glasgow, Scotland, has been appointed general manager of the Etruscan Copper Estates, Ltd., at Campiglia Marittima, Italy.

E. G. Spilsbury returned to New York last week from Europe, where he has been engaged on professional business during the last five months.

Samuel Adams, a mining man of Steamboat Springs, Colo., is making a visit to Johnstown, N. Y., and other Eastern points on mining business.

Frank H. Probert recently made an examination of the property of the East Butte Company, in Butte, Mont., in behalf of Eastern stockholders.

Walter Howard Crawford, of Nashville, Tenn., has started on an extended trip through the Western States and Mexico, on professional business.

Joseph L. Giroux, president of the Giroux Consolidated Mines Company, is now at Ely, Nev., inspecting the property of the company in that district.

Bertram Hunt, metallurgical engineer, of San Francisco, who has been spending several months abroad, returned last week and proceeded to San Francisco.

F. W. Sherman, superintendent of the Daly-West mill, Park City, Utah, was a recent visitor in New York. He returned to Utah the early part of this week.

Rudolf Hoffmann, who has been vize-hüttenmeister at the Muldnerhütte at Freiberg, has been appointed professor of metallurgy at the Clausthal *Bergakademie*.

Allen S. Towson, of New York, spent a few days in Butte, Mont., in the early part of the month, in connection with the Colusa-Leonard Extension Company's property.

C. A. Pringle, manager of the Calera Mining Company, of Chihuahua, Mexico, passed through Denver recently on his way to California on professional business.

F. T. Havard, manager of the smelting works of the Copiapo Mining Company, Ltd., who has been making a trip among the metallurgical works of the West, returned to New York this week and sailed for Chile Dec. 12.

J. A. Simmons, of New York, accompanied R. E. L. Townsend, of Denver, on a visit to the Aduddell and other properties, situated in the Russell district, Gilpin county, Colo., recently.

W. Spencer Hutchinson, mining engineer of Boston, spent a few days in Butte, Mont., recently in connection with the Raven property, and then visited the Cœur d'Alene of Idaho.

John Eaton, manager of the Dives-Pelican and Seven-Thirty properties at Silver Plume, Clear creek county, Colo., is making a business trip to Louisville, Ky., to confer with his associates.

Oliver Wethered, chairman of the Ymir Gold Mines, limited, has been in New York to confer with R. Gilman Brown, the company's consulting engineer, who recently inspected the mine.

John W. Kittridge, of Boulder, Colo., has gone to Death Valley, to take charge as consulting engineer of some properties for Wilmington, Del., people, taking with him nearly a dozen experienced Boulder county miners.

Frank H. Taylor has been chosen a director and vice-president of the Yale & Towne Manufacturing Company, of Stamford, Conn. He was formerly connected with that company, but from 1897 until last April, was with the Westinghouse Electric and Manufacturing Company.

Philip S. Morse, manager of the smelting works of the Sulphide Corporation, Ltd., at Cockle Creek, New South Wales, is visiting in the United States to study the zinc industry of this country. After completing his examination in the United States he will go to London, before returning to Australia.

Guy Elmore, of the American Concentrator Company, Joplin, Mo., was a recent visitor in New York, being in the East on business connected with several new installations of coal-washing plants. From New York he went to Tennessee in connection with plans for the construction of zinc mills at mines near Knoxville.

W. N. Burke, former general superintendent of the Colorado Iron Works, in Denver, and recently manager of the San Fernandino Mining Company, in New Mexico, has accepted the management of the Braden Copper Company, at La Junta, near Santiago, Chile. Mr. Burke takes the place of the late Charles Linner, formerly of Denver, who was killed in an accident.

Obituary

Arthur Vaughan Abbott died in St. Luke's hospital, New York, Dec. 1, aged 48 years. He was born in New York and was a member of the American Institute of Mining Engineers, vice-president of the American Institute of Electrical Engineers, chief engineer of the Chicago Telephone Company and engineer of Westinghouse, Church, Kerr & Co. Mr. Abbott was well known as a writer on technical subjects, having published books on fuel, electrical transmission and the testing of materials.

Joseph J. Crowther, a veteran blast furnaceman, died at Lorain, Ohio, Nov. 29, aged 82 years. He was born in Wolverhampton, England, and with his father and two brothers, also furnacemen, came to the United States in 1844. They first operated a charcoal furnace at Morgantown, W. Va., and later built a furnace at Brady's Bend, Penn. Later he was interested in various furnaces in Pennsylvania and Ohio, finally taking charge of Ashland furnace in Kentucky in 1882. He retired from business in 1892.

A. K. Bohn, a well known mining engineer, died from diabetes in Los Angeles, Cal., on Nov. 25. Mr. Bohn was born Nov. 11, 1865, at the old family home of his mother at what was then known as Kneisly station, near Dayton, Ohio. He attended the grammar schools at Dayton

and at St. Louis, Mo., and finished at the Colorado School of Mines about 1890. From that time on he was associated with different mining and smelting companies in Colorado, Montana and Mexico, having been for six years—1894 to 1900—with the Esmeralda smelter in Sierra Mojada, Coahuila, Mexico. He was latterly associated with the Empire Zinc Company in Mexico and had given considerable time to the endeavor to interest capital in a zinc smelter in Mexico. He had just gone to Nevada with the view of settling in one of the new camps when he was taken ill and went to Los Angeles for medical attention. He was apparently improving rapidly when a relapse because of cold or over-exertion proved more than he had strength to withstand. A. K. Bohn was the oldest son of Major A. V. Bohn, of Leadville, Colo., one of the best known mining men in the West. He is survived by his wife and one daughter, whose home is in St. Louis, his mother and father and two brothers, J. V. Bohn and C. A. Bohn, both mining engineers, the former in southern California and the latter in Mexico City.

Societies and Technical Schools

California Miner's Association—This society held its annual convention in San Francisco last week. The attendance was not as large as was hoped for, but several valuable and interesting papers were read, and there was much unanimity of feeling among the delegates. The Association has just published its proceedings of last year. The manuscript, plates, etc., were lost in the great fire, just as the book was to be carried from the press. Copies of some of the papers were, however, obtained and these have now been published.

Western Association of Technical Chemists and Metallurgists—The committee on arrangements for the general meeting to be held in Salt Lake City, Dec. 27, 28 and 29, announces that headquarters of the association during the meeting will be the Commercial Club, where all details as to program and other matters will be obtainable. The meetings for the presentation of papers will be held at the University of Utah. The details of the program cannot yet be announced. There will be included, however, trips of inspection to metallurgical plants and other points of technical interest in Salt Lake City. A local committee is arranging the details of these visits. The social feature of the meeting will be a banquet to be held at the Commercial Club on the last evening of the meeting.

Industrial

The Keystone Driller Company, Beaver Falls., Penn., has opened an office at 170 Broadway, New York, to take care of local business, and also of its growing export trade.

The Allis-Chalmers Company, Milwaukee, Wis., reports recent sales of a large number of Reynolds-Corliss engines, including several blowing engines for iron and steel works.

The Michigan Copper Mining Company, of Keweenaw Bay, Mich., has placed through the Mackinac Island, Mich., agency of the Atlas Engine Works, an order for several Atlas high-pressure water-tube boilers. They are to be installed in the new plant of the Michigan Copper Company, now in the course of erection.

The Boston branch of the H. W. Johns-Manville Company moved, early in December, into a new building at Nos. 55-59 High street. This entire building, which comprises seven floors, will be occupied by the offices, sales and shipping rooms of the company, and the increase of space provided will enable the company to carry a much larger stock on hand and thus meet the steadily increasing demand in the New England States.

The J. Geo. Leyner Engineering Works Company, Denver, Colo., has just sent forward its second special-train shipment of Leyner machinery to Goldfield. The special train consisted of an engine, freight car and caboose, and was guaranteed by the railroad to make at least passenger time. The shipment was consigned to J. P. Loftus, who has recently struck a rich body of ore, and consisted of a large two-stage Leyner air compressor and a Leyner electric hoist, both equipped with Westinghouse motors, together with an air receiver and a full complement of rock-drills, etc. Shipping in this manner cost Mr. Loftus over $1500 extra. A shipment of practically identical equipment was made by the same firm by special train, about a month ago, consigned to the Hayes & Monette lease on the Mohawk mine at Goldfield.

Trade Catalogs

Receipt is acknowledged of the following trade catalogs and circulars:

Sturtevant Mill Company, Boston, Mass. Crushing Rolls. Pp. 6, illustrated; paper, 7x11 in.; 1906.

"Steam Shovel News," published in Toledo, Ohio, Nov., 1906. Pp. 8, illustrated; paper, 8x10½ in.

Allis-Chalmers Company, Milwaukee, Wis. List of Publications in Force, October 1, 1906. Pp. 4, paper, 8x10½ inches.

The Bristol Company, Waterbury, Conn. Catalog No. 44, Oct., 1906. Bristol Recording Gauges. Pp. 28, illustrated; paper, 8x11 inches.

Wisconsin Engine Company, Corliss, Wis. Supplementary Catalog E 3. Corliss Engines. Pp. 57, illustrated; paper, 7x10 in. 1906.

George Mitchell, 52 Wall street, New York, N. Y. The Mitchell Economic Hot Blast Furnace; illustrated, pp. 12, paper, 6½x4½ in. 1906.

Chicago Pneumatic Tool Company, Chicago, Ill. "Ideal Power," Miscellaneous Machinery, Nov., 1906. Pp. 32; illustrated; paper, 6x9 inches.

The Pittsburgh Automatic Vise and Tool Company, Pittsburg, Penn. The "Pittsburgh" Automatic Two-Way Vises. Pp. 28, illustrated; paper, 4x6½ in.; 1906.

Westinghouse Electric and Manufacturing Company, Pittsburg, Penn. Circular No. 1139, Starting and Field Rheostats. Pp. 17, illustrated; paper, 7x10 in.; 1906.

Wellman - Seaver - Morgan Company, Cleveland, O. "What we do in Iron and Steel Works Machinery, Ore and Coal Handling Machinery, Cranes, etc." Pp. 23, illustrated; paper, 4x9 in.; 1906.

Gould Storage Battery Company, New York. Bulletin No. 7, June, 1906. "24-Hours Service From Small Central Station Plant." Illustrated; pp. 8, paper, 8x10 in. Bulletin No. 2, October 1, 1902. Booster System; illustrated, pp. 14, paper, 8x10½ inches.

Construction News

Gold Run California—A 20-stamp mill is to be put up at Big Bonanza Mine. J. D. Stewart is owner.

Academy Hill—The School Hill Mining Company is arranging to put in new machinery. J. N. Mackey, Black Hawk, Colo., is manager.

Georgetown, Colorado—A 100-ton milling plant and an aërial tramway are proposed at the Red Oak mine. A. B. Montgomery, Georgetown, Colo., is manager.

Apex, Colorado—The Evergreen Gold and Copper Mines Company is figuring on the erection of a smelter for its low-grade ores. J. Walter, Apex, Colo., is manager.

North Beaver Creek, Colorado—The Tungsten Mining and Milling Company is figuring on putting in a stamp mill and other machinery. G. Carlberg, Crisman, Colo., is manager.

Sturgis, Kentucky—The Western Kentucky Coal Company is considering the question of putting in new steel tipples, and many other improvements. C. J. Beecher, Sturgis, Ky., is superintendent; James T. Gardiner, 30 Broad street, New York, is president.

Carrollton, Georgia—The Randall Clay Mining and Manufacturing Company is developing a clay deposit, and will need clay grinding or pulverizing machines; also driers, screens, conveyors and other machinery. T. A. Dolan, Aragon, Penn., is secretary and manager.

Special Correspondence

San Francisco Dec. 5

A number of San Francisco business men—bankers, merchants, manufacturers, publishers, etc.—have just completed a trip to the new Nevada mining camps, on what is called a visit of inspection and observation. There were no mining men among them, that class being already familiar with the Nevada situation. Somewhat strange to say, these San Francisco business men never made a similar trip through the mining regions of their own State, where they would see 20 producing gold mines to one in Nevada. But the excitement in the stock market has waked them up to the idea that there may be something in mining after all, and that the new Nevada gold mines will eventually bring business to San Francisco.

It is reported that the Marysville Gold Dredging Company has sold its entire interests along the Yuba river to the New England Exploration Company of Boston, for the sum of $800,000. The original company was composed of Eugene de Sabla, John Martin, W. P. Hammon, Edward and John Coleman, R. P. Hotaling, Louis Sloss and others. The tract owned was some 1300 acres of dredging ground near that of the Yuba Consolidated Company. Two dredges are included in the deal. Robert E. Cranston will be the manager of the company.

It is not expected that a strike will occur at Grass Valley, Nevada county, upon the refusal of the superintendents to grant the raise in wages recently asked by the carmen, drivers, shovelers and others, outside of the machine men and skilled mechanics. From all that can be gathered the superintendents will not hold a meeting to decide on a course of action. It is understood that they are individually notifying the Grievance Committee of the Grass Valley Miners' Union of their intention. Indications point to a peaceful adjustment of the matter.

At Greenwater, Inyo county, the Greenwater & Death Valley and the United Greenwater, known as the Schwab properties, and two of the largest ventures in the district, will have five gasolene hoists in active operation within the coming week, and they will push that many shafts to the extreme limit of the engines, or until the railroads get there so that fuel and steam can be substituted for them. Crosscutting and drifting has been discontinued by the owners of the Furnace Creek, and they have commenced to sink, which they will continue to the 500-ft. level before they will attempt to prove the worth of the leads by developing. A rich copper vein has been found 15 miles south of Greenwater, where Willow creek empties into Death Valley.

Telluride is a new gold camp in the Sierra Nevada range, seven miles south of Olancha in Inyo county. The camp is in a cañon that opens on the desert 79 miles from Mohave, 7 miles from Hawaii Meadows and 19 miles from Keeler, the terminal of the Nevada & California narrow gage. There is plenty of water and more or less timber. The original discovery is the Gilt Edge claim, owned by W. E. Higgins and partners. The vein is small but of high-grade ore. A number of locations have been made and several hundred men have gone in to prospect, many of them from Lone Pine.

The town of Ophir, four miles from Auburn, Placer county, is experiencing a revival, it having been more or less inactive the past few years. The Three Star group has been continuously worked, and now others will shortly resume. The other big properties have been almost inactive except for development work.

You Bet, in Nevada county, 7 miles from Dutch Flat, Placer county, one of the historic hydraulic mining camps of the State, is being revived as a drift-mining section. The Posey Cañon Gravel Mining Company has less than 100 ft. to go before raising to tap the gravel channel. At Hunt's Hill, near You Bet, Richardson and others are developing a cement gravel proposition, which breaks out on the banks of the Greenhorn. This channel was worked slightly 40 years ago, but the cement proved so hard that the methods in vogue in those days discouraged the owners, who finally threw up the claims. Of late, under modern methods, satisfactory returns have resulted from this ancient channel. It is an immense affair and lies clearly outlined on both banks of the Greenhorn.

The Murchie Extension Gold Mining Company has acquired an additional 351 acres of mineral land, adjoining the Murchie and Banner mines, Nevada City district, making a total of 491 acres owned by the company.

Salt Lake City Dec. 8

According to a late compilation the ore and bullion settlements for the eleven months of this year ending Nov. 30, as reported through Salt Lake banks, aggregated about $15,000,000. This, however, does not represent the entire metal output of the State for the period.

The management of the Newhouse Mines and Smelters Corporation, operating the Cactus mine, in Beaver county, and the principal mining companies operating in Bingham has granted employees a general advance of 25c. per day in wages. This raise is to remain effective as long as copper sells at 18c. a pound or better.

The Tintic Smelting Company, of which C. W. Nibley, of Ogden, is president, and Bela Kadish, of the same place, is manager, has been incorporated and announcement has been made that it will operate in the Tintic mining district; the intention being to erect a lead smelter convenient to the mines of Eureka, Mammoth and Silver City. It is stated that contracts will be let in the near future for material and equipment.

The Blue Bird, or Copper King, group of 15 patented mining claims, near Milford, Beaver county, has been taken over by G. D. B. Turner, of Salt Lake, on a bond and lease. New York parties, it is said, will join in the development of the territory acquired.

Word comes from Ely, Nev., to the effect that contracts have been let for the structural material and equipment for the smelter and concentrating plants of the Nevada Consolidated and Cumberland Ely mining companies.

The property of the Side-Winder Mining Company in Bingham, Utah, has been acquired under a bond and lease by W. H. Bramel and associates, of Salt Lake.

The construction of the 200-ton concentrating mill of the Markham Gulch Milling company, in Bingham, Utah, is proggressing and the management expects to have it ready for commission within the next 90 days.

The second session of the representatives of the Interstate Commerce Commission is in progress at this writing in Salt Lake. Testimony of a decidedly sensational character has been introduced relative to the coal-land frauds in this State and Wyoming. That wholesale frauds have been perpetrated, in which the Government has been the victim, has been proved beyond a doubt. It is not unlikely that criminal actions will be brought to bring the accused to justice.

The Yerington Ironsides Copper Company has been organized at Salt Lake to operate in the Yerington, Nev., district. The officers are: A. Hanauer, Jr., president; W. H. Tibbals, vice-president; J. P. Spaulding, treasurer; and J. H. Turner, secretary; all of Salt Lake.

Denver Dec. 7

After completing their work at Salt Lake City, the Interstate Commerce Commission and its attorneys have held sessions in this city, and have returned to Washington to complete the report, to be submitted to Congress. A great deal of rottenness in the matter of securing valuable coal land from the Government by means of fraudulent entries, has been exposed, and it is to be hoped that prosecutions will follow, which will teach a lesson for the future. The Federal government is having the necessary geological investigations made in regard to what is and what is not coal land. It was proved that for several years the railroad companies have helped the Colorado Fuel and Iron Company to monopolize the coal business in Colorado by allowing it a reduction in freight rates, and that the American Smelting and Refining company has also been specialy favored.

It is rumored that the Waldorf mines, near Georgetown, the owners of which control a large area of mineral land in the Argentine mining district, will shortly pass into the hands of an English syndicate.

Duluth Dec. 8

The last two cargoes of ore went out of Duluth & Iron Range road docks Saturday last; the last left Duluth, Missabe & Northern docks the day before, and there are a few boats to load at the Great Northern docks, some of which may get out in the next few days, though it is probable that several will be forced to remain at the head of the lakes all winter. Shipments from the Duluth & Iron Range and the Duluth, Missabe & Northern roads reach the totals of 19,400,000 tons for the year, the latter road having moved almost precisely the allotment of 11,200,000, which was made at the opening of navigation last April. This is a remarkable fact. Great Northern shipments will be about 6,000,000 tons, and would have been higher if the road had received car orders it made early in the season, for it has been a lack of rolling stock that has kept it down. In no past year have the average cargoes of lake ore ships been as great as during 1906; the records of the Duluth & Iron Range road show the average load to have been 6576 net tons. This road handled through its docks every day for the season of navigation an average of 1130 carloads of ore and loaded an average of 171 ships per month.

December navigation on Lake Superior is a dangerous matter, and shippers object to it more and more each year. It is only by chance that there have not been some severe losses during the past week. This morning one of the Great Lakes & St. Lawrence ships came limping into the head of the lakes, after being a week on Lake Superior, five days overdue on a run that should take about 40 hours. The ship's mechanical stokers had given out, and there were several hundred tons of ice frozen to her sides, till she had less than a foot of freeboard. So slight an elevation above water in weather when every drop freezes as it touches metal, is a very serious predicament.

For the shipping year just closing the Vermillion range has shipped a total of 1,798,247 gross tons, compared with 1,677,186 tons the preceding season. This brings the Vermillion total to 25,496,151 gross tons; the range has been a producer since 1884. Shipments of this year by mines from this range have been as follows: Pioneer, 761,960 tons; Chandler, 317,827; Sibley, 282,292; Zenith, 179,688; Minnesota, 145,505; Savoy, 104,975. All mines of the range are now stockpiling and a production about 10 per cent. larger that that of 1906 will be made the coming season. Production from this range is all Steel Corporation ore.

The Oliver Iron Mining Company has shipped from the Mesabi range about 10,650,000 tons, including its purchases on long-term contracts from Stevenson, and what ores the Great Northern road has shipped on its account. Its own railroads have moved during the season 19,400,000 tons, and of the 11,209,000 tons moved by its Duluth, Missabe & Northern line 10,111,984 tons were for its account. Leading Mesabi range shippers for the year have been as follows: Mountain Iron, 2,533,093 tons; Morris, etc., 1,809,389; Fayal, 1,710,011; Hull, 1,504,299; Burt, 1,376,874; Adams, 1,303,991; Mahoning, 1,020,000; Stevenson 1,000,000; Biwabik, 807,373; Spruce, 647,665; Rust, 747,181; Shenango, 383,717; Chisholm, 375,942. Others shipped lesser amounts, and will be given in full in detail later. One of the interesting facts in connection with these figures of shipments is that several of the larger mines have not made the records expected of them, while new and comparatively unknown properties have done unexpectedly well. This will be a common condition, and next year there will be some enormous shippers which have never yet figured in the lists.

The Mesabi range has made a total for the year of 23,650,000 tons, against 20,153,000 tons last year, more than all the gain of the lake being there.

The Old Ranges have not been able to increase, and it will be the same next year; the additional tonnage must come off the Mesabi. Doubtless such a condition will prevail for many years, throwing the burden of the growing American steel trade upon the Mesabi range, and thus diminishing its reserves faster than would otherwise be the case. One well-known authority, Joseph Sellwood, of Duluth, says the Mesabi range is good for only 20 years, at the probable rate of increase, but this view must be considered extreme. The writer would consider 40 years much nearer the facts, and believes that large additional deposits, both in Minnesota and Michigan, remain to be discovered or opened.

Scranton Dec. 10

The Llewelyn Mining Company, against which a number of miners had brought suit to recover back money alleged to be due them under the award of the Strike Commission of 1902, has won the action in the Northumberland county court. The suit was dismissed on the ground that the court had no jurisdiction in the matter. The company contended that it was not a party to the contract and had not signed the agreement.

The Northern Coal and Iron Company, an auxiliary of the Delaware & Hudson, has purchased a tract of land in Hanover, near Wilkes-Barre, consisting of 43 acres, for $43,000. It will be used for increasing the storage yard.

During the month of November 30 miners were killed in Lackawanna and Luzerne counties, this being the largest rate for many years.

Fire and smoke are spitting forth from Sharp mountain, near East Mt. Carbon. It developed that the smoke and sparks came from a burning mine in the mountain. The fire started 30 years ago, when an individual operator was engaged in taking out coal in small quantities. It had been closed up and forgotten many years, and during these years the fire has been slowly eating its way in the abandoned mine until it is nearing the surface.

London Dec. 1

The present fashion for London promotions nowadays is Siberia. The celebrated Mr. Hooley started on this line toward the end of his meteoric career and his legacy to the mining market was the Siberian Goldfields Company. This was afterward reconstructed as the Nerchinsk Gold Company and quartz properties were acquired after the gravels on which the original company was floated were found to be totally valueless. The Nerchinsk company also had its troubles, for its leading man, Mr. Whamond, committed suicide, and its financial stability had to be entrusted to other hands. Eventually Hamilton Adams, who was already operating in France and Russia as a promoter of gold-mining operations, took the company up and continued the work. The developments at one part of the company's property have turned out so well that it has been thought advisable to form a subsidiary company to work the Kluchi block, so a company called the Kluchi Gold Mines, Ltd., has been formed and a sum of £40,000 will thereby be provided as additional working capital for the extension of the mill and for increased developments. Messrs. Pearse, Kingston & Browne have been the mining engineers since the shareholders turned Mr. Hooley out, and they have developed the property thoroughly, so that at least 230,000 tons of ore, averaging $12, have been blocked out. The plant consists of Tremain and Sphere mills and can treat 100 tons a day, and new machinery is being erected which will bring up the amount to 250 tons a day. A cyaniding plant is also being designed. The trial runs of the mills show a very poor proportion of extraction, for out of $17 in the ore treated only $9 was recovered. No doubt the new cyanide plant will catch most of the rest, but no explanation of this point is to be found in the prospectus or the engineers' report.

Johannesburg Nov. 8

During the past fortnight, heavy showers have fallen, on the Rand, and the danger of hanging up mills for want of water seems past. The outlook for a satisfactory rainy season is good. Whenever the rains start, in September or Oc-

tober, we generally get lots of rain before the dry season begins. There is a considerable difference in rainfall on the Rand.

We have been most interested in a series of mining articles by Ralph Stokes, who is traveling around the world on behalf of the *Rand Daily Mail.* Writing from Western Australia, he makes some caustic remarks on the sneak thieves who are known as sportsmen there, and their methods of robbing the mines. There is a big difference on the Rand in this regard. That there is gold stolen no one will deny. But so wide awake are the authorities, and so heavy is the penalty for a guilty one—imprisonment without the option of a fine—that gold stealing on the Rand is insignificant compared with Western Australia.

There has been a recrudescence of Chinese crime. At one of the mines near Johannesburg, a desperate attempt was made to rob the house of the mine captain. Fortunately the man was well armed, and after putting his family in a place of safety he gave the intruders a warm reception, killing one and wounding two. The failure of the raiding party has a better effect on the coolies at large than all the court cases put together. Soon after another attack was made on a house, but the coolies were driven off, one being seriously wounded.

The returns for October show that the results for the month are the highest ever achieved by the Transvaal gold mines. A new record is made. The total production, inclusive of 14,968 oz. gold reserves, was 540,609 oz. fine gold, valued at $12,-296,361, which is an increase compared with September yield of 35,498 oz., valued at £150,786. The total number of stamps operating in October was 8370 for the whole of the Transvaal, which is an increase of 55 over September. Of the total 7975 were working on the Rand, and 395 in outside districts.

Quite a new departure is the declaration by the different companies of the amount of gold held in reserve. There has been considerable discussion on this point, and some adverse criticism, so as a result of all this talk it has been decided to let the public know every month how much gold is in reserve. Now that the reserve is published there is no use to have any at all. As a matter of fact the mines of the groups have decided to cease holding any gold as reserve, and will declare as profit every month whatever they make. There will probably be a considerable fluctuation in the profits from month to month.

Quite an interesting function took place recently at the Jumpers Deep mine, when the coolies employed there presented the manager, who is retiring, with a farewell gift in the shape of a gold tray. The inscription was engraved on the front of the tray in Chinese characters, and a literal translation is engraved in English on the back.

General Mining News

In the habeas corpus proceedings in the case of Moyer, Haywood and Pettibone, officers of the Western Federation of Miners, held in Idaho on charges of complicity in the murder of ex-Gov. Steunenberg, the United States Supreme Court has finally refused the writ asked for, leaving them in custody of the Idaho authorities. Justice McKenna alone dissented from the opinion of the court, which was delivered by Justice Harlan. The court held that when a person is brought to a State from a foreign State to answer for a crime alleged to have been committed in the former State, he cannot raise in its courts the question whether or not he was a fugitive from justice when brought back. When a request is presented to a governor of a State from a governor of another State for the return of a criminal, the responsibility of determining in some way whether a crime has been committed rests upon the governor of the State where the fugitive from justice is found, but he is not obliged to demand proof of the commission of a crime outside of the requisition papers themselves, and failure of the governor of Colorado to require proof of guilt of appellants is not an infringement of their rights under the constitution and laws of the United States. The decision concludes as follows:

"Any investigation as to the motives which induced action by the governors of Idaho and Colorado would be improper as well as irrelevant to the real question to be now determined. It must be presumed that these officers proceeded throughout the affair with no evil design and no other motive than to enforce the law."

ARIZONA

GILA COUNTY

Old Dominion—The United States Circuit Court of Appeals has affirmed the decision of the lower court in sustaining the demurrers interposed by the Lewisohn estate to the suit brought against it by minority stockholders of the Old Dominion Copper Mining and Smelting Company. The complainants alleged that Leonard Lewisohn, who formed the Old Dominion Company with A. S. Bigelow, of Boston, sold the company certain property for 30,000 shares of its stock. It was alleged that the property was worthless. The court holds that the transaction was legal, and that no one was defrauded thereby.

YAVAPAI COUNTY

Arizona Diamond Drill Development Company—This company is prospecting a number of properties near Mayer, by the means of a diamond drill. Prospecting by this means has proven very satisfactory in this vicinity.

Climax Gold-Mining Company—A new strike is reported to have been made at the mines of this company, 10 miles south of Prescott. Two feet of ore that assays $55 per ton gold has been uncovered; the extent of the strike is not yet determined but the ore shoot has been explored for a distance of forty feet.

Carroll Gold and Copper Company—This company is the owner of a group of five claims in the Agua Fria mining district, and is now beginning operations on a large scale. The present workings have now attained a depth of 240 ft., and the showing is such that the company has decided to put down a three-compartment shaft to the depth of 1200 ft. or more. Machinery for this purpose will be installed as soon as possible. This mine has for a long time been regarded as a silver mine, but as the workings have gained depth copper values have continued to come in, until now it is clearly a copper mine although carrying considerable values in gold and silver. The ore is assuming a sulphide nature, although it will be fully 100 ft. before the water level is reached. The surface indications on this property are unusually good, the ledges are large and ore taken from the surface was rich enough to ship. As depth has been gained the orebodies have improved in value.

CALIFORNIA

AMADOR COUNTY

Amador Queen—Moore, Bruce and others interested in this mine, in Murphy's Gulch below Jackson, are endeavoring to get a renewal of their lease. Having found some good "pockets" they desire to search for others.

BUTTE COUNTY

Prospecting for Diamonds—The company which has started men at work hunting for diamonds above Oroville, under Superintendent M. S. Cooney, has piled up several hundred tons of gravel and is sinking shallow shafts.

CALAVERAS COUNTY

North Star—Work is to be at once resumed in this mine near San Andreas by Otto Dolling, who has completed the new hoist.

FRESNO COUNTY

Copper Wizard and Andesite—S. N. Griffith has bonded these two copper groups near Clovis to F. L. Dana, of Houston, Texas, the price for the two being $50,000. Prospecting work will begin at once.

INYO COUNTY

Keeler—Capitalists have secured options on many of the old mines at this camp and preparations for more thorough development are being made. The New Coso is taking out high-grade silver ore from the Lucky Jim mine, and it is expected shortly to ship 100 tons daily.

MONO COUNTY

True Friend—In the north crosscut at the bottom of the shaft in this mine,

Masonic district, a 10-ft. ledge carrying good values has been met. A 10-stamp mill is to be installed, but will be designed to have ultimately 40 stamps.

NEVADA COUNTY

Horse Valley—This mine, near Graniteville, has built a restraining dam and secured a permit from the California Debris Commission to hydraulic.

Cañon Creek—The Fritz Meister claim at this place, near Washington, is about to have a 10-stamp mill, good bodies of ore having been discovered. The mill is to be run by water power.

PLACER COUNTY

Big Bonanza—J. D. Stewart has 28 men at work re-timbering and repairing the tunnel of this mine at Gold Run, and will put up a 20-stamp mill this winter.

Hercules—Diamond-drilling machinery to prospect this mine on Little Grizzly creek is being hauled in. They are to hunt for the southerly extension of the rich Antone Joseph diggings.

North California Mining Company—It is reported that a good strike has been made in Long Valley camp by this company. It is a high channel deposit of auriferous gravel.

SHASTA COUNTY

Crown Deep—This mine, in Lower Springs district, five miles from Redding, has been sold to Philadelphia men and extensive developments are to be made.

Mountain Monarch—This mine, heretofore worked as a gold mine, turns out to carry better values in copper and the plan to erect a mill and cyanide works has been given up, it being now the intention to ship the ore to a smelter. The mine is three miles west of Shasta. The tunnel is 600 ft. in.

SISKIYOU COUNTY

Advance Mining Company—This property has been sold to a Denver, Colorado. company and a tramway to the mill is to be built and electric power supplied.

Schneider Ranch—A new free-milling mine on this ranch has been opened and has been bonded to Miller & Swenson who are employing men to develop it.

STANISLAUS COUNTY

Dredge—The company which is to dredge certain ground near La Grange is putting in an electric-power line and making other active preparations for work.

Gravel—The group of gravel mines on Buckeye mountain owned by the Humboldt Mining Company has been bonded by L. Brodt, who represents foreign capital. A new ditch is to be dug so as to get a more plentiful supply of water.

TUOLUMNE COUNTY

Mazeppa—This mine, near Stent, has been started up after a long idleness. The shaft is 800 ft. deep and there is a 10-stamp mill on the property.

Chrome—DeGolia & Atkins are shipping two carloads of chrome ore to Denver, Colorado, from their mine in Woods Creek.

YUBA COUNTY

Pleasant View—This mine near Camptonville is about to be opened up in a systematic manner. The tunnel is in 1500 ft. in all.

COLORADO

LAKE COUNTY—LEADVILLE

Monthly Tonnage—Despite the drawbacks of shortage of cars and scarcity of coal during part of the month of November, the total tonnage for the month lacked only a few hundred tons of reaching 90,000 tons. Should there be no drawbacks to contend with during the present month, the output will reach 100,000 tons of all classes of ore.

New Monarch—South Evans gulch is astonishing the mining world by the richness of the ore that is being sent from the Winnie shaft. During the summer a streak of ore about 1 ft. wide was opened in one of the stopes embedded in a mass of $20 ore; samples were taken from the vein and gave returns from 15 to 56 oz. gold per ton. Development was started on the streak, and it has been kept going steadily until now it has been opened for over 1000 ft. with the high values still retained. A little over a carload a month is shipped to the smelter at Salida, and this comes from the opening of the vein, as no stoping has been done and stoping will not be started until the development work on the vein is carried to the end lines of the property. In addition to this very rich ore a body of sulphide, lying alongside of a porphyry dike to the south, is being worked, the whole body running 5 oz. gold per ton. The low-grade ore that is being shipped from the property is to be taken into consideration, so altogether the New Monarch Company is shipping in the neighborhood of 1500 tons per month. Prospecting work is still being carried on at the Katy shaft, to the east of the Winnie, but as yet no ore has been opened.

Rock Hill—Conditions are once more normal in this section, and the mines are again shipping the regular daily quota of ore; the Reindeer in the lead with 100 tons daily, followed by the Murphy shaft, with 50 tons daily. The lessees on the Ben Burb are shipping a good grade of hard carbonate from the drift that connected the property with the Great O'Sullivan claim; 10 tons daily are being shipped, and the ore nets the lessees $20 per ton. The Bessie Wilgus has been closed down preparatory to making the necessary repairs for sinking the shaft. The Raven shaft has been leased by W. E. Bowden and associates and the necessary surface improvements are being done before sinking is started. The Crecentia is shipping steadily 50 tons daily, and prospect work is being carried on in the Ruby territory.

London Mine—Mosquito range is shipping steadily a grade of ore that holds up to 5 oz. gold, per ton, and some high-grade stuff is being sacked that runs 12 oz. gold per ton. The White Quartz group, adjoining the London to the west, will start up shortly and work will be continued during the winter. It is financed by Denver parties.

OURAY COUNTY

Blue Bell—At the annual meeting of the stockholders in Philadelphia last week the old board was re-elected and chose officers as follows; William Chalfant, Jr., West Chester, Penn., president; George Crawford, New York, secretary and treasurer.

SAN MIGUEL COUNTY

Tomboy—D. A. Herron, of Telluride, manager of the Tomboy Gold Mines Company, recently returned from a brief visit to Salt Lake City, Utah, where he witnessed a test on 10 tons of Tomboy ore, the results of which were sufficiently gratifying to induce him to order an experimental sizer for installation in the concentrating room at the Tomboy mill. The improvement consists principally of a belt sizer which, it is expected, will enable three concentrators or vanners to do the work of six. Ten stamps only will be equipped at present, but if the device proves satisfactory it will be extended to the entire 60 stamps in the mill. After passing over the sizer the oversize goes to two Wilfley tables, and the undersize, after being dewatered, passes over a single Frue vanner, or perhaps a slime table may be used. If the sizers at the Tomboy accomplish the results claimed, they will undoubtedly be adopted in almost every mill in San Miguel county, especially in the big plants, where concentration is a most important feature of the ore treatment. Last summer the Tomboy company put in one of the largest air compressors in the State in order to operate a larger number of machine drills. There are at present about 27 in constant use, day and night. The mine is located at an altitude of between 11,000 and 12,000 ft., therefore the drills require a compressor of greater capacity than would be necessary at a lower elevation. New mortars have lately been installed throughout the mill, and all stamps are kept pounding continually, from 250 to 275 tons of ore being treated every 24 hours. The ore is said to be coming from all over the mine, no part especially favored, and running the usual values. There are still large reserves above the mill level and much of the production is from that source. Development in the lower levels indicates the ore there is as valuable as in the upper levels. For some time no sinking has been done in the shaft, which is down 500 ft. from the mill level, but it

is probable that work of sinking will be resumed at an early date.

Golden Wonder—The most important strike reported in the district so far this year was made on the Golden Wonder by James Knouse, of Telluride, the owner, a week or two ago. The claim is located at the head of Cornet creek, about half way between the Liberty Bell mines and the top of Sawtooth range; which divides San Miguel and Ouray counties. The vein was intersected by a crosscut tunnel 410 ft. in length, at a vertical depth of 300 ft. under the surface. The owner then sunk a shaft through the slide-rock and encountered the vein. In the bottom of the shaft it is 7 ft. wide, with neither the foot nor hanging wall visible, and composed entirely of mineral matter. Several tests of the ore have been made and it carries higher values, chiefly in gold, than any of the big propositions in the camp. It is generally believed that in the Golden Wonder the "Lost Bonanza" has at last been disclosed. From the earliest days of mining in this section large chunks of exceptionally rich float have been found along Cornet creek, but the best prospectors were never able to find the vein whence it came, hence it was called the "Lost Bonanza."

MARYLAND

GARRETT COUNTY

A tract of 2700 acres, containing coal, has been sold to Cruse & Perry, of Philadelphia, who expect to develop the property.

MICHIGAN

HOUGHTON COUNTY—COPPER

Quincy—A quantity of powder exploded in No. 8 shaft at the Mesnard branch, doing some damage to the shaft. There were 40 men in the mine, and they were in serious danger from the heat and the gases for a time, but were finally rescued. One man was killed and three badly hurt as the direct effect of the explosion.

MISSOURI

JASPER COUNTY

Col. James O'Neill, of Webb City, has installed two 12-in. pumps on his property in the south limits of that city, on what was formerly known as the old Sucker flat lease, which he recently acquired. His purpose is to drain the ground thoroughly in order to go after the deeper run of ore which has been proven by drill to exist on this property.

Howard Land—Geo. Ball and Wm. Gunning have made two important drill strikes on the Howard land immediately west of the Carter land, two miles northwest of Webb City.

Underwriters—The second half of the 1000-ton mill recently erected by the Underwriters Land Company north of Webb City will soon be in operation. Hoisting from incline shaft No. 2 will then be commenced and this should practically double the output of that mine.

Milton—Drilling by Jess Gillard on the Milton farm north of Oronogo has resulted in some unusually rich cuttings. Three holes have gone down to a depth of over 110 ft. and the same run of ore was found in each of them.

Winslow Mining Company—This company, operating on the Bowman & Ware land, northwest of Webb City, is at present engaged in sinking four shafts on its lease. The company is also making rapid progress in erecting its new mill a short distance north of the old plant on which some big outputs have been cleaned up during the past few months.

MINNESOTA

IRON—MESABI RANGE

The Oliver Iron Mining Company is to open its Gilbert orebody, in 26-58-17, adjacent to the Malta, Sparta and Genoa, and will begin work as soon as stripping outfits can be removed there from the neighboring mines of Eveleth. This mine has been thoroughly developed by extensive drilling and will be mined by the most modern and scientific methods. It will probably be some time before any large tonnage can be moved from there. One of the chief producers of the Oliver Company next year, eliminating such mammoth properties as Mountain and Hull, will be Stevens, in 59-15, where stripping has been under way for years. Another very large producer will be Fayal, which has not equaled its high record in the past two years. But a large amount of development has been done there recently and enormous amounts of ore lie exposed for the steam shovels.

The New York State Steel Company has taken a second explored property on the Mesabi range, the NE of the NE of section 4-58-17, heretofore called the Tesora, and a small shipper. It contains some 600,000 tons of medium-grade ore, and was secured at a reasonably low price. It will be developed in conjunction with the Kellogg, in section 9 of the town directly east, where this company is now clearing the ground preparatory to starting a shaft. It is expected that next year's shipments from Kellogg will be 100,000 tons. This new company is entering the iron-ore field with vigor and is taking a number of explorations, with the view of developing its own mines, if possible. It now has sufficient ore to maintain its expected production for a number of years, and is safe in going forward with exploring on land that may or may not produce results. It has begun explorations on some tracts and has several others under consideration, at least a few of which will doubtless be taken up in due time. Perhaps no concern is now looking for ore on the Mesabi more vigorously than this new Eastern steel interest.

The Republic Iron and Steel Company, which has been stripping its Kinney mine all summer, expects to continue this work through the winter, with one shovel, and is moving off about 50,000 yards a month. This is all done on company account, and the costs are rather low. That is, they average about as this correspondence has reported for stripping on company account from other operations with which I have been familiar. This is considerably under the rate for contract work. The mine is to be put in shape for a production next year of about 400,000 tons, which is 300,000 tons larger than its average, though this year the total is better than it has been heretofore. Most of Kinney's product for next year has been sold to other consumers.

MONTANA

BUTTE DISTRICT

Amalgamated — This company has stopped sinking for the present in all of its shafts except the High Ore and West Colusa. The former is 2560 ft. deep; the latter is 1650, and is going to the 2000. It is driving one of the lower openings south in the Anaconda mine to get under the shaft on the Belmont with the intention of raising for a connection with the latter. The Belmont will be the main outlet for Anaconda and Neversweat mine ore. Its shaft is 900 ft. deep. In itself it is not a mine and has never been one, although some good ore was found in it between the surface and a depth of 300 ft., which is about the limit of orebodies in that part of the district, southeast Butte. United Copper sank the Belmont shaft at an estimated cost of $275,000, including exploration work below. The shaft will be of great benefit to the Anaconda Company, for it will save considerable hauling up and down the hill.

Pittsburg & Montana—The company is mining between 175 and 200 tons of ore a day that runs from 4.6 to 4.8 per cent. copper. It has two shafts, each of which is 1200 ft. deep, and connected by a crosscut 2300 ft. long at the bottom. From a crosscut leading in a northwesterly direction from the main crosscut it has sunk two winzes, one on the Domer vein and the other on the Rossell. The former is 300 ft. deep and the latter 100. Both are sinking. In the Rossell there is a vein of high-grade ore 12 ft. wide, from which the company secures most of its output. The company has 7½ miles of underground openings, and while it is not earning money, it is making close to expenses each month. As soon as developments warrant, it will remodel the smelter and treat its own ore.

North Butte—The company places its output at 1200 tons a day. It will not increase this quantity much until it establishes another outlet for its ore, steps in which direction have been taken by a decision to sink a deep shaft on the Ber-

lin, the northern extremity of its possessions.

Butte & Bacorn—This company is operating in the extreme northern part of the district and is backed by Pittsburg men. It is sinking three shafts. Last week it cut an 18-in. stringer of copper-silver ore north of the 300-ft. station in the Colleen Bawn claim and is drifting on it. Two days ago it cut into another vein at 500 ft. in the Calumet and is crosscutting it. At present the vein does not show much mineral. The ore in the Colleen is good, an assay showing 44.6 oz. silver, $7.50 gold, 4 per cent. copper and 4.6 lead.

East Butte—Two 12-ft. veins have been opened through the Dutton shaft at 400 ft. depth, according to a report made by Frank H. Probert, who inspected the property recently for W. A. Paine of Boston. Mr. Probert says also that a 50-ft. vein in the Yankee Boy, company ground, contains 3.5 to 4 per cent. ore and advises the erection of a 500-ton concentrator in two units.

NEVADA

NYE COUNTY—TONOPAH

Ore Shipments—Shipments of ore over the Tonopah Railroad for the week ending Nov. 29 were: Tonopah Company, 750 tons; Belmont, 360; Tonopah Extension, 310; Midway, 57; West End, 26; total, 1503 tons. Additional shipments from Goldfield were 938 tons, making a total of 2441 tons.

West End—Owing to the fuel famine at present existing in Tonopah, the West End, MacNamara, and other mines, have had to close down. The railway officials have promised to make strenuous efforts to bring in sufficient fuel to enable the principal mines in the district to resume operations within a few days.

MacNamara—The ore-bins are full of high-grade ore awaiting facilities for shipping to Salt Lake. Owing to the great demand for foodstuffs the entire railroad system is congested, and mining companies find it impossible to secure railroad cars either for bringing in supplies or shipping ore.

Extension—The management has been fortunate in securing oil fuel to enable part-time operations for a month. All the ore raised is being stocked on the surface to await the raising of the car blockade.

Ohio—The shareholders of the Ohio-Tonopah Mining Company have agreed to accept the offer of the West End company to purchase the Ohio mine for 200,000 shares in the West End.

Eagan-Oddie Claims—Senator Oddie has disposed of a group of claims he has long held in a favorable position in Tonopah, for the sum of $250,000, and the purchasers are arranging to form a company to develop them. The claims are situated on the north of the Montana and Midway mines, and have good prospects.

NYE COUNTY—BULLFROG

Gibraltar—High-grade ore has been cut in No. 2 tunnel in the drift from No. 1 at a point 100 ft. north of the face. A large amount of the ore has been raised and will be shipped to the smelters as soon as teams can be obtained.

Tramp Extension—This mine has been placed under the management of Thomas P. Kilker, and development operations will be commenced as soon as the required number of miners are obtained. The mine is well situated on Bonanza mountain, and has good prospects.

Croesus—The shaft is being sunk to a depth of 150 ft., and will shortly be equipped with a 25-h.p. hoist, which is now on the railroad. It should reach the mine within a month.

Shoshone-National Bank—The shaft is down 75 ft., and will be sunk deeper as rapidly as possible. Arrangements are being made for the erection of a new hoist to expedite the work. No material change has taken place in formation cut in the main drift.

Mayflower—It is reported that Chas. M. Schwab has acquired a controlling interest in this mine, and several of the adjoining properties. As a consequence, there has been a marked activity in the shares of other mines in the vicinity. The Mayflower has a large low-grade vein and has always been looked upon favorably by mining men. It will doubtless prove a large, steady producer when properly developed, and operated systematically.

NYE COUNTY—REVEILLE

Reveille Mine—This is the property of the Nevada Smelting and Mining Company, of which E. J. Collins is general manager. The ore is an argentiferous lead. The shaft is 100 ft. in depth and is in a lenticular lode in a limestone formation. There are 6000 tons of lead ore on the dump awaiting the erection of a smelter. Thirty carloads of ore recently shipped to Salt Lake averaged 57 oz. silver and 69 per cent. lead per ton. About 35 men are employed in the mine. This corporation also has a group of about 30 claims at Eden and is working eight men there. Work has just commenced, and it is proposed to drive tunnels, sink shafts, and do general exploration and development work. There are a half dozen or more ledges, all of which show good values.

NYE COUNTY—KAWICH

Goldreed—Development work is being carried on in all the company's claims, but progress is slow on account of the difficulty in getting supplies into the camp. Excellent ore is showing in the workings in several of the claims, and good strikes are frequently being made in other properties in the camp.

NYE COUNTY—KING SOLOMON

King Solomon Mining Company—This company is developing a large mining property about 35 miles northwest of Tonopah. The preliminary mining work having proved the value of the property, the company is making arrangements for sinking a new permanent working shaft to a depth of 500 ft. The vein in the 300-ft. level is 4 ft. in width and carries good values in gold, silver and lead.

WHITE PINE COUNTY

Cumberland-Ely—A special meeting will be held Dec. 17, to authorize the increase of the capital stock from $5,000,000 to $6,500,000 by the issue of 300,000 new shares of $5 each. The new stock will be used to pay for the company's share in the railroad and smelter owned jointly with the Nevada Consolidated Mining Company.

OREGON

BAKER COUNTY

Forest City Exploration and Mining Company—This company, which has its headquarters in Cleveland, O., is operating several claims in the Goose Creek copper district, 30 miles east of Baker City. Much development work has been done, and it will be continued through the winter.

Gold Hill—Col. James A. Parting, who owns this property in the Durkee district, 26 miles southeast of Baker City, is negotiating for its sale to a Boston syndicate, represented by S. F. Holcomb, who has been examining the property.

United Elkhorn—At this mine, in the Elkhorn range, 20 miles west of Baker City, the new power drills are now at work on the 400-ft. level. A tunnel is to be started to tap the orebody at 2500 ft. depth. The drills are driven by air compressed at the station down the mountain at the head of the gulch, by machinery driven by hydro-electric power. Everything about the mine is run by electricity and the mine is lighted by electricity. Edward I. Fields is manager.

Western Exploration and Dredging Company—This company has secured control of 5000 acres of land along Burnt river near Durkee, and is now testing the tract with a Keystone drill, with a view to operating dredges there. The company is organized at Portland, Oregon, with H. W. Goods, president; C. E. S. Wood, vice-president; Ralph Hoyt, treasurer; F. M. Batchelor, secretary.

LANE COUNTY

A discovery of coal is reported at Spencer Butte, near Eugene. Arrangements are being made to test the discovery by drilling.

PENNSYLVANIA

ANTHRACITE COAL

Lehigh Coal and Navigation Company—This company is carrying out plans to

increase its business in Philadelphia and will spend about $250,000 in improving its facilities, including some additional canal boats. On the Delaware river front, near Cramp's ship yard, it is constructing a coal-storage plant with a capacity of 200,000 tons. Modern machinery will be installed to take the coal from the canal boats and transfer it to the storage yards. The construction of seven 400-ton bins will provide facilities for local and perhaps retail deliveries. Two trestles, 450 ft. long, will be built in the storage yard, Piers 75 and 76 will be rebuilt and extended to the Port Wardens' line, which will make them 500 ft. long and 100 and 111 ft. wide. Each pier will cost about $85,000 and the storage yard as much more. This company has not, in the past, been able to supply its customers with coal the year round. When winter closed the canal, the company has been compelled to turn over the coal to the railroads.

Lehigh Valley Coal Company—This company has leased the Silver Brook colliery, which was abandoned by the J. S. Wentz Company about a year ago. A peculiar feature of the transaction is that the Wentz company pays the Lehigh company the sum of $5000 for taking the lease. The Wentz company must also remove the breaker and all other buildings within a specified time. It is presumed that the Lehigh company will not haul the coal at the colliery, but will remove it through the Quakake tunnel to Hudsondale, where it built a large storage yard recently and will probably erect a breaker.

Pennsylvania Coal Company—A serious fire threatened at No. 7 mine of this company, at Pittston. It originated in the 14-ft. vein. about 4000 ft. from the mouth of the shaft. The officials are confident that it is now under control.

Philadelphia & Reading Coal and Iron Company—This company is carrying out extensive improvements at the Good Spring colliery, near Donaldson, where tunnels are being driven to the Mammoth and Buck mountain veins. Trial shafts have proven the Mammoth seam in excellent condition. The Lykens vein mined for the past two years continues in splendid condition. Extensive improvements are also being carried out at the Lincoln colliery, near Tremont, where two lifts are being sunk on the slope. The Brookside colliery, near Tower City, although an old operation, is one of the best producers in the Schuylkill coal region. A shaft has been sunk to a depth of 1860 ft., requiring five years for its completion. The bottom of the basin has been reached and gangways are being driven. The head-frame and hoist will not be completed till spring.

BITUMINOUS COAL

Overholt & Keister—This firm is reported to have taken options on 15,000 acres of land in the Connellsville coke region. The intention is to open several mines and to build 2000 coke ovens as soon as possible.

SOUTH DAKOTA

LAWRENCE COUNTY

Lucky Strike—This company has let a contract for 200,000 ft. of logs to be delivered at the new sawmill on its ground. As soon as the shipments of logs begin regularly, the mill will be put in operation, and the work of turning out lumber for the new 40-stamp mill will begin. The company expects to furnish practically all its own lumber. The new mill, for which most of the machinery has already been contracted, will be an amalgamation and cyanide mill.

Echo—Surveys are being made preparatory to the patenting of the company's holdings in the Garden City district. The ground lies near the Penobscot.

Golden Crest—The mill, which has been closed pending the installation of new machinery necessary for the electric power which is to be used, will resume operations within a few days. The first work to be done will be to pump out the shaft where there is now about 75 ft. of water. At the depth of 200 ft. a new level wlil be run to open up the orebodies.

PENNINGTON COUNTY

Central Black Hills Copper Company—The prospects are good for an early resumption of work on this property, which lies west of Rochford, in the Limestone region. A body of copper carbonate has been opened up.

CUSTER COUNTY

Westinghouse Electric and Manufacturing Company—This company has added to its holdings by purchasing the Highland and the White Spar mica mines located 2 and 4 miles west of Custer. This gives the company a good acreage, and work is being carried on in a substantial manner and on a large scale. The factory, which has been located at Custer, will be moved to Denver on account of the scarcity of labor in this part of the country.

Leroy—This company, with ground located about 4 miles west of Custer on French creek, has been reorganized and will proceed to the development of its property. The claims will be patented, a steam hoist and other necessary machinery will be installed, and the work carried on in an extensive manner.

Christianson Spodumene—A three years lease on this ground, near Keystone, has been granted to Charles Meigs, who will at once put a force of men to work and prepare the spodumene for shipment.

VIRGINIA

GILES COUNTY

It is reported that a syndicate has bought a large tract of iron-ore lands in this county, running over into Craig county, with a view to opening mines. James Lang, of Lewisburg, W. Va., and Julian Bryant, of Richmond, Va., are representatives of the syndicate.

LEE COUNTY

Black Mountain Collieries Company—The Baltimore *Manufacturers' Record* states that this company is developing about 2000 acres of coal land on Black mountain, 10 miles from Pennington Gap. All necessary equipment for the mining plant has been purchased and is being delivered, and an opening is being made which is expected to produce 1000 tons of coal per day. Mr. William Ramsay is the engineer and manager in charge of operations, and contemplates putting out coal by February, 1907. The main office of the company is Norfolk, Va., and its officers are J. M. Barr, president; F. C. Wright, vice-president; William Ramsay, manager, and A. W. Wagner, secretary and treasurer.

WASHINGTON

STEVENS COUNTY

First Thought—The company has resumed the shipment of ore to the Granby smelter, at Grand Forks, B. C. This company, the First Thought Gold mines, Ltd., has voluntarily reduced the working shift from 10 to 9 hours a day, at $3.50 per day as heretofore.

Crystal Marble Quarry Company—This company has purchased the plant, tools and material of the Standard Group Marble Company.

Bead Lake—The tunnel is in 2140 ft., and has struck into a body of ore, after five years of exploitation. The company is now putting the property in shape to ship.

WEST VIRGINIA

PRESTON COUNTY

A sale of 10,000 acres of coal land to Charles H. Loucks, of Scottdale, Penn., is reported. The property is near Zar, and is about 10 miles from the Baltimore & Ohio Railroad.

WISCONSIN

ZINC DISTRICT

Baxter Mining Company—The directors of the Baxter have come to the point of installing machinery that will save money at the coal pile. Mr. Palmer, after going over the matter of installing a larger compressor, has just purchased a Class "HC" Ingersoll-Rand compound-steam, compound-air, duplex machine, having a capacity of 348 cu.ft. of free air per minute, whereby they will save a large amount in fuel. It is the intention to install the new compressor without delaying operations in the least. The deal was made through one of the Galena Iron Works engineers. The

compressor is considered the finest that has as yet been installed in the district.

Peacock Mining Company—A deal has just been closed with the Galena Iron Works for the erection of a small mill at the Peacock mine, near Mifflin camp. The present equipment consists of a Galena pattern Cornish lift pump operated by a 20-h.p. Fairbanks-Morse engine. In connection with the mill there will be a new power plant having two 32-h.p. Fairbanks-Morse gasolene engines, so arranged that the mill, pump and hoist can be operated singly, or all together, by either of the engines in combination, thus allowing operations to continue should an accident throw one of the engines out of commission. Dr. Hales, of Mineral Point, Wis., one of the chief owners, has investigated the mill question thoroughly and concluded that small units were the better for the conditions as found at the Peacock. In this connection it is well to state that the majority of the paying mines are equipped with small plants, having an average capacity of 40 tons of 20 per cent. ore.

PHILIPPINES

The Philippine Miners' Promotion Association has been organized in Manila for the purpose of disseminating literature throughout the islands and in the United States setting forth the general mineral resources of the archipelago. The officers are as follows: Governor-General James F. Smith, honorary president; George Landers, president; M. A. Clarke, vice-president; H. B. McCoy, second vice-president; C. E. Hamilton, third vice-president; Captain Collette, fourth vice-president; George Morgan, treasurer; Chauncey McGovern, secretary.

Foreign Mining News

CANADA

NOVA SCOTIA

After a long conference at Montreal between the officials of the Dominion Iron and Steel Company and the Dominion Coal Company, Hon. W. S. Fielding, Finance Minister, acting as mediator, a working agreement was arrived at, under which the Steel Company will purchase all the coal it requires from the Coal Company for two years at prices averaging $1.50 per ton more than the contract price of $1.24 per ton in the agreement lately broken. The Steel Company, however, maintains its position that the old contract is still binding, and will submit that question to the courts; of sustained, it will claim re-payment of the extra price.

ONTARIO—COBALT DISTRICT

November Shipments—The official statement of shipments of ore from the Cobalt mines for November is as follows, in pounds:

	Lb.
La Rose	495,000
Buffalo	280,000
Coniagas	240 000
Nipissing	119,720
Trethewey	106,770
Nova Scotia	47.040
Foster	47,000
Green-Meehan	34,050
Total	1 449,580

The final surveys of Cobalt and Kerr lakes, mining rights to the beds of which are advertised for sale by tender, have been completed by the Government surveyors.

Foster-Cobalt—Permanent organization has been affected with the following as the officials: President, W. K. George; vice-president, W. H. Blake; directors, H. S. Strathy, C. A. Foster, W. C. Kerr. Development work is being done and plant has been shipped to the mines.

Big Pete—A calcite vein has been struck on this property at a depth of about 30 ft. which, it is supposed, may be a continuation of one of the veins of the Foster mine in the immediate neighborhood.

Coleman Development Company—A promising vein of cobalt with a showing of leaf silver is being opened up.

Gilpin-Cobalt—A New York-Boston syndicate, represented by H. Dreany, Toronto, has secured a controlling interest in this property in Bucke township for about $400,000.

La Rose—Work with the diamond drill from the bottom of the 276-ft. shaft shows that at a further depth of 260 ft. the value of the vein continues to hold out. Leaf and plate silver were extracted throughout nearly the whole of the bore, and the vein matter at the bottom showed values equal to those of the surface workings.

Nipissing Mines—About 200 men are steadily at work and the force is being increased. The fault at the foot of the south drift of vein 26 has been found several feet to the eastward, where there is a width of 12 in. of ore, of higher values in silver than the upper portion of the vein. The fault here shows to a considerably greater degree than is usually the case in this area, most of the faults thus found having indicated comparatively higher movements of the country rock. Vein 27 shows a width of 9 in. at the 35-ft. level with considerable values in free silver.

O'Keefe—H. C. Barber, Toronto, has purchased from T. J. O'Keefe 40 acres southwest of Cobalt town for a company now in process of organization.

Right-of-Way—This company commenced taking out ore about Nov. 1. A 64-lb. mass was uncovered recently, chiefly silver. The vein being worked is a continuation of La Rose vein.

Silver Queen—About 100 ft. of drifting on the 75-ft. level at the main shaft shows a continuous width of the vein of high-grade ore of 16 to 18 in., in addition to which the wall rock for some distance is highly mineralized. A new 12-in. vein is being opened and shows some native silver.

University—A nine-tenths interest has been purchased by a syndicate consisting of John and Duncan McMartin, Henry and Noah Timmins, and David A. Dunlop, all of whom are interested in La Rose mine. Machinery is being installed to extend operations by developing some of the surface veins which have not been opened.

Violet—This mine, situated near Cross lake, has been brought by Clarence J. McCuaig, of Montreal, price not stated. It is a shipping mine, having disposed of ore valued at $30,000, and is undergoing steady development.

O'Brien—On Nov. 14 the actions instituted by the Ontario Government against James B. O'Brian and Michael J. O'Brien to set aside the leases under which the O'Brien mine and the adjoining property, known as the Joint O'Brien, were held, on the ground of fraud, etc., were settled by agreement. The title of the defendants was confirmed upon their agreeing to pay the Government a royalty of 2½ per cent. on the value of the output. The case has been in litigation over 17 months. The property is in close proximity to La Rose mine, and is regarded as valuable. Work has been going on, the shaft has been put down 300 ft., and drifting done to the extent of some 400 ft. The settlement of the action by exacting the payment of a royalty in return for a clear title is regarded as an important precedent, likely to be followed up in other cases.

ONTARIO—HASTINGS COUNTY

Eldorado—This copper mine has become a profitable enterprise. The smelter is running steadily on 12 per cent. ore and three carloads of matte valued at $18,000 were recently shipped to New York.

Golden Horn—At this mine, near Kenora, a new stamp mill differing considerably in type from the ordinary stamp mills hitherto in use in this field has been installed and put in operation. It has a daily capacity of 40 tons of ore.

ONTARIO—MANITOU LAKE

Laurentian—At this mine near Gold Rock, R. R. Nickerson, formerly of California, has been given charge of the development. Work in the ore on the 85-ft. level is being pushed. Anthony Blum, of Boston, is owner.

Minnchaha—At the property of this company, at Wabigoon, the shaft has been put down an additional 50 ft., the ore at the lower level yielding well.

ONTARIO—PORT ARTHUR DISTRICT

Three A Silver Mine—This mine, on Thunder bay, east of Port Arthur, was extensively worked many years ago, but was closed down during the seventies owing to the drop in silver. It has been bought by a New York syndicate, the price being stated as $75,000 and will be operated without delay.

West End Silver Mountain—At this mine, Arthur district, a vein rich in silver, which had been lost, was recovered last week, and a quantity of valuable ore taken out. Much of the ore is being shipped direct to the smelter, without being stamped. A tunnel is to be run from the West End to the Shunia-Weachu mine over 2000 ft. distant.

MEXICO

GUERRERO

San Mateo—This company, of which Domian Flores is president, and Robert Wilson manager, is preparing to put in a 30-ton concentrating plant at Poder de Dios, in the Moxtepec district.

Platanillos—This company, at Taxco, of which H. A. Lewis, of Chicago, is president, is preparing to start up again with its 40-ton lead blast furnace, after a forced shut-down of some months, caused by the rains and inability to get in the blower and other needed machinery. During the shut-down E. C. Small has made an examination of the company's property with Mr. Lewis, and it is understood that another 40-ton furnace will be put in commission without delay.

Santa Rosa—This company has two 50-ton blast furnaces running at Taxco, and is considering the erection of a third, of 100 tons capacity.

Guerrero Development Company—At Chilpancingo this company is running a tunnel 1200 ft., to cut the Veta Madre.

Guerrero Iron and Timber Company—This company has begun work on the Leona iron mine, 20 miles south of Chilpancingo. C. H. Foote, of Chicago, is president, and J. J. Moylan, of Mexico City, vice-president.

Trinidad—Plans are being made for the development of this mine, near Aldama. John McGrath is in charge.

JALISCO

Ameca—Now that the rainy season has passed and the roads are getting into shape, so that the ore may be transported with some surety of reaching its destination, the shipments to Ameca are again becoming of some consequence. This being the terminal of one of the branches of the Mexican Central, it is naturally the shipping point of a large surrounding territory. There are now coming in from the Bonanza Mining Company, at Barranca, of which E. J. Callahan is manager, the concentrates accumulated during several months from its Chilean mill. It is questionable whether much more will be done at this property until more economical milling can be devised. O'Brien Brothers are sending in high-grade copper concentrates from their El Guaje, where an excellent showing is being made. Within a few hours of Ameca, Reitz & Forbes are just opening up a small but rich and promising vein of silicious ore running some 3 oz. gold to the ton, which of course comes to Ameca. So also does the ore of the Philadelphia Mining and Smelting Company (507 Drexel building, Philadelphia, Penn.), about four hours out from Ameca, under the management of A. F. Hall, whose three years' work is beginning to reap its reward for himself and company from the high-grade copper ores that are just opening up into good bodies. To the south of Ameca, a good day's ride, at Ayutla, H. H. Sawyer has unwatered the famous old Bautista mines, which he acquired about a year ago, and has broken into a vein of lead ore some meters wide, full of streaks of native silver. Only the shortage of pack animals prevents his shipping a large tonnage. From near Ayutla, also, E. Fitzpatrick and Felipe Hueso are shipping increasing quantities of copper ore. Mr. Fitzpatrick has just taken up additional ground around his properties, which are reported to be in bonanza. On another day's ride south of Ayutla, at Autlan, the Cacoma Mining and Smelting Company (407 Security building, St. Louis, Mo.) is installing pumps for unwatering and opening up the deposits of chalcopyrite that were proven up before the recent floods, and for the treatment of which crushers and jigs have been ordered for a 50-ton mill. At Autlan, also, the Copper Range Company, Mexico, of 77 Jackson boulevard, Chicago, with Chas. D. Du Bois, president, is pushing development work on its properties to be ready for the 50-ton blast furnace which has been ordered from the Colorado Iron Works of Denver.

OAXACA

Magdalena—At Magdalena the new smelter of Lloyd R. Hamer and associates, of Mexico City, has enjoyed several months of successful operation and has given quite an impetus to that section. The more important of the new work near Magdalena, in the Tlacolula district, is at the old lead mines of Bonifacio Martinez, which have been taken over by Mexico City people. New machinery has been installed and already shipments have been started to the Hamer smelter.

AFRICA

WEST AFRICA—GOLD COAST

Gold production reported in October was 20,840 oz. For the 10 months ending Oct. 31 the total output was 136,061 oz. in 1905, and 175,233 oz. in 1906; an increase of 39,172 oz. this year.

ASIA

INDIA—MYSORE

Kolar Goldfield—The gold production in October was 47,101 oz. bullion, which is 463 oz. more than in September, but 5190 oz. less than in October, 1905. For the 10 months ending Oct. 31 the total was 521,593 oz. bullion in 1905, and 479,819 oz. in 1906; a decrease of 41,774 oz., or 8 per cent. The bullion reported this year was equal to 431,837 oz. fine gold, or $8,926,071 in value.

SOUTH AMERICA

PERU

Peruvian Mining, Smelting and Refining Company—This company has been organized by interests identified with the United States Smelting, Refining and Mining Company, to take over the Churuca mine, near Moricacha, Peru, situated 112 miles from Callao on a branch railroad from Ticlio. The mine, it is claimed, shows a considerable tonnage of ore developed, which averages 9.3 per cent. copper.

COLOMBIA

The government of the Republic of Colombia has decided to open in New York a general information bureau. The object of the bureau is to acquaint those interested with the resources and physical and political conditions of Colombia. That country is entering upon a new era of development. The great riches of its forests, mines and fertile valleys will be exploited in the near future, and consequently there should be many people in the United States interested. This bureau is at 25 Whitehall street, New York, and is in charge of Señor Ahrio Dias Guerra.

Coal Trade Review

NEW YORK, Dec. 12

The coal situation in the West continues to be serious. Lake navigation has closed for the season, which ought to release the cars which have been carrying coal to Lake ports; but this does not seem to have improved matters. Nearly all the coal-carrying roads from Pittsburg west to the Missouri seem to be suffering from blockades and short car supply, while mine operators are unable to work steadily or continuously.

In the East trade is more steady. Anthracite business has improved with the coming of cold weather and consequent increase in sales of domestic coal.

Independent operators in the anthracite region are quoted in some papers as fearing that there may be a scarcity of coal in the event of a severe winter. From Pottsville reports have been sent to the press making such a prediction as coming from the independent operators. They base the prediction on the fact that work at most of the anthracite collieries has been pushed so steadily for the last six months, that there has been little opportunity to make new openings or sink new levels.

These statements were shown to the general superintendent of one of the large companies who stated: "While it is true that some of the individual operators have been pushing their operations without opening up new resources, I do not for a moment think that there is the slightest danger of an anthracite famine. All the

large companies are, however, preparing to develop their workings, as it is manifest to everyone interested that new sources must be developed to keep the supply equal to the great demand."

COAL-TRAFFIC NOTES

Shipments of coal and coke originating on the Pennsylvania Railroad Company's lines east of Pittsburg for the year to Dec. 1 were as follows, in short tons:

	1905.	1906.	Changes.
Anthracite.....	4,208,260	4,177,256	D. 31,004
Bituminous.....	27,735,655	29,603,054	I. 1,867,399
Coke.....	10,345,634	11,670,480	I. 1,324,846
Total.....	42,289,549	45,450,790	I. 3,161,241

The average monthly tonnage for the 11 months was 3,844,504 tons in 1905, and 4,131,890 tons this year.

Anthracite shipments in November were 5,182,853 long tons, a decrease of 239,431 tons as compared with November, 1905, when a large quantity of coal was being piled up in the storage yards on most of the lines. For the 11 months ending Nov. 30 the shipments are reported as follows, by companies:

	1905. Tons.	Per Ct.	1906. Tons.	Per Ct.
Reading.....	11,527,650	20.6	10,271,242	20.2
Lehigh Valley....	9,163,971	16.4	7,814,091	15.4
N. J. Central.....	7,294,948	13.0	6,350,433	12.5
Lackawanna.....	8,606,389	15.4	8,409,033	16.5
Del. & Hudson....	5,188,872	9.3	4,886,130	9.6
Pennsylvania	4,449,749	7.9	4,421,287	8.7
Erie.....	5,687,993	10.2	5,151,068	10.1
N. Y., Ont. & W...	2,611,823	4.6	2,240,415	4.4
Del., Sus. & Schu'l	1,463,693	2.6	1,318,863	2.6
Total.....	56,015,088	100.0	50,862,567	100.0

The total decrease this year was 5,152,521 tons, or 9.2 per cent. The heavier relative losses were on the Lehigh Valley and the Reading; the smaller ones on the Lackawanna and the Pennsylvania.

The coal output of the Indian Territory mines for the fiscal year ending June 30 was 2,970,961 tons in 1905, and 2,966,812 tons in 1906; a decrease of only 4149 tons, notwithstanding the suspension of mining in April and May.

Anthracite shipments by lake from Buffalo in November were 380,175 tons; for the year to Dec. 1 they were 2,502,811 tons. The larger items were 847,500 tons to Chicago, 732,025 tons to Duluth and Superior and 429,755 tons to Milwaukee.

New York Dec. 12

ANTHRACITE

The hard-coal market, with the present spell of cold weather, has a splendid opportunity to show a great burst of activity, but is hindered from doing so by the short supply of cars. At the present moment new orders are coming forward in great rapidity and shipments on old orders are urgently requested, but curtailed arrivals prevent them from being satisfied. Egg is the only size of coal that is abundant; all other sizes are sold as fast as they arrive, and the steam sizes, particularly, are short. This has not affected the price of the latter, even pea coal being sold at its old price. The demand for coal for all-rail shipments is heavy, but this business suffers more than the other from lack of cars. Embargoes on rolling stock to distant points are the rule.

Prices remain 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; $1.30@1.35 for barley; all f.o.b. New York harbor shipping points.

BITUMINOUS

The soft-coal trade on the Atlantic seaboard is excessively active. Demand greatly exceeds the supply, though prices have not materially advanced. The cold weather has probably been the prime cause for the increased demand, and it will also result in the closing of shoal-water ports; in fact, we already hear of barges' having to be cut out from ice. The supply of cars shows a slight improvement at the worst points. A feature of this week is the short supply of vessels for coastwise shipments, due partly to their absorption by export trade. Labor at the mines is also scarce.

Trade in the far East is active, with demand much larger than the supply; this is due to shortage of vessels. The Sound is calling for more coal than it can get, due to the same reason and also to the delays in unloading at the wharves of the New Haven road. Two and three weeks are required to unload ordinary barges, and the railroad refuses to pay for the incurred demurrage; it is rumored that legal steps will be taken to recover this loss, which would amount to a large value in a short time.

Trade in New York harbor is also short of coal, and prices range from $2.75@2.85 for good grades of steam coal up to $3 and more for the specialties. All-rail trade is active, but little coal is now sold for this market at less than $1.50 at the mines. Vessels in the coastwise market are scarce and in strong demand. The lower ports are now charging $1 and discharging expenses to Boston, Salem and Portland, and 85c. to the Sound, besides demanding the loading and discharging clause.

Birmingham Dec. 10

The coal production in Alabama is decidedly off just now. The railroads can furnish but about one-third the number of cars desired for the handling of the product and as a consequence the mines are idle almost half of the time. Despite the fact that the railroads appear to be slow in getting in shape to give some relief of consequence in the near future, the development in the coalfields continues. The Ensley Southern (Southern Railway) extension from Short Creek to Coal Creek, in the western part of the county, is nearing completion. The railroad will reach some of the lands of the Pratt Consolidated Coal Company. The Louisville & Nashville Railroad Company has let the contract and a force of hands is being collected for an extension of 14 miles in the southern part of Jefferson county to penetrate lands to be developed by H. F. DeBardeleben and associates.

Large consumers of fuel who get supplies from this district, especially railroad interests. have placed fuel agents in the district to look after the coal shipments. Former superintendent J. J. Cotter, of the Southern Railway, is here in the interest of the Central of Georgia. Cars are being furnished by railroad companies needing coal and these cars are being watched from the minute they are loaded until they get to the main line of the road to whom the coal belongs.

Chicago Dec. 10

Cold weather throughout the West and Northwest for the last three or four days has given a boom to the coal business—a welcome change from the dullness that existed early in the week. Western coals especially have benefited from the change. prepared sizes of Illinois mines being most in demand. Anthracite has been also brought into suddenly increased demand by the weather and the scarcity of chestnut has been emphasized. Dock yards are fortunately in good shape for handling the business, having caught up on delayed shipments during the dull days. If the cold continues, as seems probable, the coming week will see brisk business in every branch of the coal trade.

Illinois and Indiana coals are greatly burdened in getting to market by inadequate car supply and this trouble also bears heavily on the anthracite business that develops in a cold-wave period. Eastern coals are also slow in coming forward because of car scarcity, though they are in better supply generally than last week. The lack of cars will cause much complaint from that part of the public which has empty coal bins, as soon as the cold weather comes to stay.

Lump and egg from Illinois and Indiana mines sell for $2@3.25, run-of-mine for $1.75@2.25 and screenings—in light demand—for $1.10@1.50. Hocking, in fair, but somewhat lighter demand, brings $3.50@3.65 for 1¼-in. lump. Youghiogheny, the demand for which is not so strong but still good, holds up to $3.65 for ¾-in. Smokeless is still weak as to run-of-mine, which is cut 10@20c. from the circular price of $3.40; lump and egg smokeless hold up well to $4.30 for the best grades, with other smokeless lump and egg, however, obtainable for 15 or 25c. less. Cannel coal continues in strong demand and inadequate supply, selling at $5.15 per ton.

Cleveland Dec. 11

The coal market is still largely a matter of car supply. The car shortage has not lessened in the least, but has been aggravated during the past week by the appearance of cold weather and some snow

flurries. The lake coal movement has been stopped, practically, although a few few more cargoes will go to the head of the lakes. The shippers are still sending their material to Lake Michigan and when it is necessary are sending it from Milwaukee to the head of the lakes all rail. One boat has been chartered to Lake Superior at $1 and some charters are still being made to Milwaukee at 75c. The movement is light.

As to the local coal situation there is a good demand for mine-run and for the various sizes, in an effort, if possible, to get a little material ahead against the possible shortage later on. The collection of a surplus seems impossible. As it is, mine-run coal is now selling at about $1.50 at the mines both in Ohio and Pennsylvania, with three-quarter at $1.60 and lump at $1.80. Slack is holding about the same as it has been, with Pennsylvania quoted, in this territory, at 85c. at mines and Ohio at $1. The trade is light in domestic coals, due to the car shortage. Dealers are practically unable to fill orders on time.

The coke market is holding strong. There is a good demand both for spot shipment and on contract, with prices steady at $4.25 at oven for the best grades of foundry, and $3.50@3.60 at oven for furnace coke.

Pittsburg

Dec. 11

Coal—There was a good coal-boat stage in the rivers on Saturday, Dec. 8, and barge water yesterday and today. As a result nearly all the heavy tows of coal got out, and it is likely that all the loaded barges will get away to southern ports. The total shipments on this rise in the rivers are expected to aggregate 10,000,000 bu. A large number of empty coal-boats and barges were brought back by tow-boats that went out on the November rise. This will insure steady operation for the river coal mines for some time. The railroad mines in this district are still being operated to only about one-half their capacity, owing to the shortage of railroad cars. The Pittsburg Coal Company is still sending coal to lake ports for the northwestern markets, and while insurance on lake vessels expires this week, it is intended to continue shipments as long as possible. Prices continue firm, and are on a basis of $1.60 for mine-run. The usual differential of 10c. for ¾-in. and 1¾-in. is not being observed in some instances, as sales of 1¼-in. have been made at $2 a ton at the mine.

Connellsville Coke—There is no change in prices, furnace coke for December and January shipment being quoted at $3.50; $3.10@3.25 for first half and $3@3.15 for deliveries extending through the year. Foundry coke is quoted at $4@4.25 for spot and first quarter, and $3.75@ for the entire year. The *Courier* gives the production for the week at 289,152 tons, an increase of nearly 4000 tons compared with the previous week. The shipments aggregated 15,161 cars distributed as follows: To Pittsburg, 5005 cars; to points west of Pittsburg, 8462 cars; to points east of Connellsville, 1730 cars. The production in the lower Connellsvile region amounted to 125,539 tons.

Foreign Coal Trade

Dec. 12

Exports of coal and coke from the United States for the 10 months ending Oct. 31 are reported by the Bureau of Statistics of the Department of Commerce and Labor as follows:

	1905.	1906.	Changes.
Anthracite	1,928,768	1,851,466	D. 77,302
Bituminous	5,944,161	6,378,483	I. 434,322
Total coal	7,872,929	8,229,949	I. 357,020
Coke	507,599	642,931	I. 135,332
Total	8,380,528	8,872,880	I. 492,352

Exports do not include bunker coal loaded on steamships, the quantity of which is not yet reported for the 10 months. The coke went chiefly to Mexico and Canada. The disposition of the coal was as follows:

	1905.	1906.	Changes.
Canada	6,024,168	6,216,261	I. 192 093
Mexico	742,889	936,837	I. 193,948
Cuba	452,588	557,962	I. 105,374
Other W. Indies	253,254	267,750	I. 14,496
France	4,012	3,120	D. 892
Italy	67,427	48,345	D. 19,082
Other Europe	26,401	24,873	D. 1,528
Other countries	302,190	174,801	D. 127,389
Total	7,872,929	8,229,949	I. 357,020

The coal reported under other countries went chiefly to South America. Canada took this year 75.5 per cent. of the total exports. The shipments to Canada in detail were:

	1905.	1906.	Changes.
Anthracite	1,897,484	1,819,586	D. 77,898
Bituminous	4,126,684	4,396,675	I. 269,991
Total	6,024,168	6,216,261	I. 192 093

The total increase this year was 3.2 per cent.

Imports of coal and coke into the United States for 10 months ending Oct. 31 were as follows, in tons:

	1905.	1906.	Changes.
Canada	1,066,133	1,202,349	I. 136,216
Great Britain	53,012	97,844	I. 44,832
Japan	41,716	11,763	D. 29,953
Australia	139,340	151,837	I. 12,497
Other countries	397	4,361	I. 3,964
Total coal	1,300,598	1,468,154	I. 167,556
Coke	50,616	112,364	I. 61,748
Total	1,351,214	1,580,518	I. 229,304

Of the coal imported this year 29,377 tons were classed as anthracite. With the exception of some Nova Scotia coal which comes to New England ports, most of the coal is received on the Pacific coast. Coke was not reported separately prior to July 1, 1905. A few thousand tons of coke come from Germany; the rest is from British Columbia.

Imports of coal into Spain for the nine months ending Sept. 30 were 1,654,587 metric tons, an increase of 73,869 tons; of coke, 161,922 tons, an increase of 57,568 tons. Nearly all the imports are from Great Britain.

Iron Trade Review

New York, Dec. 12

The week has seen in some degree a quieting down of demand and less pressure to buy. This is partly because of the approaching end of the year, when there is usually a pause while people are taking account of stock and of the result of the year's business; and partly because most large consumers are now supplied over the first half of the coming year. The pause is welcome to many. Of course, some new business is coming forward still; enough to keep prices and premiums up, and to continue the promise of a busy year.

A good deal of the buying of the past week has been in small lots, where consumers have let their stocks run down too close for comfort, and want to feel secure for the immediate future. For such lots extra prices have to be paid.

Shipments of iron ore from the Lake Superior region are over for the season, navigation having closed. The Mesabi range has made a total of 23,600,000 tons for the season, and the Vermillion 1,800,000. Shipments from the Old Ranges are not yet made up.

The bill to revise the Canadian tariff, which is now before Parliament at Ottawa, provides for an extension of the bounties on iron and steel for four years. These bounties were to terminate Jan. 1, 1907; under the new law they are to be as follows: Pig iron from Canadian ores, 1907, $2.10 per ton; 1908, $2.10; 1909, $1.70; 1910, $0.90. Pig iron from foreign ores, $1.10, $1.10, $0.70 and $0.40. Iron bars puddled from Canadian pig, $1.65, $1.65, $1.05, and $0.60. Steel ingots, at least 50 per cent. from Canadian pig iron, $1.65, $1.65, $1.05 and $0.60 per ton, for the four years respectively.

Iron and Steel Exports—Exports of iron and steel, and of machinery, from the United States for the 10 months ending Oct. 31 are valued by the Bureau of Statistics of the Department of Commerce and Labor as follows:

	1905.	1906.	Changes.
October	$12,673,947	$15,910,437	I. $3,236,540
Ten months	115,596,224	142,609,320	I. 27,013,096

The increase in October was 25.5 per cent.; for the 10 months it was 23.4 per cent. The leading items of the iron and steel exports for the 10 months were, in long tons:

	1905.	1906.	Changes.
Pig iron	41,212	65 463	I. 24,251
Billets, ingots & blooms	179,880	180,632	I. 752
Bars	44,661	72,094	I. 27,433
Rails	249,941	273,009	I. 23,068
Sheets and plates	59,780	90,673	I. 30,893
Structural steel	63,401	93,460	I. 30,059
Wire	110,244	144,193	I. 33,949
Nails and spikes	40,828	52,731	I. 11,903

The larger exports of rails this year were to South America, 101,357 tons;

Canada, 65,237; West Indies, 29,760; Japan, 20,011; Mexico, 19,145 tons.

Iron and Steel Imports—Imports of iron and steel, including machinery, into the United States for the 10 months ending Oct. 31 are valued by the Bureau of Statistics as below:

	1905.	1906.	Changes.
October	$2,255,194	$3,407,763	I. $1,152,569
Ten months	21 820,949	27,784,650	I. 5,963,701

The increase in October was 51.1 per cent.; for the 10 months it was 27.3 per cent. The more important items of the imports for the 10 months were, in long tons:

	1905.	1906.	Changes.
Pig iron	170,891	265,665	I. 94,774
Scrap	12 604	11,203	D. 1,401
Ingots, blooms, etc	11,501	17,067	I. 5,566
Bars	29,186	28,754	D. 432
Wire-rods	14.413	15 080	I. 667
Tin-plates	58,788	43,846	D. 14,942

The chief points are the large comparative increase in pig iron, and the decrease in tin-plates.

Iron Ore Movement—Exports and imports of iron ore in the United States for the 10 months ending Oct. 31 are reported as below, in long tons:

	1905.	1906.	Changes.
Exports	179 919	256,384	I. 76 465
Imports	709 766	908,366	I. 198,600

Most of the exports were to Canada. Cuba furnished the greater part of the imports, but some ore came from Canada and a little from Spain.

Imports of manganese ore for the 10 months were 218,225 tons in 1905, and 185,281 tons in 1906; a decrease of 32,944 tons. This ore comes mainly from Russia, India and Brazil.

Baltimore Dec. 4

Imports at Baltimore for the week included 1159 tons of spiegeleisen and 615 tons of ferromanganese; also 1025 tons pig iron. Imports of iron ore were two cargoes, 9850 tons, from Cuba. One cargo of iron pyrites, 5670 tons, was received from Huelva, Spain.

Included in the exports were 1000 tons of rails and 57 tons of fish-plates to Cuba; 2506 tons of rails to Tampico, Mexico; 2093 tons steel rails and 103 tons fish-plates to Buenos Aires.

Birmingham Dec. 10

The production of pig iron in the Southern territory and in Alabama in particular will be greatly curtailed during the last month of the year. Four furnaces have been shut down for repairs and three others will have to work on half time. The railroad car shortage is so intense that the raw material supplies cannot be kept up and hence the necessity. All Alabama iron companies are behind more or less in their deliveries. The accumulation of iron on the yards in this district continues to grow and there is no telling when the furnaces will be able to catch up again.

Sales are still being made right along and the better portion of the probable make for the second quarter of the coming year is under consideration. All iron wanted before April is being termed practically spot iron and a few sales are being made. Inquiries are being received for iron to be delivered during the latter part of the year. The quotations show no change. Spot iron is quoted at $23 per ton, No. 2 foundry and soft. First quarter iron is quoted at $21@22 per ton. Second quarter iron for next year is priced at $17.50@19 per ton, No. 2 foundry or soft. Last-half-of-1907-iron is quoted at $17.50 per ton, No. 2 foundry.

Chicago Dec. 10

A firm but quiet market exists in all branches of the iron trade. There is a greater disposition of melters to delay contracts for 1907 deliveries, since the announcement of an advance in Southern pig-iron freight rates, Birmingham to Chicago and adjoining points—from $3.90 to $4.15—effective Feb. 1. Pig-iron for quick delivery continues to be in active demand, and the available supply being mostly Southern iron, agents for Southern are kept busy trying to help their customers, whose immediate needs outrun their contract supplies. Small sales, but a firm maintenance of prices, seem certain until after the first of the year.

On quick-delivery No. 2 iron brings $21@23 Birmingham, or $24.65@26.65 Chicago, the range being wide on account of the diversity of melters' needs, their willingness to pay fancy prices, and the scarcity of the supply. Car-shortage has had much to do with the speculative prices of Southern iron, and the supply continues to be very irregular. Northern quick-delivery lots bring $25.50@26.50, but are very scarce. Lake Superior charcoal sells at $26@26.50 in the small lots available.

On contracts for the few first-quarter supplies yet unprovided for, Southern is quoted at $21.50@22 Birmingham, or $25.65@26.15 Chicago, on the basis of the advanced freight rate. For the second and third quarters, $19@19.50 Birmingham is named, or $23.15@23.65, Chicago, but few contracts are being made for such deliveries.

Coke is very scarce, the supply of Connellsville being especially short, and prices remain high, being $6.65@7 for the best Connellsville with Virginia cokes 25@50c. lower.

Cleveland Dec. 11

Iron Ore—Cold weather on the lakes has resulted in an almost complete cessation of ore shipments. One dock only is working and that is only loading a few boats. The others have gone out of commission for the year. It is an open question whether the last boats loaded will get through the Sault, although tugs and the smaller ships of the Pittsburg Steamship fleet are trying to keep the channel open. The movement for November amounted to 3,734,767 tons compared with 3,341,229 tons for 1905, the increase being 392,938 tons. The movement for the season to Dec. 1 was 36,973,002 tons, compared with 33,071,844 tons for the corresponding period a year ago, the increase being 3,201,158. The total season movement will be only a little over 37,000,000 tons. Some chartering is still being done on the basis of 75c. from Duluth to Ohio ports; 70c. from Marquette and 60c. from Escanaba, including the unloading charge. This covers ore for delivery during 1907 and about 2,000,000 tons has been covered to date.

Pig Iron—Foundry iron for spot shipment is almost out of the question in this territory. It is entirely out of the question from the South, where furnaces are behind on deliveries, due to the car shortage. The few car-lots sold by Northern furnaces are going at $26 at furnace. First-quarter delivery is made at $25 at the furnace. Second-quarter iron is sold at $24@25 at the furnace. Last half is selling at $22@23, according to the furnace, some holding for higher.

Finished Material—An increasing portion of the business in plates and shapes is being done on the higher price basis. Many of the consumers having contracted for small amounts, earlier in the year, entailing deliveries through the first half of 1907, have specified to the full extent of their contracts and are now being forced into Eastern markets to pay premiums on plates and structural. This has not changed the temper of buyers, who are paying 1.90c. Pittsburg without complaint on shapes, and 1.80c. Pittsburg on plates. Billets are selling at $39@40 Cleveland for forging quality and $35@36 Cleveland for re-rolling billets for delivery during the first quarter, with deliveries after that time bringing less money. Sheets are in strong demand. The prices are unchanged. Bar iron for spot shipment is selling at 1.80c. Pittsburg, and some bar-steel producers are demanding the same price. The market throughout is strong.

New York Dec. 12

Pig Iron—The market is quieter, so far as spot and first-quarter business goes. Some negotiations are on for the second half of next year. There is little spot iron to be had; what there is for sale is mainly in speculative lots from second hands.

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

Northern:	
No. 1 X foundry	$25.50@$27
No. 2 X foundry	24.50@26
No. 2 plain	24@25.50
Forge pig	20.50@22
Southern:	
No. 1 foundry	23.50@27
No. 2 foundry	23@26.50
No. 3 foundry	22@25.50
No. 4 foundry	21@24.50
No. 1 soft	24@27
No. 2 soft	24@26.50
Gray forge	20@21.50

Basic pig:	
Northern	22@23.50
Virginia	22@23.25
Alabama	22@23.50
Foreign:	
Scotch foundry, ex-ship	24@24.50
Middlesboro, No. 1, ex-ship	23@23.50
Middlesboro, No. 2, ex-ship	22@22.50

City or local deliveries are not included in prices, which are for large lots, on docks or cars. Foreign irons are quoted ex-ship, duty paid.

Cast Iron Pipe—More new contracts are reported, while others are under negotiations. For spring delivery $34.50 per ton is quoted for 6-in. pipes, carload lots, at tidewater, with some foundries asking $1 more.

Bars—Bars are strong at 1.845c. tidewater, 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 good at 2.50c. delivered.

Plates—For tidewater delivery, carload lots, prices are: Tank, 1.845@1.945c.; flange, 1.945@2.045c.; marine, 2.245@2.345c., according to width. Some makers are asking $2 or $3 per ton premium to secure deliveries.

Structural Material—Bids were received Dec. 12 for the steel for the approaches to the Blackwell's island bridge, in New York, about 15,000 tons being needed. The contract has not been awarded. About 10,000 tons is called for on new buildings in the city. Prices are nominally unchanged, but premiums continue to be paid to secure deliveries.

Rail—Business here has been mainly in trolley rails, for which there is quite a call for spring delivery.

Old Material—Dealers are still hustling for scrap to fill orders. Buyers seem ready to pay big prices. Steel melting scrap is badly wanted, and brings $17.50@19; No. 1 yard wrought is $18@19; machinery cast, $18@19. These prices are for New York and vicinity.

Philadelphia Dec. 12

Pig Iron—The week has been a quiet one, but the surface quiet has been offset by quite a number of inquiries, or rather negotiations which as yet have come to nothing, for iron for delivery during the second and third quarters of next year. There is scarcely any furnace that has any iron for sale within the next three months. A declining demand is looked for from now on for perhaps 30 days. A great deal of iron is now held up in the South for want of cars and engines and there is even some difficulty in this State in obtaining prompt deliveries. All kinds of crude iron show an upward tendency and this tendency will probably continue. Small foundries and some of our small rolling mills are in a bad way for iron, but they will probably get out of the hole, as they must have the material. No. 1 X foundry may be quoted at about $26.50; No. 2 X at $25; No. 2 plain $24.50; standard gray forge $22; basic $23; Middlesboro No. 1 on dock $23.

Steel Billets—The effort to place an order for steel billets last week, even at a premium offer, is reported to have failed. Quotations continue at about $34.

Bars—We have an apparently quiet bar iron market, but there is a great deal of rumbling beneath the surface. The best refined is nominally quoted at 1.83½ and steel bars at 1.73½; but higher prices rule actually.

Sheets—The conditions prevailing for weeks past still continue and the card rate ranges from 2.70 to 3.10. The mills are straining every facility to keep up to their promises.

Pipes and Tubes—The pipe market is very strong. Tubes are contracted for far ahead as usual and the pressure is no less than at any time for months.

Plates—The car-builders are making very urgent demands for the prompt delivery of plates and a good deal of new business has come in within the past week at the recent advance.

Structural Material—The current talk is that structural material is about to be advanced.

Scrap—The greatest activity prevails in the scrap market and it is hard to tell the scrap story this week. Large quantities are called for and most of the buyers are content if they can obtain reliable assurances that their requirements will be filled as they need the material. Choice railroad wrought is held as high as $24; No. 1 yard scrap is quoted at $21.50. Machinery scrap is to be had in a small way at about $20 per ton.

Pittsburg Dec. 11

An advance of 10c. a box on tin-plate, equivalent to $2 a ton, is expected to be ordered this week. This will make the price of coke tins, 14x20, 100 lb., $4 a box. Sheets have been practically advanced, as it is impossible to buy for December shipment at the established price, premiums ranging from $1 to $3 being asked. Wire and wire products were again advanced, this time $2 a ton. On Sept. 19 concessions were stopped, which was equivalent to $1 a ton advance and on Nov. 10 a straight advance of $1 a ton was made. The new prices in carload lots to jobbers are as follows: Nails, $2 a keg; plain wire, $1.85 and galvanized barb wire, $2.45 per 100 lb. The only important line of finished-steel products that has not been advanced within the past two months is structural material. It is rumored that an increase in prices may be ordered shortly, but it seems doubtful that any official action will be taken, as the mills are sold up for many months and premiums are freely paid for prompt deliveries. Demand in all lines is remarkable and, despite the fact that production is greater than ever before, all the large mills are behind in deliveries. The American Sheet and Tin Plate Company is operating all of its sheet mills, 164 in number, and 232 of its 253 tin-plate mills. The idle plants are Humbert works, at Connellsville, Penn., Morwood, at Gas City, Ind., and Anderson at Anderson, Ind., which contain a total of 21 mills. Stocks are lighter than usual for this period of the year and there is not likely to be a sufficient supply to meet the heavy spring demand. The independent interests are operating almost as fully as the leading producer, and sales have been made through the first quarter and into the second quarter. The advance of one point in merchant steel pipe, equal to $2 a ton, ordered on Dec. 5, was not unexpected. The demand for pipe has been enormous. It is said the independent producers for some time have declined to accept business at the prices named by the leading producer but have reserved their capacity and are now in a position to take on new business at more profitable prices. The National Tube Company advanced prices two points, or $4 a ton, on Oct. 13. The latest advance makes the extreme discount to jobbers in carload lots 78 and 5 per cent. and to consumers 77 and 5 per cent.

The demand for scrap continues and higher prices are being paid. The Sharon Steel Hoop Company, which recently bought 5000 tons of heavy melting stock, paying $19, has added 7000 tons to the purchase, for which it paid prices ranging from $19.50 to $20. The Carnegie Steel Company is in the market for scrap, but refuses to pay the prices asked by dealers. Old car wheels are in demand and prices have advanced, some sales having been made this week at $23.50 to $24.

Pig Iron—The market is quiet, no sales of any consequence being recorded. There is a hesitancy on the part of consumers to place contracts for the second half as producers are holding out for stiff prices. The Bessemer Pig Iron Association today sold a lot of 700 tons of bessemer iron for delivery in the first quarter at $23, Valley furnaces. Prices of foundry iron range from $23 to $25 for spot and first-quarter delivery, but there does not seem to be any to be had. Gray forge also is scarce and is quoted nominally at $22.85 to $23.10, Pittsburg.

Steel—Bessemer billets are held at $29.50@30 and open-hearth at $31.50@32.50. Plates are firm at 1.70c. and steel bars at 1.60c.

Sheets—Production is heavier than at any time this year and mills are away behind in deliveries. While premiums are being paid for spot delivery, established prices remain at 2.60c. for black and 3.65c. for galvanized No. 28 gage.

Ferro-Manganese—There is but little change in the market, quotations remaining at $82 to $83 per ton.

Cartagena, Spain Nov. 24

Iron and Manganiferous Ores—Messrs. Barrington & Holt report that shipments for the week were two cargoes, 3950 tons dry ore, and three cargoes, 9050 tons manganiferous ore, to Great Britain; one cargo, 6450 tons Calasparra magnetic, to Sydney, Cape Breton. Prices have again advanced. Manganiferous ores are scarce.

Quotations for iron ores, f.o.b. shipping port, are: Ordinary 50 per cent. ore, 9s. 6d.@9s. 9d.; special low phosphorus, 10s. @10s. 3d.; specular ore, 58 per cent. iron, 12s. 9d.; S. P. Campanil, 11s. 5d. Manganiferous ore, No. 3 grade, 35 per cent. iron and 12 manganese, is 14s. 3d.; no higher grades on the market.

Pyrites—Iron pyrites, 40 per cent. iron and 43 sulphur, are 11s. 3d. per ton, f.o.b. shipping port.

Metal Market

NEW YORK, Dec. 12.

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..	42 988,617	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 ..	43,955 134	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 Dec. 10 and years from Jan. 1.

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week.....	$ 5,731	$ 376 852	$ 909,498	$ 215.410
1906.....	6 055,965	93 229 150	48 336 059	2,497 665
1905.....	34 619 503	10,689,671	32,859,937	4 092,467
1904.....	100,900,489	6 599,623	33,727,810	1,132,613

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

The statement of the New York banks—including all the banks represented in the Clearing House—for the week ending Dec. 8 gives the following totals, comparisons being made with the corresponding week of 1905:

	1905.	1906.
Loans and discounts..	$1,016 320,800	$1,044,668,800
Deposits	992.235 700	982.177.500
Circulation.....	53.268,700	53.740 900
Specie	173 526,300	171,954 900
Legal tenders.....	73,286,100	66.887,300
Total reserve.....	$246,812,400	$238 842.200
Legal requirements....	248,058,925	245,544,375
Deficit.....	$ 1,246,525	$ 6,702,175

Changes for the week this year were an increase of $416,500 in circulation; decrease of $3,583,500 in loans, $9,732,000 in specie, $2,533,400 in legal tenders and $16,457,200 in deposits. The reserve shows a deficit below the legal limit, for the fourth time this year.

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

	Gold.	Silver.	Total.
New York.....	.....	.....	$171,954.900
England.....	$164.509,330	.....	164,509 330
France.....	548,702.980	$201.267,575	749.970.555
Germany	143,680,000	47,895,000	191,575,000
Spain.....	76,755,000	121.620,000	198.375,000
Netherlands....	27,657,500	28,275,000	55.932.500
Belgium.....	16,166,665	8,033,335	24 200,000
Italy.....	158.835,000	21,630,000	180.465,000
Russia.....	576,090,000	21,905,000	597.995,000
Austria.	234,580,000	59,095,000	293,675,000
Sweden.....	19,305,000	.....	19,305 000

The returns of the associated banks of New York are of date Dec. 8, and the others Dec. 7. 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.

Indian exchange is again firmer, and the Council bills offered in London were all taken at an average of 16.06d. per rupee. The demand for money in India is strong.

Shipments of silver from London to the East are reported by Pixley & Abell as follows, for the year to Nov. 29:

	1905.	1906.	Changes.
India.....	£5,948 321	£ 14,292.796	I. £ 8,344.475
China.....	879 113	430 700	D. 448 413
Straits..	38,299	1,750	D. 36.549
Total.....	£ 6,865,733	£ 14,725,246	I. £ 7,859 513

Receipts for the week were £8000 from the West Indies and £178,000 from New York; a total of £186,400. Exports were £63,000 to India.

The movement of gold and silver in France for the 10 months ending Oct. 31 was as folows:

Gold:	1905.	1906.
Imports....	Fr. 716,809.000	Fr. 403,537,000
Exports.....	110.698,000	112,733 000
Excess, imports....	Fr. 616,111,000	Fr. 290,804,000
Silver:		
Imports.....	83.439,000	127,684,000
Exports.....	56,382,000	99,271,000
Excess, imports....	Fr. 27,057,000	Fr. 28,413,000

Imports of copper and nickel coins were 130,000 fr. in 1905, and 105,000 fr. in 1906; exports were 286,000 fr. in 1905, and 164,000 fr. this year.

Prices of Foreign Coins

	Bid.	Asked
Mexican dollars.....	$0.52½	$0.55
Peruvian soles and Chilean.....	0.47⅞	0.49
Victoria sovereigns.....	4.85½	4.87½
Twenty francs.	3.87	3.91
Spanish 25 pesetas...	4.78	4.80

SILVER AND STERLING EXCHANGE.

December.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.	December.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.
6	4.84¾	68¼	31 1/16	10	4.83½	69¼	32⅛
7	4.84	68¾	31 1/16	11	4.84	68⅛	31¾
8	4.83¾	69	32	12	4.83¾	68¾	31¾

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.

December.	Copper. Lake, Cts. per lb.	Copper. Electrolytic, Cts. per lb.	Copper. London, £ per ton.	Tin. Cts. per lb.	Lead. Cts. per lb.	Spelter. New York, Cts. per lb.	Spelter. St. Louis. Cts. per lb.
6	22¾ @23	22¼ @22½	103½	42⅞	5.75	6.45 @6 50	6.30 @6 35
7	22¾ @23	22¼ @22¾	103¼	43	5.75	6.45 @6.50	6.30 @6.35
8	22¾ @23	22¼ @22½	.....	43	5.75	6.50 @6.55	6 35 @6.40
10	22¾ @23	22¾ @22¾	104	42⅞	5.75	6.55 @6.60	6.40 @6.45
11	22⅞ @23¼	22½ @22¾	104⅞	42⅞	5.75	6.55 @6.60	6 40 @6.45
12	23 @23¼	22¼ @22¾	106	42⅞	5.75	6.55 @6.60	6.40 @6.45

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

Copper—Under the influence of a steady demand, both for home trade and export, the advance in prices has made further progress, and at the close quotations are firm and higher at 23@23¼c. for lake, and 22½@22¾c. for electrolytic in cakes, wirebars or ingots. The average price at which business in casting was done during the week is 22¾c.

The London market has strongly reflected the excellent position in refined sorts, and the bull element has had things more or less its own way. The quotations at the close are cabled at £106 for spot and £106 15s. for three months.

Refined and manufactured sorts are quoted as follows: English tough, £109@110; best selected, £110@111; strong sheets, £114@115.

It is reported that the average price received by the United Metals Selling Company for all its copper for November was 22.05c. per lb. This would correspond to 21.80@21.85c. per lb., cash, New York The average of our quotations for electrolytic for the same month was 21.83c.

Tin—Business in this metal continues rather uninteresting. Transactions are of a hand-to-mouth character and prices have followed closely the fluctuations in London, whence the close is cabled at £196 10s. for spot and £196 for three months, while business here is doing at 43c.

Lead—The market is unchanged at 5.75 New York.

Reports from London indicate a somewhat easier feeling and prices have declined to £19 5s. for Spanish lead and £19 7s. 6d. for English.

Spanish Lead Market—Messrs. Barrington & Holt report from Cartagena, Spain,

under date of Nov. 24, that the price of lead has been 88.25 reales per quintal, silver being paid for at 14.50 reales per oz. Exchange, 27.62 pesetas to £1. The price of lead, on current exchange, is equal to £17 17s. 9d. per long ton, f.o.b. Cartagena. Exports for the week were 188 tons argentiferous and 66 tons desilverized to Marseilles; 300 tons argentiferous lead to London; a total of 554 tons.

Spelter—Under a very heavy demand from both brass manufacturers and galvanizers, prices have steadily advanced. The fears which have been entertained that production would overtake consumption appear to be groundless, and in fact it is reported that near-by deliveries are ruling at a premium, on account of the scarcity of spot supplies. The close is strong at 6.55@6.60 New York and 6.40 @6.45c. St. Louis.

The London market is unchanged at £27 17s. 6d. for good ordinaries and £28 2s. 6d. for specials.

Spanish Zinc Ore Market—Messrs. Barrington & Holt report from Cartagena, Spain, under date of Nov. 24, that shipments for the week were 2293 tons blende and calamine to Antwerp. The market is unchanged.

Zinc Sheets—On Dec. 7 the prices of zinc sheets was advanced 10 points. It is now $8.10 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 present is the highest point reached; the lowest was $7.65, in May.

Antimony—There is no change. Ordinary brands, 24½@25; Hallett's, 25 @25½; Cookson's, 26@26½.

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.

Missouri Ore Market

JOPLIN, Dec. 8

The highest price reported paid for zinc was $49.70 per ton for one carload; the assay basis price ranged from $44 to $47 per ton of 60 per cent. zinc, and the average price was $43.78.

Thehighest price reported paid for lead was $84 per ton, with all grades changing correspondingly. The average is $81.22.

Inability to secure cars gives the market for zinc a weaker aspect, and prices declined on low-grade ore. An increased shipment of silicate ores lowered the average price.

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

	Zinc, lb.	Lead, lb.	Value.
Joplin	2,423,990	253,810	$65,903
Webb City-Carterville	1,918,930	538 750	64,263
Galena-Empire	1 237,010	18,020	28,944
Alba	890,610	10,080	21,337
Duenweg	470,000	250,980	20,976
Oronogo	493,140	10 560	11,978
Badger	450 290	3 540	10,939
Aurora	514,970	42,730	10,806
Baxter Springs	450 120	. .....	9,565
Neck City	384,350	.....	9,032
Granby	490,000	43,000	8,700
Spurgeon	303,750	43,790	7,127
Prosperity	150,540	43 270	5,161
Sherwood	65 860	65,520	4,135
Cave Springs	159 290	.....	3.504
Zincite	111,400	7 000	2,942
Carthage	65,890	.....	1.548
Totals	10,585,140	1,331,050	$285,860
49 weeks	524,135,950	73,111,850	$14,167,049

Zinc value, the week, $231 800; 49 weeks, $11,334,687
Lead value, the week, 54,060; 49 weeks, 2,832 362

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	44.63	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	44.13	November	68 67	81 98
December	49.00	....	December	76.25	....

Wisconsin Ore Market

PLATTEVILLE, Dec. 8

Sixty per cent. zinc-ore prices touched a higher level this week, at $46 per ton. Only one or two buyers showed much anxiety to secure ore; the balance did not seem to care whether they got any ore or not. Notwithstanding this fact the price of Empire ore was run up to $48.50. It is reported that the surplus supply at a majority of the smelters is ample to carry them several months, although there is not over 1250 tons surplus in the bins at the mines. The tonnage loaded this week does not represent all sold, owing to the continuance of the car shortage. The car situation is not any worse than it has been for the past month, for the simple reason that it could hardly be worse. The first severe cold snap of the year did not seem to affect any of the producers materially. Some of the newer propositions were compelled to suspend operations. There are three new concentrating plants just ready to begin cleaning ore.

The different camps of the district loaded ore for the week ending Dec. 8, as follows:

Camps.	Zinc, Lb.	Lead, Lb.	Sulphur Lb.
Platteville	334,430	.....	... .
Benton	359,000	. ..	.....
Galena	289,900	.....	.....
Highland	264,000	.....	....
Buncombe & Hazel Green	154,400	.....	.....
Cuba City	130,000	.....	.....
Total for week	1 531.730	.....	.....
Year to Dec. 8. .	73,328,840	3,345,130	4,053,910

The reports from one or two camps were not received in time for this weeks' issue, but will appear next week.

Chemicals

NEW YORK, Dec. 12

Copper Sulphate—The market continues strong, with prices unchanged at $7 per 100 lb. for carload lots, and $7.25 for smaller orders.

Exports of copper sulphate from the United States for the 10 months ending Oct. 31 were 17,895,093 lb. in 1905, and 18,654,716 lb. in 1906; an increase of 759,623 lb. this year.

Nitrate of Soda—Messrs. Mortimer & Wisner, of New York, give the following statistics of nitrate for the United States, as of date Dec. 1, in long tons:

	1905.	1906.	Changes.
Stocks, Jan. 1	8,380	13,100	I. 4,720
Imports, 10 months	251 400	281,680	I. 30,280
Total supplies	259,780	294,780	I. 35,000
Deliveries, 10 months	253,780	288,780	I. 35,000
Stocks, Dec. 1	6,000	6,000	.....
Afloat for U. S.	90,200	95,000	I. 4,800

The tonnage afloat includes all cargoes reported which are due to arrive by March 15 next.

Heavy Chemicals—Imports of heavy chemicals into the United States for the 10 months ending Oct. 31 were, in pounds:

	1905.	1906.	Changes.
Bleaching powder	86.031,112	86,932,107	I. 900.995
Potash salts	214,237.703	241,585,085	I. 27,347 382
Soda salts	24,101,260	17,842,820	D. 6,258,440

Exports of acetate of lime for the 10 months were 57,487,406 lb. in 1905, and 58,538,467 lb. in 1906; an increase of 1,051,461 lb. this year.

Phosphates—Exports of phosphates from the United States for the 10 months ending Oct. 31 were 811,653 tons in 1905, and 843,050 tons in 1906; an increase of 31,397 tons. The larger exports this year were 256,199 tons to Germany; 128,757 tons to Great Britain; 110,257 tons to France; 87,142 tons to Italy.

Exports of phosphates from the port of Savannah in November are reported by J. M. Lang & Co., as follows: Great Britain, 2400 tons; Holland, 3323; Germany, 3273; Austria, 1095; Italy, 1175; total, 11,266 tons.

Sulphur—Imports of sulphur and pyrites into the United States for the 10 months ending Oct. 31 were, in long tons:

	1905.	1906.	Changes.
Sulphur	71.027	65 380	D. 5,647
Pyrites	428.857	459 987	I. 31.130

Estimating sulphur contents of pyrites at the usual figure, the total sulphur imported was 242,570 tons in 1905, and 249,375 tons in 1906; an increase of 6805 tons this year.

Mining Stocks

NEW YORK, Dec. 12

The general stock market has been irregular, chiefly on account of high rates for money. The close is more hopeful, relief being expected from treasury disbursements which are to be made in advance of Jan. 1, when they will be due.

Amalgamated Copper touched $113, but closed at $114¾. American Smelting common closed at $153½, a gain. United States Steel brought $48½ for the common, and $104½ for the preferred.

On the curb there is still a lot of dealing in Nipissing and on Dec. 11 a low record was made at $12, with a rally to $13½. The rest of the mining list was quiet, with prices nearly stationary. Among the larger traders were United Copper, British Columbia Copper, Giroux and Foster Cobalt.

Greene Consolidated Copper was also an active stock, selling up to $27, and closing $26½, on sales of 12,000 shares.

On the Consolidated Exchange, Elkton, of Cripple Creek, brought 69c.; El Paso, 65c.; Ophir, $2.90; while $4.85 was paid for Iron Silver.

Boston Dec. 11

Mining shares continue to be active, and if it were not for the tightness of money in the local market prices would probably soar. As it is, most stocks are quoted lower than a week ago. Call money is from 10 to 15 per cent., and this is not an incentive for a broker to urge the taking on of a line of stocks. In fact, it has caused liquidation in some directions. The center of attraction has been in Allouez and Centennial, while the recent activity in Arcadian has died out for the present. That some interest is trying to obtain control of Allouez there is no doubt, but it is a fact that the present owners will not part with their holdings this side of $100 per share. The control of Centennial, which is directed by the same management as Allouez, has already been taken from them, it is acknowledged. Allouez made its best record price at $55.25, late last week, a rise of $7.75, closing tonight at $54. Centennial, after declining $2 to $36, spurted to $40.12½, which is its best price on the present basis, although it is back to $39 today.

The Arcadian game has now tamed down, although it was swift for a time. One day last week the price fluctuated from $14.50 to $10, on extremely heavy trading; subsequently it fell to $8.50, and closed tonight at $9. The cause for the dullness is that the books are closed. There is a deep-laid plan as to the ultimate place where this company will land, but it is guessed that it will finally be taken over and exchanged for Quincy mining stock on a basis of four or five for one of the latter. Quincy fell $5 to $102, on the announcement that an accident had occurred at the mine, but easily recovered to $106.25, with a final setback to $101 today. The rights have been quoted $3, and better. Greene has been an active feature. It was put off $2 to $25, but rose to $27.62½ today. It is likely that extra stock will be issued in time to increase the company's smelting capacity. Mohawk rose $5.50 to $79, on the further increase of the dividend to $4, semi-annually. Amalgamated went off a trifle last week to $112.87½, but has steadily advanced and touched $115.37½ today.

Old Dominion continues soft, although it was in better demand to-day. It declined $2.75 to $53, but recovered to $56.50 to-day. Shannon also fell $2.50 to $15.87½, but has recovered slightly. Calumet & Arizona, on free offering, fell $11, to $165, ex-dividend, recovering $2 of the decline. North Butte slid back $3.50 to $109. Butte Coalition has also been heavy, falling $1.50 to $35, but with recovery to $36 today. Osceola is well held, and is up $4 to $139. Parrot is also $1 higher, at $30. Rhode Island fell $1.37½ to $5.12½ on the levying of a $1 assessment. Utah weakened $1.37½, to $62, but recovered to $64.50 the same day. Tecumseh had a smart spurt today from $18.75 to $21, and Trinity sold up $1, to $11.87½.

Nipissing went off $5 during the week, on the curb, to $12.25. Acme Consolidated has been the heaviest traded-in stock on the curb, rising from 14 to 30c. per share.

San Francisco Dec. 6

Business has continued good, but not as active as it has been for two or three weeks past. Buying orders have been slower, some people apparently thinking that stocks are too high. This caused a little heaviness and some recession in prices toward the close of the week. This seems to be temporary, however, and an early recovery is probable.

The Comstocks, on the whole, kept their prices well, but the southern Nevada stocks were a little irregular today. New issues continue to come on the exchange, making a long list; but nearly all show some trading.

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	29.854
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	65.105	27.163	30.113
August	60.259	65.949	27.822	30.529
September	61.695	67.927	28.528	31.483
October	62.034	69.523	28.637	32.148
November	63.849	70.813	29.493	32.671
December	64.850	.....	29.977	.....
Year	60.352	.....	27.839	.....

The New York prices are in cents per fine ounce; 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	15.250	18.641	68.174	81.111
April.	14.920	18.375	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	15.005	18.585	66.887	81.167
Aug.	15.664	18.380	15.725	18.706	69.830	83.864
Sept.	15.965	19.033	15.978	19.328	69.667	87.831
Oct.	16.279	21.203	16.332	21.722	71.406	97.269
Nov.	16.599	21.833	16.758	22.398	74.727	100.270
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	32.096	40.516
April	30.525	38.900	Oct	32.481	42.852
May.	30.049	43.313	Nov.	33.443	42.906
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	5.750
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; November, £19,281.

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	26.938
Sept.	5.887	6.216	5.737	6.056	26.375	27.563
Oct.	6.087	6.222	5.934	6 070	28.225	28 075
Nov.	6.145	6.375	5.984	6.225	28.500	27.781
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 Dec. 8.

Name of Company.	High.	Low.	Clg.	Sales.
Alaska Mine	2½	1⅞	2⅛	7 285
Am. Nev. M. & P. Co.	3½	3⅛	3⅛	2,500
Amalgamated	114¾	112¾	113¾	302,300
Anaconda	288¾	281¾	286¾	122,100
Balakala	11⅜	11⅛	11⅛	100
British Col. Copper	13⅜	12⅛	12⅝	8,800
Buffalo Cobalt	4⅛	3¾	4	5,100
Butte of London	....	....	2¾	
Butte Coalition	38	35⅞	35⅞	2,550
Butte Copper & Zinc	7	6½	6⅝	10,000
Cobalt Contact	¾	¾	¾	12,090
Colonial Silver	5	4	4⅜	7,700
Cum. Ely Mining	12⅞	12	12½	22,700
Davis Daly	13½	12¾	12⅞	1,625
Dominion Cop	5⅛	5	5⅛	2.430
El Rayo	6⅞	6½	6⅝	7,500
Foster Cobalt	3¼	2¾	3	6,200
Furnace Creek	3⅜	3	3	150
Giroux Mine	11½	10	11¾	10,800
Gold Hill	5⅞	3⅞	3¾	19,600
Greene Gold	2	1⅜	1⅞	1,280
Greene Gold & Silver	2	1¾	1¾	5,120
Greenwater & D. Val.	3	3	3	100
Guanajuato	5	5	5	3,400
Guggen. Exp	....	....	300	
Hanapah	⅜	⅜	⅜	800
McKinley Darragh	2⅞	2½	2⅝	23,300
Micmac	6¼	6⅛	6¼	10.300
Mines Co. of Am	3	2⅞	3	37 600
Mitchell Mining	6¼	5	5½	27,100
Mont. Sho. Con. (New)	16	14	15	1,175
Nev. Utah M. & S.	4½	3¾	4½	1 400
Newhouse M. & S.	18⅝	17	17⅞	31,350
Nipissing Mines	19½	14	14¾	550,500
Old Hundred	5¼	4¾	5	22,500
Richmond Eureka	....	....	7¾	
Silver Queen	2⅝	2	2⅜	17,000
Stewart	2⅜	1½	2⅜	13,900
Tennessee Copper	49¾	48	48⅞	4,400
Union Copper	1⅞	1½	1⅞	1,625
Utah Apex	....	....	7	
West Columbus	23	20	22	8 200

NEW YORK INDUSTRIALS.

Am. Agri. Chem	25⅞	25¾	25⅞	75
Am. Smelting & Ref	155⅛	151¾	152⅞	69,300
Am. Smelt. & Ref., Pf.	116	115¾	116	1,754
Bethlehem Steel	19	18	19	600
Colo. Fuel & Iron	57⅛	54¼	57¾	112,100
Federal M. & S., Pf	97¼	95¾	95¾	700
Inter. Salt*	64½	64¼	64½	6,000
National Lead	77¼	74¾	75	6,100
National Lead, Pf.	103	103	103	400
Pittsburg Coal	18	17	17⅜	3,400
Republic I. & S.	41¼	37¾	41¼	34,600
Republic I. & S., Pf	102	100½	102	6,700
Sloss-Sheffield	76½	74¼	76½	2,945
Standard Oil	539	520	525	117
Tenn. C. & I.	163½	163	163	350
U. S. Red. & Ref.	29¾	29	29¼	400
U. S. Steel	48⅞	47¾	48¼	363.420
U. S. Steel, Pf	105⅛	104¼	104⅞	27,615
Va. Car. Chem	41½	38½	39	4,650
Va. I. Coal & Coke	93	81	89¾	33,205

PHILADELPHIA Dec. 8

Name of Company.	High.	Low.	Clg.	Sales.
American Cement	10⅛	9½	9⅞	1,058
Cambria Steel	39½	38¾	38¾	6,533
General Asphalt	6	6	6	160
Penn. Steel, pd.	105	104½	104½	67
Philadelphia Co.	48½	48	48¾	328
Tonopah Mining	20¾	19¾	20¼	1,888

PITTSBURG Dec. 8

Crucible Steel	12⅝	12½	12⅛	151
Crucible Steel, Pf.	80¾	80	80	1,264
Harbison-Walker Ref.	13½	13½	13½	302
Ohio Tonopah	.27	.23	.23	950
Tonopah Ext	6½	5¾	5¾	1,095

St. Louis Dec. 8.

Adams, $0.40—$0.25; American Nettie, $0.08—$0.06; Center Creek, $2.60—$2.20; Central Coal and Coke, $64.50—$63.75; Central Coal and Coke, pfd., $80.00—$79.00; Central Oil, $60.00—$55.00; Columbia, $4.00—$3.90; Con. Coal, $24.00—$22.50; Doe Run, $145.00—$140.00; Granite Bimetallic, $0.24—$0.22; St. Joe, $19.00—$18.00.

COLORADO SPRINGS Dec. 8

Name of Company.	High	Low	Clg	Sales
Acacia	13	12½	13	9,000
C. C. Con	7⅛	6¾	7	
Dante	7	6¾	6¾	49,000
Doctor Jack Pot	8⅜	8	8¼	26,000
Elkton	59	55½	59	25 800
El Paso	58	56	57½	8,600
Findley	68½	67	67	10,500
Gold Dollar	8¼	8¼	8¼	17,350
Gold Sovereign	6½	6¾	6¾	21,000
Isabella	29	23	27¾	30,000
Jennie Sample	9⅜	9	9¼	
Mary McKinney	70½	70	70	11,000
Pharmacist	6½	6¾	6¾	
Portland	1.45	1.40	1.44	2,300
Vindicator	95	94	94	
Work	24¾	22¾	24¾	29,000

BOSTON Dec. 8

Adventure†	5¼	4¾	5	2,435
Allouez	55¼	47	54½	24,791
Am. Zinc	32½	30½	32½	400
Arcadian	14⅞	9¼	9¼	82,631
Atlantic	16	13⅜	14	2,255
Bingham	33	30½	30⅝	1,995
Boston Consolidated	32⅝	30⅞	31¼	2,565
Calumet & Arizona*	185	168	168	3,994
Calumet & Hecla*	860	855	855	51
Centennial	40	35½	40	12.593
Con. Mercur*	.58	.48	.53	2,280
Copper Range*	83	79¾	80¾	10,172
Daly-West	23¼	20	20¼	2,586
Franklin	23¼	21¾	22¼	5,147
Granby	13¾	13¾	13¾	920
Greene Consolidated	56¾	51½	53¾	54,048
Isle Royal	26½	23¼	23½	690
Mass	8¾	7½	8	940
Michigan	19⅞	18	18½	3,168
Mohawk	80	73½	79	7,644
Mont. Coal&Coke new	2½	1⅝	1⅝	3,6 9
Nevada	19¼	17½	18½	3,290
North Butte*	114½	111¾	112½	9,203
Old Colony	2	1½	1½	1,070
Old Dominion	56½	53	54	6,086
Osceola	138½	134	138	6,729
Parrot*	29½	27	28	1,626
Phoenix	1⅜	1	1	51
Quincy†	110	102	106	1,640
Rhode Island	7¾	5⅛	5¾	6,511
Santa Fe	4⅞	4	4	5,350
Shannon*	18¾	18¾	18¾	300
Tamarack	111	107	110	328
Tecumseh	21½	19⅝	19¾	12.220
Trinity	11⅛	9¾	11	5,465
United Copper, com	75¾	75	75	1,310
U. S. Oil	10	9½	10	1,220
U. S. Smg. & Ref	63½	61¼	61¾	3,001
U. S. Sm. & Ref., pfd.*	46	45	45¼	3,239
Utah Copper	65¾	62½	64	5,828
Victoria	7	6¾	6¾	1,500
Washington	2	2	2	500
Winona†	12½	10½	11	3,520
Wolverine	172½	162	166	1,133
Wyandotte	2¾	2	2	2,210

*Ex. Div. †Ex. Rights.

BOSTON CURB.

Abitibi & Cobalt	.35	.26	.29	7,350
Ahmeek	100	100	100	341
Ariz. Com'l	36	31¾	31¾	940
Black Mt	10	9½	10	1,695
Cananea Cent	39	34	35	8,398
East Butte	13	11½	12	3 935
Hancock Con	16½	13	13⅝	1,410
Keweenaw	16	11½	13	5,833
Majestic	3⅛	3½	3½	4,331
Raven	1.25	.90	1.00	12,096
Shawmut	.90	.82	.82	7,055
Superior	22½	21	21½	660
Superior & Pitts	27½	25½	25⅝	12,950
Troy	4¼	3⅛	3⅛	4,980

NEVADA MINING STOCKS. Dec. 12.

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

TONOPAH STOCKS.	High.	Low.	Last.
Tonopah Mine of Nevada	20.37½	20.00	20.12½
Tonopah Extension	6.00	5.87½	5.87½
Montana Tonopah	3.75	3.70	3.72
Belmont	6.10	6.00	6.10
Tonopah Midway	2.56	2.55	2.56
West End Con	2.30	2.25	2.30
Jim Butler	1.47	1.45	1.47
GOLDFIELD STOCKS.			
Sandstorm	.72	.70	.70
Kendall	.61	.60	.60
Red Top	3.75	3.75	3.75
Jumbo	3.75	3.75	3.75
Goldfield Mining	1.45	1.42	1.43
Diamondfield B. B. Con	.58	.56	.57
Atlanta	.74	.73	.74
Mohawk	14.50	14.50	14.50
Silver Pick	1.58	1.55	1.57
Laguna	1.60	1.58	1.60
BULLFROG STOCKS.			
Montgomery Shoshone Con.	15.50	14.00	14.50
Tramps Con	1.80	1.75	1.80
Gold Bar	1.55	1.53	1.55
Bullfrog Mining	.47	.45	.45
Bullfrog National Bank	.60	.59	.60
Homestake Con	1.50	1.40	1.40
MANHATTAN STOCKS.			
Manhattan Con	1.08	1.05	1.07
Manhattan Dexter	.83	.81	.82
Jumping Jack	.48	.46	.47
Stray Dog	.68	.66	.67
Indian Camp	1.05	1.05	1.05

LONDON. *(By Cable.*)* Dec. 12.

Dolores, £1 8s. 9d.; Stratton's Independence, £0 3s. 3d.; Camp Bird, £1 9s. 0d.; Esperanza, £2 13s. 9d.; Tomboy, £1 15s. 0d.; El Oro, £1 6s. 3d.; Oroville, £1 0s. 6d.; Somera, £0 5s. 0d.; Utah Apex, £1 11s. 3d.; Arizona Copper, pref., £3 12s. 6d.; Ariz. Copper, def., £3 10s. 6d.

*Furnished by Hayden, Stone & Co., New York.

SAN FRANCISCO Dec. 5.

Name of Company.	High.	Low.	Clg.	Sales.
COMSTOCK STOCKS.				
Belcher	.60	.40	.46	5,500
Best & Belcher	1.30	1.25	1.30	1,000
Caledonia	.57	.45	.45	900
Chollar	.26	.16	.17	5,700
Con. Cal & Va	1.30	1.15	1.20	3,550
Crown Point	.27	.25	.25	5,400
Gould & Curry	.27	.23	.23	4,400
Hale & Norcross	1.00	.96	.98	200
Mexican	1.10	1.00	1.00	3,400
Ophir	2.90	2.90	2.90	350
Overman				
Potosi	.21	.18	.18	1,600
Savage	1.20	1.15	1.15	1,200
Sierra Nevada	1.00	.89	.89	4,700
Yellow Jacket	.90	.85	.85	1,400
TONOPAH STOCKS.				
Belmont	6.50	6.00	6.00	1,100
Golden Anchor	.60	.55	.55	15,500
Jim Butler	1.50	1.45	1.45	53,800
McNamara	.90	.81	.86	39,000
Midway	2.60	2.45	2.60	4,600
North Star	.49	.46	.46	9,700
West End	2.35	2.25	2.30	8,183
GOLDFIELD STOCKS.				
Atlanta	.94	.80	.80	34,067
Columbia Mt	1.42	1.00	1.05	35,250
Comb. Frac	5.25	4.25	4.25	5,350
Diamondfi'd B.B. Con.	.72	.55	.55	36 306
Florence	....	....	....	.....
Frances-Mohawk	....	....	....	.....
Goldfield Mining	2.20	1.87	1.87	12,300
Jumbo	4.15	3.95	3.95	8,600
Kendall	.75	.69	.69	4,500
Laguna	1.80	1.50	1.75	10,650
Mohawk	16.37	14.62	14.62	6,125
Red Top	4.10	3.75	3.75	7,350
Silver Pick	2.10	1.60	1.72	4,100
Sandstorm	.86	.73	.75	4,900
BULLFROG STOCKS.				
Bullfrog Mining	.56	.51	.51	6,600
Bullfrog Nat'l Bank	.67	.63	.63	11,600
Gold Bar	1.72	1.60	1.60	8,000
Homestake Con	1.57	1.45	1.50	5,200
Original	.27	.24	.24	21,300
Tramps Con	2.25	1.95	1.95	13,531
MANHATTAN STOCKS.				
Indian Camp	1.10	1.02	1.02	42,600
Jumping Jack	.55	.50	.50	43,825
Manhattan Con	1.25	1.05	1.07	9,700
Manhattan Dexter	.98	.72	.97	86,800
Stray Dog	.77	.72	.74	49,750

New Dividends

Company.	Payable.	Rate.	Amt.
Am. Smelting & Ref	Jan. 15	$1.75	$875,000
Am. Smelting & Ref., pfd	Jan. 2	1.75	875,000
Bunker Hill & Sullivan	Dec. 4	0.60	360,000
Butte Coalition	Dec. 19	0.40	400,000
Calumet & Arizona	Dec. 20	4.00	800,000
Con. Mercur	Dec. 19	0.02½	25,000
Copper Range Con	Dec. 22	2.00	767,562
Daly West	Dec. 15	0.60	108,000
General Chemical, pfd	Jan. 2	1.50	150,000
Granby Consolidated	Dec. 31	0.30	405 000
Guggenheim Exploration	Jan. 2	2.50	337,500
Iron Silver, Colo	Jan. 1	0.20	100,000
Maryland Coal	Dec. 31	4.00	74,600
Mohawk Copper	Jan. 10	4.00	400,000
Mines Co. of America	Dec. 26	0.02	40,000
National Lead	Jan. 15	1.00	149,054
North Butte	Dec. 22	2.00	800,000
Quincy, Mich	Dec. 22	2.50	250,000
Republic Iron & Steel, pfd	Jan. 2	3.75	765,634
Shannon Copper	Dec. 20	0.50	150,000
Tezuitlan Copper	Jan. 2	2.00	20,000
U. S. Red. & Refining, pfd	Jan. 1	1.50	59,287
U. S. Smelt., Ref. & M., pf	Jan. 2	0.87½	656.250
U. S. Steel, com	Dec. 31	0.50	2,541,512
Work. Colo	Dec. 10	0.02	30,000

Assessments

Company.	Delinq.	Sale.	Amt.
Belcher, Nev	Dec. 5	Dec. 27	$0.10
Deadwood, Cal	Dec. 15	Jan. 3	0.05
Enreka Devel., Utah	Dec. 14	Jan. 4	0.05
Gould & Curry, Nev	Dec. 10	Dec. 31	0.10
Great Ironclad, Cal.	Dec. 24	Jan. 15	0.03
Lyon, Utah	Dec. 10	Jan. 2	0.01
Nephi, Utah	Nov. 30	Dec. 29	0.005
Naildriver, Utah	Dec. 24	Jan. 10	0.05
Niagara, Cal	Dec. 13	Dec. 29	0.03
Nassau Copper, Cal.	Dec. 10	Jan. 4	0.02
Pittsburg Con	Dec. 15	Jan. 3	0.05
Planetary, Utah	Dec. 7	Dec. 21	0.01
Red Cloud, Idaho	Dec. 15	Jan. 15	0.001
Star Con., Utah	Dec. 20	Jan. 9	0.03
Susannah, Utah	Dec. 21	Jan. 10	0.00½
Sweetwater, Utah	Dec. 24	Jan. 2	0.00½
Tule Belle, Cal	Dec. 3	Dec. 31	0.02
West'n Mines Co., Nv.	Dec. 24	Jan. 24	0.02