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The Importance of Potable Water Supplies to Mining Communities.

BY CHARLES E. MORRISON.*

On first thought it might seem presumption to assert that a relationship exists between mining and sanitary engineering, and yet it is undoubtedly true that, at least in many cases, some knowledge of sanitary science is necessary to the mining man. As a professional man, as a more or less scientifically trained one, and as the possible guardian of human life, it is essential for him to know, and ought to be within his sphere to determine, the potability of water.

Strictly speaking, the examination of water is divided among the chemist, the biologist and the doctor; the chemist determining the inorganic constituents, the biologist the organic, and the medical man, specially trained in hygiene, drawing the conclusions. It is neither assumed nor expected that the mining engineer shall be all or any one of these; but it is a fair assumption that, from his knowledge of chemistry, together with a careful inspection of existing conditions, he shall be able to determine fairly accurately the character of a water which he, and those dependent upon his superior knowledge, are forced to drink. The technical schools provide for this contingency by requiring students to be familiar with an ordinary chemical water analysis. That he is called upon to make such a determination, or that he frequently has the opportunity of using such knowledge to secure a pure supply, is entirely obvious.

In an examination, the first thing to attract attention would be the means of supply, which may be the rain, springs, wells or running streams.

Rain is said to be the purest source of supply, its only impurities being those washed out of the atmosphere. These are seldom if ever dangerous, but may be disagreeable, as in the neighborhood of smelters, where the products of combustion carried off by stacks contaminate the surrounding air to such an extent that the first rain caught readily gives a chemical reaction. Furthermore, water retained in tanks any length of time is subject to bacterial growth which, if not dangerous, may render it distasteful.

Springs, having their source in the water percolating through the earth, and being subject to a bacterial, chemical and mechanical action tending to reduce impurities to a minimum, are usually the purest and best supplies for small communities. It often hapens that contact with the various geological strata of the surrounding district impregnates the water with impurities that are harmful. As an illustration of this fact, we might cite a case that appeared recently in one of the technical papers.

The conditions were these. A small mining town in northern Mexico had come into existence due to the discovery of orebodies which were being developed, and in connection with which a smelter was being operated. The ore was silver-lead, carrying a good deal of arsenic. The plant was under the direction of Americans, and the different heads of departments were from the States, while the laborers were natives. The water supply was being derived from springs in the vicinity and proved entirely satisfactory until suddenly an epidemic of what was at first termed typhoid appeared in camp. A later diagnosis, however, discovered it to be arsenic poisoning, pointing at once to the conclusion that the drinking water had in some way become contaminated. This was verified by examination, and finally the conviction was reached that, in some manner connected with mining operations, the water supply had become impregnated with arsenic. The result of this epidemic was almost the complete suspension of mining and smelting operations for a time, as many of those affected were in charge of departments.

What applies to springs may be said of wells. Deep wells are, of course, superior to shallow ones, since filtration has an opportunity to act longer, but both may prove unsatisfactory because of polluted surface wash and infiltration from contaminated sources. It has been estimated that in Great Britain, out of a total of 200,000 typhoid cases, of which 10% were fatal, a majority were due to polluted wells.

It is true that natural filtration tends to remove impurities, but elimination of the disease germ is less complete than of the other constituents, and it should be remembered that contamination involves more the question of quality than of quantity. Huxley expressed himself to the effect that the chemical constituents indicating pollution might be negligible and yet the pathogenic content be sufficient to infect a whole community with disease. In other words, we might say that a chemical examination never determines the potability of a water, though it may prove its impurity and is always an exceedingly accurate indicator. Such a chemical examination would involve the determination of chlorine, solids due to organic matter, nitrates, nitrites, ammonia, etc.[1] The results may mean much or little, depending to a large extent upon the experience of the investigator.

Running streams are naturally more impure than other sources, since they are derived from rain, springs and surface wash, and usually have added to them the wastes from the entire watershed. Running water purifies itself by the oxidation of impurities, and with a certain dilution these impurities are said by sanitarians to be harmless. However this may be, these factors can hardly be expressed quantitatively, and we are forced to conclude that there is always a possibility of contamination, and that under certain conditions all water supplies may be harmful.

It might be said that water supply is seldom a question of choice, and that the mining engineer is compelled to take what is at hand; but it is, nevertheless, true that where he is a factor, he is such an important one that he may modify conditions to suit himself. This being so, it becomes his duty to investigate most carefully and intelligently his surroundings, so as to discover and eliminate, as far as possible, those influences tending to produce disease. These influences may be summed up as "contamination by human or animal wastes"; if we provide against this we prevent the development of those diseases, of which typhoid is most representative and conspicuous, that are disseminated by the water supply.

It would seem that some weight ought to be attached to the foregoing from the fact that the vital statistics in the United States Census report for 1900 show such a wide discrepancy in the typhoid-fever death rate between mining and manufacturing or commercial centers. It must be significant that the death rate is so much greater in the former than in the latter, and this, too, in spite of the fact that medical men declare the disease to be much milder in form in the West than in the East.

Reasons for this discrepancy in mortality will naturally suggest themselves, such as lack of medical care or proper nursing; but, on the other hand, to offset this, we have the sturdier constitutions of the patients and the mildness of the disease. It would seem, then, that the most logical explanation would be the much greater prevalence of the disease in the West than in the East, due, undoubtedly, to poorer sanitary arrangements and lack of attention to precautionary methods.

Examining the statistics, we note first that the average death rate from typhoid in 1900 for the whole United States was 35.4 per 100,000; for engineers (civil, electrical, mechanical and mining) and surveyors, the rate was 43.8 per 100,000, while for professional men the average was 37.9 per 100,000. These facts, in connection with the statement that "from all other causes (except accidents, injuries and suicides) the death rate of engineers and surveyors was considerably below the average for that class," would indicate that typhoid was the most common and fatal disease among engineers, and that the mortality was greater among them than in other callings.

This may be brought out by the comparison of a mining region—the Cordilleran section—with a commercial or manufacturing one, such as the North Atlantic coast section. The former in-

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[1] See Mason's "Examination of Water."

cludes the whole of the States of Arizona, Nevada, Utah, Idaho and Wyoming, and parts of New Mexico, Colorado, Montana, Washington, Oregon and California, while the latter embraces parts of the States of Maine, Massachusetts, New Hampshire and Connecticut and all of Rhode Island. In the Cordilleran section, the typhoid mortality for 1900 was 31.8 per 1,000 deaths, as compared with 12.6 per 1,000 deaths in the North Atlantic section, or two and one-half times greater. Or, if we compare typical mining States with typical industrial States, we will notice that in Arizona the death rate from typhoid was 3.35% of the total deaths from all causes; in New Mexico, 3.81%; in Colorado, 2.98%; while in Massachusetts the rate was 1.25%, and in Connecticut 1.61 per cent.

There are many factors, perhaps, which tend to make this difference, but undoubtedly the most important is that, in mining districts, little or no thought is given to the water drunk nor to the disposition of animal, house and other wastes, which is not the case in more settled communities. Both of these matters, it would seem, should receive the careful consideration of the mining engineer from economical if not from humanitarian reasons.

Sulphur in Liquid Fuel.

A. Goetzl writes on the determination of sulphur in "liquid fuel," *i. e.*, petroleum residues, in the *Zeit. f. angew. Chem.* (1905, No. 30, p. 1528). He has tried the usual methods without success, and has finally found that good results are obtained by the following:

Two or three grams of the fluid are treated with 4 c.c. of fuming nitric acid in a large platinum crucible covered with a watch-glass. When, after some hours, the reaction in the cold ceases, the crucible is heated on a gently warmed water-bath. When the mass has quieted down, the cover is removed and the heating is continued until the material is dry. He then adds 6 or 8 gm. of a mixture of calcined soda (free from SiO_2 and Na_2SO_4) with two parts of saltpeter, and stirs (as soon as the mass softens) with a platinum rod. He covers with some more of the nitrate mixture, and heats over a rosette-burner. After the combustion is completed, the melt is dissolved in hot water, and the solution is poured into a beaker; HCl is added, the liquid is brought to boiling, and the sulphuric acid is precipitated with barium chloride.

Some electrolytic solutions give the most uniform deposits when they are kept in motion. In order to get the best effects the solution has to be kept clean by being frequently filtered. Agitation, however, does not very noticeably improve nickel solutions on account of the quantity of precipitated hydroxide in the bottom of the bath.

The Loup Creek Colliery Company.

BY GEO. W. HARRIS.*

About ten years ago a railroad, following the windings of Loup creek, was built from Deepwater station on the Chesapeake & Ohio railroad. Some six miles of road was constructed, and lumbering operations were carried on by the owners of the 25,000 acres of land, which is now being opened up by the Loup Creek Colliery Co. This early development also marked the beginning of the Deepwater-Tidewater railroad system.

The Loup Creek Colliery Company owns the largest coke plant in West Virginia; it is located at Page, Fayette county, W. Va., eight miles from Deepwater. Deepwater is a small station on the Chesapeake & Ohio railroad, and is the present western terminal of the Deepwater-Tidewater railroad.

This Loup Creek property contains the richest steam- coking- and gas-coal seams of West Virginia, and every acre of the tract is underlaid with coal. From the top of the Pottsville conglomerate to the Mahoning sandstone, at Page, there are thirteen workable seams which, with others over three feet thick, but not correlated, aggregate 70 ft. in thickness. It is interesting to note these seams and their thickness; in addition to the local names of the beds in the Kanawha series will be given the corresponding names of the same beds in the Allegheny series in Pennsylvania, the latter in parenthesis. Commencing with the Eagle (which is about on a level with the top of the monitor plane at the tipple) the seams are

FIG. 1. ANSTED SEAM AT PAGE NO. 6 MINE OPENING.

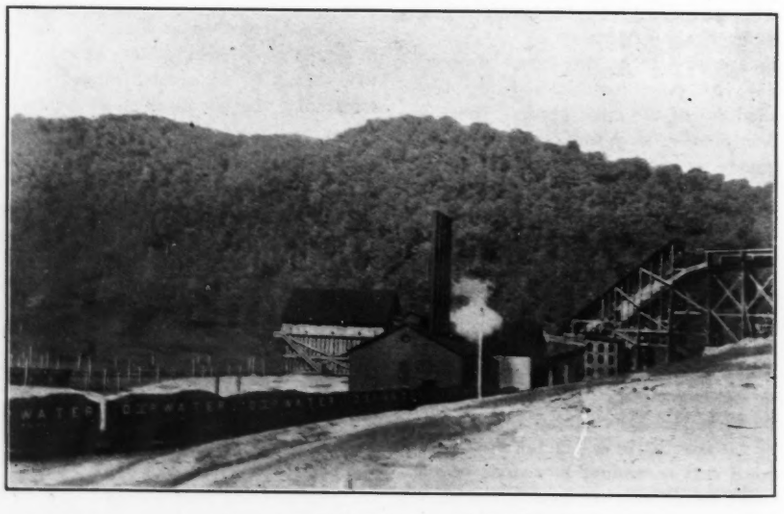

FIG. 2. STOCK BIN, POWER-HOUSE AND TIPPLE.

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given in ascending order, with the thickness as follows: Eagle (Clarion), 6 ft. 8 in.; Ansted or Campbell's creek (Lower Kittanning), 9 ft. 6 in.; Winifrede (Upper Kittanning), 4 ft. 6 in.; Coalburg (Lower Freeport), 4 ft. 6 in.; Lewiston, 8 ft.; Stockton (Upper Freeport), 6 ft.; No. 5 seam (Mahoning), 9 ft. In addition, below water level at a depth of about 250 ft. is the Sewell (Nuttall) seam, 4 ft. 2 in. thick; and at a depth of 500 ft. occurs the Fire Creek (Quinnimont), 4 ft. 8 in.

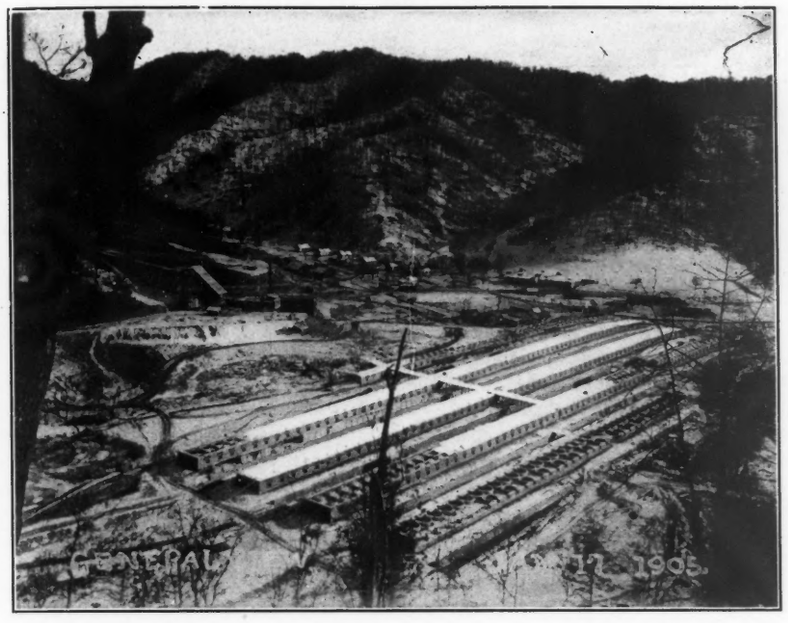

FIG. 3. PLANT OF THE LOUP CREEK COLLIERY.

All the seams above water level at this plant are identified and correlated in the Kanawha measures, and are worked in many places in that district; the quality of the coal and the persistency of the seams are thoroughly demonstrated. The seams below water level, or the New river beds, are in better condition here than at any point in the New river district. All the seams from, and including, the Ansted down are coking coals, while the beds above the Ansted seam are splints, blocks and cannels.

The Loup Creek property is at the extreme eastern escarpment of the Kanawha measures; there the seams are thicker, the coal is better and of a coking quality superior to any other in the district. All the beds as they go westward from Page decrease in thickness and in fixed carbon, and increase in hydrocarbons, ash and sulphur. Where these seams come out of the Appalachian axis, they are non-coking. Thus the Sewell bed is a coking coal, while at Kanawha it is a splint. The well-known Hocking Valley coals in Ohio also further illustrate the changes that take place in the character of the seams with distance.

The mines at Page are at about the lowest part of the immense acreage controlled by this company; therefore, the workings are all to the rise, thus favoring haulage and drainage. At present the only seams worked here are the Eagle and the Ansted beds. The former is 450 ft. above the railroad tracks at the tipple; the Ansted is 180 ft. above the Eagle bed. The coal from the various openings in these seams is brought to the head of the plane at the tipple by steam locomotives. The section developed is merely a spur of the mountain which contains the main body of the coal. However, at the rate of 1,000,000 tons a year, from the two seams in this portion alone there is coal available for fifteen years. The coal is reached by drift openings; ten pairs of double entries are advancing on the butts; rooms are driven from these on the faces of the coal. The measures lie nearly horizontal; the entries, following the strike, are about level; while the rooms, running directly up the dip, have a pitch of from 1 to 2 per cent.

Fig. 1 shows the method of opening a mine at Page; this is the No. 6 entry on the Ansted seam, and the first set of timber is about to be placed in position. One miner standing in the opening is holding his pick at the slate parting, which is about 4 ft. above the bottom rock; part of the top bench of coal has not yet been taken down.

The seams worked in this mountain spur are bodies of coal about one mile in length and of varying width. The pairs of entries are driven across the spur; they are separated by 500 ft. of coal. All entries and rooms are driven to line, and are arranged in the Eagle bed directly under those in the seam above. This admirable practice does away with the shearing tendency which might result were a pillar in one seam over an opening in the bed below. The importance of this method increases as the stratum between the beds decreases in thickness.

The method of mining at this plant is a modified pillar-and-stall system, which has proven satisfactory at the mines of the Gauley Mountain Coal Co., at Ansted, W. Va. The interests controlling the Loup creek and Gauley mountain companies are nearly identical; Col. Wm. N. Page is interested in, and is president of, both operations.

According to the method of mining followed, the weight of the superincumbent stratum affects chiefly the entry pillars. Therefore, the pillars between the entries are made 100 ft. wide. Rooms are turned from one side only of each pair of entries; these are further protected against squeeze by a solid barrier of coal left on the lower side, and by the room stumps on the upper side. Thus the rooms from one pair of entries are driven up 400 ft. toward the next pair; and a solid pillar of coal is left between the face

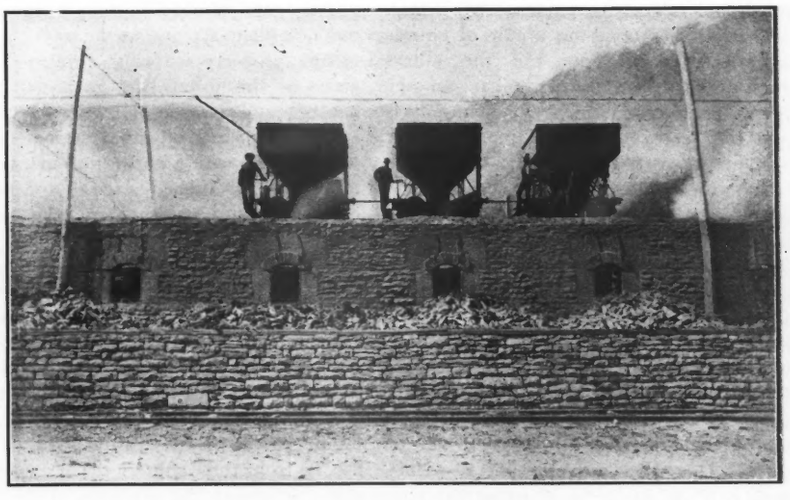

FIG. 4. CHARGING THE COKE-OVEN.

of each room and the nearest entry, as a barrier. The rooms are turned on 60 ft. centers; they are 25 ft. wide with 35-ft. pillars.

One of the important features of the method of mining here employed consists in working out the coal in panels. Thus 16 or 17 rooms are driven up to their limit, and the pillars are drawn to within 100 ft. of the entry. The result is that a section of coal, 400 by 1,000 ft., is worked out clean, as the workings advance. The room pillars, therefore, do not long carry weight; further, when the panel is worked out and the top falls, the pressure on the entry pillars is greatly lessened. Moreover, a squeeze may be avoided, or at least limited to a comparatively small area. A very large percentage of the coal in the seams should be removed by this method.

The room pillars are successfully drawn by robbing in steps. Let us suppose that all the rooms in one panel have been driven up to their limit; then, starting at the face of the outside room of the panel, the pillar nearest the entry mouth is attacked. If the top is good, the pillar may be taken out in three or four blocks; in the case of poor top, it may be necessary to remove a smaller area of pillar each time. After the pillar in the first room has been drawn back about 50 ft., the robbing of the pillar between the first and second rooms may be commenced. Thus, the robbing in a series of rooms is in the form of steps which are approximately along a line running diagonally across the pillars. The top should break nicely along this line of robbing; if one pillar in the series should not be carried back in line with the others, probably the coal would crush and robbing be rendered hazardous. When all the rooms on a pair of entries have been worked out and the pillars robbed, then the barrier pillar on the lower side of the entries, the chain-pillars and the room stumps are removed; the section is "worked out."

Both the Eagle and the Ansted seams at Page contain slate bands which affect the method of blasting or mining the coal. The Eagle has the following average section, the top stratum being noted first: Coal, 1 ft.; slate, 10 in.; coal, 1 ft. 5 in.; slate, 5 in.; coal, 3 ft.; making a 6-ft. 8-in. seam, with a total coal-thickness of 4 ft. 5 in. The Ansted has a top bench of 5 ft. 2 in., and a bottom bench of 3 ft. 10 in. of coal; between these is 16 in. of slate. The seam measures 10 ft. 4 in., with 9 ft. of coal. In shooting the coal a special effort is made not to bring down the slate parting at the same time; this is kept separate from the coal by practically the same method in mining both beds, as follows:

In the Eagle, the undercut is made in the middle bench of coal which is then blasted out and loaded into cars. Next the two partings are shot; in the rooms the slate is gobbed at the side, while in the entries it is dumped outside of the mine. After the slate has been cleaned up, the top and bottom benches of coal are shot.

A modification of this method is used in mining the Ansted bed, which contains only one parting. The undercut is made in the bottom of the top bench of coal next to the slate parting. This coal is shot and loaded into cars; then the slate is blown and removed, after which the bottom bench is mined. In this method the top bench is mined out about 12 ft. in advance of the bottom coal, so that the miner may have a place to work on when making his undercut, and when loading the top coal. The bottom bench and slate parting make a platform about the height of the mine car, so that more than half of the coal is readily loaded without lifting it from the floor of the room. Indications point to the thickening of the plate parting in the Ansted seam, as the bed passes under the main part of the mountain; when this slate reaches a thickness of 2 ft. or more, the underlying and overlying coal benches will probably be worked as two separate seams, to avoid handling the heavy slate.

The method just described is applicable to pick mining, at present in vogue at Page. When the mines have been opened up sufficiently to prove the coal thoroughly, mechanical undercutting machines will be installed; whether of the chain or puncher type will depend largely on the texture of the coal and other features of the bottom bench in both seams. With the introduction of undercutting machinery, the mining probably will be made in the bottom bench.

The large number of mine openings at this new plant are due to the way this part of the property is being developed. In place of the usual long main-entry for haulage and ventilation, with the cross-entries branching off from it, there is an outside haul, with a uniform grade, no top to keep up, no timber renewal, and no air crossovers to build. Here the cross-entries start from the outcrop, and each pair has its own ventilating furnace.

By this method a large coal territory was quickly and cheaply developed at Page; steam haulage was made possible. Each pair of entries constitutes practically an individual mine, thus localizing an explosion or a squeeze. No. 1 entry, with its air course on the Ansted seam, is 14,850 ft. from the dump at the head of the plane, following the windings of the haulage road. Each succeeding pair of entries will be nearer the plane up to No. 10, which will come out at the plane. The last one opened is No. 7 entry, 8,300 ft. distant. All the Ansted coal is carried over the outside haulage road with a descending grade; but the coal from the Eagle seam has an adverse grade for a short distance.

After hauling out, at the head of the plane, the mine cars are dumped into a 250-ton bin on a Phillips cross-over dump, and the empties are automatically returned to the empty-car siding. From the bin the coal is loaded in a 10-ton monitor, and is dropped down the plane to the tipple. In this section the monitor transportation is the usual method of handling coal on long planes; the monitor resembles a boiler mounted on wheels. The coal is loaded into the open upper end, and is discharged through the lower end. The lower end has a swing bottom, which shuts and opens automatically. The double-track plane is self-acting; the loaded monitor, in descending, pulls the empty one up.

When the monitor dumps, special provision is made at the tipple to prevent shock. The monitor strikes a cross timber and the shock is taken up by springs; part of the weight is transmitted, by wire ropes, to a swinging device, which is also provided with springs. This arrangement also assists in starting the monitor when it is ready to return up the plane. In locating the buildings (which are shown near the tipple in Fig. 2) an important point was considered. Nothing was placed near the tipple directly in front of it that might be injured should the monitor break loose on the plane.

The tipple is arranged to load lump coal, slack or run-of-mine; when lump coal is shipped, the run-of-mine passes over bars with 1½-in. openings, and the screenings drop into a bin. The fine coal is transported from the tipple bin by two spiral conveyors, to two Stedman disintegrators; and thence, by scraper lines, to the slack-bin. This machinery is in duplicate, with a capacity of 100 tons per hour. In case all the coal dumped into the tipple is needed to charge the ovens, a door may be dropped over the openings to the 1½-in. bars, and the run-of-mine thus passes straight down the main chute to bars with 4-in. openings. Everything dropping through these bars goes to the tipple bin, and so to the disintegrators, etc. The lumps go to a coal crusher, after which the fine coal is elevated to the tipple bin. The Stedman disintegrators take all coal that will pass through 4-in. bars; therefore the lumps are broken to that size and under.

It is pretty generally recognized today that coke made from crushed coal of a fairly uniform fineness is superior to that made from run-of-mine, which contains mixed lump and slack. At Page the coal coming from the Stedman disintegrators is about as fine as ordinary corn meal; or, more specifically, 80% of it will pass through a No. 10 mesh. The disintegrators run at 450 r. p. m.; and should finer coal be desired, the speed of the machines may be increased.

In view of the possibility of this fine slack igniting by spontaneous combustion, in the 500-ton slack bin, special precau-

tions are taken both to prevent the mass of coal from becoming too hot, and, in such an event, to detect the high temperature in time to draw out the slack. Ten vertical ventilators are distributed through the bin, so that any gases forming in the slack may readily pass out. Each ventilator is made of 2-in. plank, is 10 in. square, and extends from outside the bottom of the bin to a point higher than the coal can accumulate. Thus cool outside air may enter the ventilator and pass out at the top. At intervals of 4 or 5 ft. along the ventilator, and on each of the four sides, are openings, arranged so that any gases may escape from the surrounding coal, but the slack cannot work out through them. Two 2-in. iron pipes are so placed in the bin that thermometers may be lowered in them and the temperature of the slack be taken.

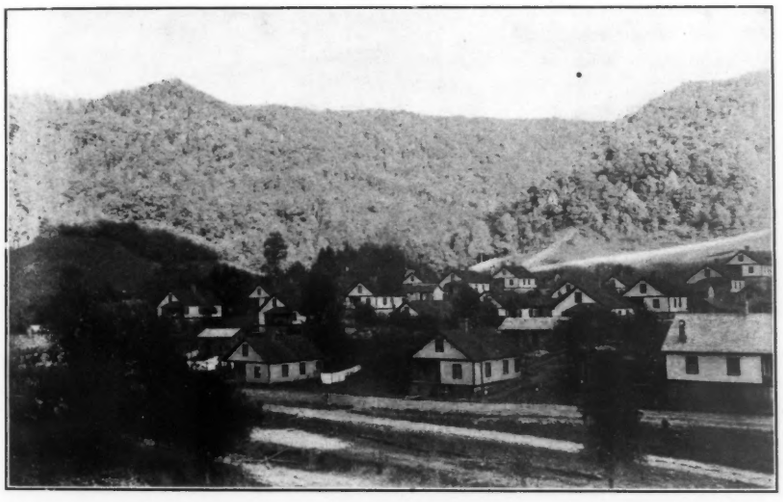

FIG. 5. MINERS' HOMES, NORTH PAGE, LOUP CREEK COLLIERY.

Both the slack bin and the brick boiler- and power-house may be readily extended if greater capacity is needed. Four horizontal tubular boilers (of 600 h. p.) furnish steam for the Nordberg Corliss horizontal twin engine. This engine (500 h. p.) drives the coal-crushing, conveying and elevating machinery, and a 150-kw. 250-volt generator. At present electric current is used to operate the larries in charging the coke-ovens and to run a centrifugal pump; but space has been provided in the power-house for additional generators, in case electrical mining machines or locomotives should be installed.

A prominent feature of the Loup Creek Company's plant is its coke-oven equipment; 505 12-ft. beehive ovens have been built, making this the largest coke operation in the State. When the market and transportation warrant it, the plant will be increased to 1,000 ovens or more. A view of the plant is given in Fig. 3 (photographed in January, 1905). At present over 100 ovens are making coke, and smoke obscures this view of the works. There are four blocks each containing a double row of ovens, and one bank of single ovens. To increase the plant, these rows of ovens will be extended at the upper end. The capacity of the mines is practically limited by the amount of coal that can be sent down the tipple plane in the monitors. If more than 4,000 or 5,000 tons of coal are demanded per day, either another plane may be built, paralleling the one shown on the left, or a new tipple will be constructed and additional mines will be opened in the mountain spur shown at the right of Fig. 3.

When the 505 ovens are all making coke at Page, a third of these, or about 170 ovens, will have to be charged with slack every day, as 72-hr. coke is made at this plant. This means the transportation of 1,020 tons of slack, with only 3½ min. in which to charge each oven in a day of ten hours. In practice ovens are not drawn to conform to any schedule, and often are not charged continuously during the whole day. The expeditious manner in which this work is done is shown in Fig. 4. Three larries are coupled together and so spaced that three ovens may be charged at one time. The gates in the bottom of the slack bin are also spaced so that the three connected larries may be loaded simultaneously. One larry is equipped with two 35 horse-power motors, the two other larries are trailers. The trolley wire is carried by wooden poles, one on either side of the block of ovens, as shown. The poles are protected against fire by a coating consisting of a mixture of cement, lime and alum.

Over each oven door are two iron rods, held in place by a bed-plate set in the wall; the rods have hooks at their lower ends, and a bar is suspended from them by means of chains. Some coke drawers prefer this swinging support for their scrapers when drawing coke, rather than a rigid bar set in the door frame. The track along the top of the ovens, on which the larries run, is far more substantial than customary; it consists of 7-in. girders weighing 70 lb. per yd. There is little spring to this track when weight comes on it, and, therefore, the weight of the larry is not felt by the oven arch. The track is supported by piers built of red brick, on top of which is an iron plate to which the track is bolted. The top of the pier is finished with cement forming a setting for the track plate and a capping for the pier.

The larry tracks are provided with the regular street-railway switch, that is, a tongue switch and mate with stiff bolted frog. There is considerable advantage in this construction, for one rail is unbroken at the switch, and the tongue is heavy and substantial.

One important matter to consider about a coke plant is the water supply, a great quantity of which is needed to wet down the coke in the ovens. An abundance of water, from various sources, will be available at the Loup Creek Colliery Company's works. A reservoir was excavated near the tipple; concrete side walls provide a depth of 8 ft. of water. It holds 325,000 gal.; water is generally supplied from Murphy branch through 8-in. glazed tile-pipe. In summer, when the branch is often dry, the reservoir is filled by a two-stage centrifugal pump, through a 9-in. pipe. The centrifugal is operated by electricity, and pumps water from an impounding reservoir on Loup creek; at 900 r. p. m., 700 gal. are lifted a vertical height of 93 ft. to this reservoir, which is about 75 ft. above the ovens. The impounding reservoir will hold 1,200,000 gal., and is the first of a series of such dams that may be constructed on Loup creek.

The workmen at this plant have far more costly houses (which are also more comfortable) than elsewhere in this section. It has been found to be a good investment to make the miners comfortable. This large operation will require many dwellings, one group of which is shown in Fig. 5, or North Page. In the mountain in the background are the mine openings which supply the tipple with coal. These houses are laid out in regular order, and, with the trees, present a pleasing appearance. Each house is 28 by 32 ft., with four rooms downstairs and two in the story above. They have a studded frame, sheathed with 1-in. boards placed diagonally to brace the building. Over the sheathing is building paper, and then weather boards. The floors are double. The interior is plastered with ivory wood-fibre (manufactured by the United States Gypsum Company), which is tough and durable; nails may be driven into it the same as in wood. Drilled wells, 50 to 80 ft. deep, furnish water for the town.

The Loup Creek Colliery Company made the first shipment of coal on Sept. 1, 1905; during that month it sent to market 8,000 tons, a good record for the first month. It is now mining about 500 tons a day, and is rapidly increasing this tonnage. The company is incorporated

for $1,600,000, fully issued and paid at par. W. N. Page, of Ansted, W. Va., is the president, and the following are the directors: F. P. Addicks, W. P. Bliss, J. O. Green, E. Hewitt, G. M. Hyams, W. N. Page, H. H. Rogers, Jr. The management at Page consists of F. P. Mills, general manager, and J. J. Marshal, assistant and engineer. I wish to here acknowledge the courtesy of the officials of the company in furnishing full information and for the excellent photographs taken by Mr. Mills, from which views the accompanying illustrations were made.

The Salt Lake of Carmen Island, Gulf of California.

BY F. J. H. MERRILL.*

About 130 miles south of Guaymas lies Carmen island, near the shore of the peninsula of Lower California. It is a volcanic island, formed of two ranges meeting in an acute angle, with the vertex toward the north. The eastern range is the shorter, and between it and the adjacent western range lies a bay which forms a sheltered harbor.

At the head of this bay, which once extended to the vertex of the re-entrant angle, is a low beach of calcareous mud and sand, which has been raised a few feet above the sea level by an elevation of the coast. This beach originated as a spit or bar across the bay, and by the change of level has separated from the waters of the gulf a circular body of salt water about half a mile in diameter, which furnishes a large supply of solar salt and makes a valuable contribution to the mineral resources of Mexico. An important feature of this salt lake is the apparent fact that it does not lose its productive power, though it has been used as a source of salt for many years, and is superficially cut off from renewal by the tides. It is asserted that during high tides the salt water from the gulf percolates through the bar which forms the surface barrier. This could not be determined by the writer, during the brief duration of his visit, but is a possible explanation of the endurance of the supply, which seems limitless.

The island has been for a long time the property of a Mexican family, and lately the salt industry has been operated under a lease by J. C. Bothin, of San Francisco and Guaymas, who has marketed a larger amount of salt than had previously been shipped from the island.

While there are along the Pacific coast of Mexico several points where salt is made from sea water by solar evaporation in shallow bays or *pans*, the lake on Carmen island is probably the most important source of this material because of its purity, which is of very high degree.

The salt is deposited in clear white crystals, which are gathered by laborers and put in piles to drain. Tramways transport the dried material to the storehouse, where it is sacked for transportation or ground in a mill for domestic use. In the sheltered harbor vessels load at a dock, or, if of too great draft, are supplied with their cargoes by means of lighters. The cost of gathering the salt is very small. It is said that it could be sold at the dock for $2 per ton.

Salt in Mexico has been, until recently, under the control of a local trust, which has maintained high prices. It is stated that it has been sold in the city of Mexico as high as $45, or $22.50 United States currency, per ton. For those who use much salt, as in metallurgical operations, the price of this commodity is of considerable interest.

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Paragenesis of Gold and Tourmaline.

BY A. SELWYN-BROWN.

Among the many excellent gold specimens in the West Australian Mine Department's museum, in Perth, there are few that possess greater interest than a small nugget containing well-defined crystals of black tourmaline. This unique exhibit was found in 1899, in some workings at Mount Monger, in northeast Coolgardie. It weighs a little over 100 oz., and consists of about 85% gold, the balance being ferruginous quartz and tourmaline.

The tourmaline crystals are thickly studded in the solid gold mass, and sparingly in the quartz. They vary in length from 1 to 5 mm. and in diameter from 0.1 to 0.7 millimeter.

Tourmaline has been often found in close association with gold, in Australia, particularly in the tin districts. It has also been similarly noted in several localities in South America and the United States. But such a fine example of the intimate admixture of both as is exhibited by the Mount Monger specimen is unique.

A study of the chief deposits containing gold in association with tourmaline shows that they generally bear evidence of intense hydrothermal activity. Hussak has described a gold-tourmaline vein, on the Minas Geraes goldfield, Brazil.[1] It is a quartz vein carrying quartz, tourmaline, arsenopyrite, iron pyrite and small quantities of pyrrhotite, andalusite, zircon, and monazite. The gold appears to be chiefly wrapped up in the arsenical pyrite. The vein runs parallel to the stratification between a micaceous schist and itabirite (hematite-mica-schist). Microscopic sections of the ore show that some of the andalusite crystals have been completely altered into sericite, rutile, arsenopyrite and pyrite.

From the evidence gained while studying the deposit, Hussak concluded that the vein in a product of igneous injection and should be considered a dike, rather than a fissure-vein. The occurrence of zircon, monazite, tourmaline, and other minerals, both in the vein and in the country rocks, greatly influences Hussak in his conclusion. But Lindgren is inclined to consider the formation to be a true fissure-vein formed by aqueous agencies, possibly at a higher temperature than in the case of ordinary veins.[2] He is influenced in this view by the fact that the contact-minerals are present, not only in the rocks adjoining the vein, but also in the whole series of schists. The schist and sericitic quartzite forming the wall of the vein, and the presence of the pseudomorphic sericite after andalusite, as well as the apparently simultaneous forming of arsenopyrite and sericite, appear to furnish conclusive evidence to support the fissure-vein theory.

Although the association of gold, tin and tourmaline in the same vein is rare, yet a study of some of the large tin formations will throw light on the origin of the singular parageneses of gold and tourmaline. Tourmaline is nearly always associated with tin ore. For instance, in the Mount Bischoff mine, Tasmania, tourmaline is one of the prominent minerals. It occurs in the form of microscopic crystals in the quartzite country rock, in stanniferous porphyrite topaz dikes, and forms the gangue in regular and well-defined fissure-veins traversing the quartzite. Associated with tourmaline are quartz, fluorite, topaz, wolframite, arsenopyrite, zircon, pyrite, zinc blende, galena, monazite; and, in places within the oxidized zone, also calcite and siderite. Indeed, the whole country bears evidence of intense hydrothermal metasomatic action. The preponderance of fluorides, borates and sulphides, indicates that the hydrothermal solutions carried the most of the metals in the form of chlorides. Hydrofluoric acid is also in evidence, also alkaline solutions of H_2S and $CaCO_3$, the latter acting as precipitants. These solutions accompanied or followed a period of volcanic activity resulting in the formation of many dikes.

Complete details regarding the geological formation of the Mount Monger deposit, from which the museum specimen was obtained, are not available. It is known, however, that the country is largely granitic, and that quartz veins are numerous. These veins are mostly auriferous, and always carry pyrite; while, in a few instances, tellurium has been detected. Tourmaline and gold both occur in the massive granite. It is possible that the specimen resulted from the precipitation of hydrothermal fluoride and chloride solutions by alkaline sulphides in the presence of boric acid, the reactions resembling those which occurred at Mt. Bischoff.

[1] *Zeit f. prakt. Geol.*, 1898, p. 345.

Where only limestone happens to be in the horizon of oil occurrence, the oil occurs in the pores; but, as many of the pores do not intercommunicate, much of the oil in such rock can never be utilized.

[2] "Genesis of Ore Deposits," by Posepny and others, p. 562.

Bremner's Mortar Box for Stamp Mills.

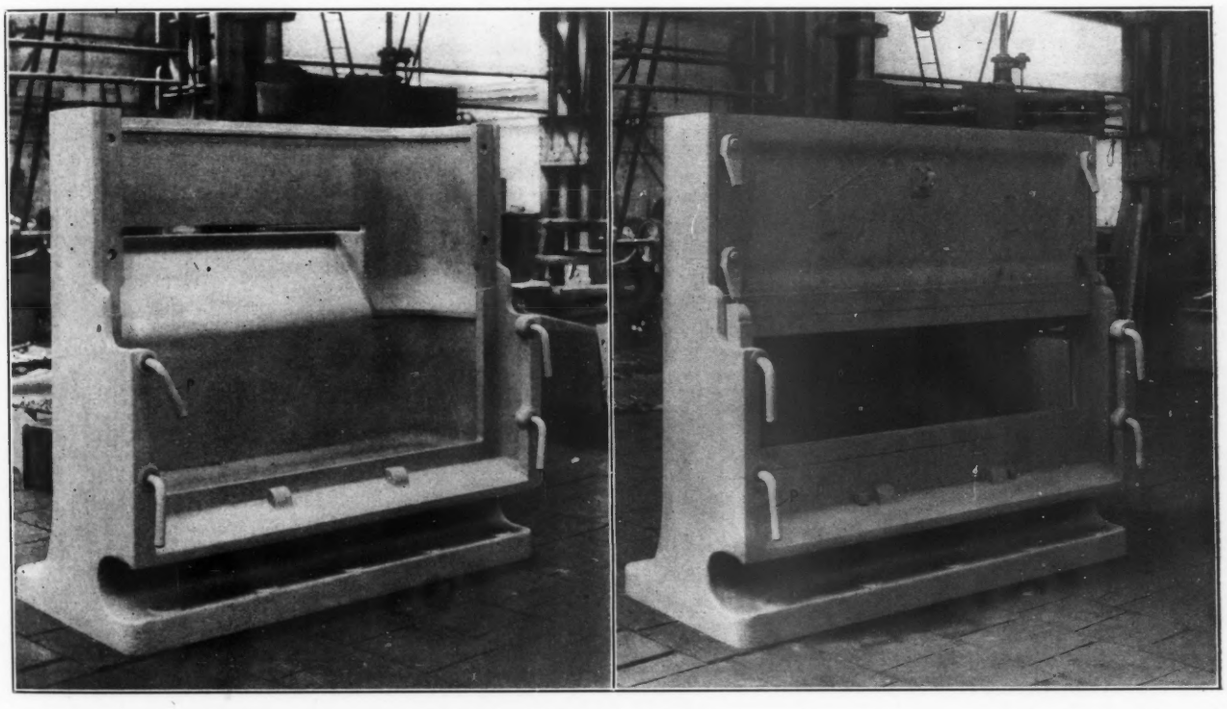
In treating low-grade ores in large quantities by means of high-duty stamps, it is desirable to adopt improvements for the purpose of getting the crushed ore through the screens as quickly as possible, and also for facilitating repairs and renewals. The mortar box here illustrated has several points of novel design. It has been designed by D. A. Bremner, managing director of the High Speed Stamp Company, Ltd., of London, especially for use in connection with the Morison stamp; but it is equally applicable to any other high-duty mill. It has been adopted by John Taylor & Sons for new mills now being erected in the Mysore goldfield.

The screen is brought up as close to the stamps as possible, and is arranged in a vertical position. It is made as wide as possible, extending over the whole width of the box. The backs of the box are made rounded, so as to bring the pulp around to the screen and prevent the accumulation of sand at the ends of the box. The upward splash of the pulp is restricted by means of flanges at the rounded ends, and by means of lips, above the screen and at the back of the box, respectively. All these arrangements are made for the purpose of hastening the passage of the pulp through the screen.

The screen is held in position in such a way as to be easily removed or replaced, and at the same time be kept tightly up to its seat. This is effected by four screws *P*, two at each side, which pass through extensions of the box. By arranging that their bent ends shall always point to the right, the jarring of the stamps tends to tighten the screws, instead of inducing them to work loose.

The linings of the box are made in such a way that they can be renewed in the least possible time. The linings of the back are fixed to the linings of the feed mouth, and are hung over the lip of the feed mouth, while their lower ends are fixed in position by a bar. The linings at the ends of the box are curved and are held tightly in position by this bar and by the screen flange and end dies.

It will be noticed also from the illustrations that the feed mouth is wider than usual, and that the outer lip is lower than the inner lip, in order to prevent choking of the mouth. Back splash from the box is checked by a flexible or jointed screen.



BREMNER'S MORTAR BOX FOR STAMP MILLS.

Vanadium Steel.

The noted French student of metallography, Léon Guillet (in *Le Genie Civil,* Oct. 21, 1905), concludes that vanadium exercises a beneficial effect upon the mechanical properties of metallurgical products. In normal steels it causes a very distinct increase in ultimate tensile strength, also raising the elastic limit. It has no apparent influence on ductility, nor on resistance to shock, but it improves hardness slightly.

In rapidly cooled steels, vanadium elevates both the elastic limit and the ultimate tensile strength. Its influence in this direction is almost as great as that of carbon, but, unlike carbon, it does not make all of its compounds fragile. It is particularly noticeable that alloys of iron carbide and vanadium are more sensitive to hot working and to mechanical treatment, than ordinary steels; this, however, does not seem to be the case with more complex alloys, notably nickel-vanadium steels.

Classification of Rocks.

The science of petrology has been greatly developed during the past twenty years by specialists working the world over. It has been advanced from its former position, as an interesting branch of mineralogy, to a system having an important bearing on applied geology and mining. It is a singular fact, however, that, while the field of the science has been largely extended, and methods of petrographical investigation have been brought to a high degree of perfection, no practical standards of nomenclature and classification have enjoyed universal recognition. It has been proposed that nomenclature should be based: (1) Primarily on structure; secondarily, on mineral composition. (2) That it should be based on mineral composition which corresponds with chemical composition and structure. (3) That it should be based primarily on mineral composition, and secondarily on chemical composition. (4) That it should be based on chemical composition. (5) That it should be based on mineralogical composition corresponding to chemical composition. (6) That it should be based on the collective relations of rocks, namely, the geological rôle, the mineral and chemical composition, and the structure.

These propositions have been developed into most interesting and ingenious schemes of classification by many competent authorities, but none of these

schemes commands universal acceptance. The scheme based on the collective relations of rocks, developed by Becker, Iddings, Cross, Pirsson and Washington, is one of the latest, and has been worked out with much logical detail. It arranges igneous rocks in five classes, based on the relative proportions (present in each class) of the two great mineral groups called "salic" and "femic"; the "salic" referring to silicious and aluminous minerals; the "femic" referring to the ferro-magnesian minerals. These groups are represented by five classes with arbitrary division lines. In two of the classes the salic minerals exceed in amount the femic; in two others the femic exceed the salic, while in the remaining class the two are in equal proportions, or nearly so. The class names are:

(1) Persalane: extremely salic;

$$\frac{\text{Sal.}}{\text{Fem.}} > \frac{7}{1}.$$

(2) Dosalane: dominantly salic;

$$\frac{\text{Sal}}{\text{Fem.}} < \frac{7}{1} > \frac{5}{3}.$$

(3) Salfemane: equally salic and femic;

$$\frac{\text{Sal}}{\text{Fem.}} < \frac{5}{3} > \frac{3}{5}.$$

(4) Dofemane: dominantly femic;

$$\frac{\text{Sal.}}{\text{Fem.}} < \frac{3}{5} > \frac{1}{7}.$$

(5) Perfemane: extremely femic;

$$\frac{\text{Sal.}}{\text{Fem.}} > \frac{1}{7}.$$

The sub-classes and minor divisions are founded on mineralogical ratios. This classification is chemico-mineralogical, and is based on a magma of an assumed standard of mineral composition. It is quite independent of actual magmatic crystallization. In addition to magmatic names, a further nomenclature is introduced to indicate the actual mineralogy and texture of the rocks. This system has recently been criticized by W. H. Twelvetrees (Government Geologist, Tasmania)[1], who considers the terminology repellent and uncouth; and while the system may be looked upon as an elaborate logical product, it is undoubtedly true that tradition and habit will continue our attachment for past and familiar modes of speech. The new scheme is more suitable for museum shelves than for the purposes of the practical scientist.

Mr. Twelvetrees prefers a modification of the old Rosenbusch classification, which he thinks provides well for geological needs. Roughly it is as follows:

A. Lime—Alkali Rocks.

1. The granite-rhyolite family.
2. The syenite-trachyte family.
3. The diorite-andesite family.
4. The quartz diorite-dacite family.
5. The gabbro-basalt family.
6. The peridotite-pikrite family.
7. The pyroxenite family.

B. Alkali Rocks.

1. The alkali granite-quartz keratophyre and pantellerite family.
2. The alkali syenite-keratophyre and alkali trachyte family.
3. The monzonite-latite family.
4. The elaeolite and leucite syenite-phonolite and leucitophyre family.
5. The essexite-trachydolerite family.
6. The theralite-tephrite family.
7. The ijolite-nepheline basalt family.
8. The missourite-leucite basalt family.

This system is, of course, far from being an ideal one. It may be claimed, however, that it does not introduce harsh sounding made-to-order names. It does not depend upon geological occurrences, age, and structure for its characteristics. Its families embrace the plutonics with their volcanic equivalents, and their accompanying dike rocks. Mineralogical composition is the basis; factors like occurrence and structure, forming useful subdivisions. It is simple, easily grasped, and its nomenclature is essentially expressive; qualities that are very desirable in a science of such practical utility as petrography.

[1] "Modern Petrology," by W. H. Twelvetrees, *Transactions* Austr. Assoc. Adv. of Science.

Blast-Furnace Capacity.

The American Iron & Steel Association has compiled and published a list of the blast-furnaces completed since the issue of its "Directory" in June, 1904. From this list the following table is compiled, the yearly capacity of the furnaces being given in long tons:

	Capacity.
Completed furnaces, June 1, 1904	28,114,000
New furnaces completed	1,982,000
Increased capacity of furnaces rebuilt	500,000
Total	30,596,000
Furnaces abandoned	461,000
Furnaces idle since June 1, 1904	1,500,000
Total deductions	1,961,000
Furnaces standing Nov. 1, 1905	28,635,000

In addition to this, 16 furnaces which were in course of erection on Nov. 1, 1905, will have a total annual capacity of 1,830,000 tons. Of these furnaces 3 stacks, with an anuual capacity of 315,000 tons, will probably be ready for blast in January, 1906; 2 stacks, with an annual capacity of 240,000 tons, will be ready in February; 2 stacks, with an annual capacity of 215,000 tons, will be ready in March; 1 stack, with an annual capacity of 145,000 tons, will be ready in April; 3 stacks, with an annual capacity of 450,000 tons, will be ready in June; and 5 stacks, with an annual capacity of 465,000 tons, will be ready in the summer or fall of 1906.

As the production of pig iron in this country in October was at the rate of almost 25,000,000 tons annually it will be seen that, if the capacity of the furnaces which have been idle since June 1, 1904, be omitted, over 87% of the available furnace capacity of the country on Nov. 1 was then in operation.

During November several furnaces which have been idle since June, 1904, have resumed work and repairs are now being made on a number of furnaces long idle which are expected to be ready for blast in December, January, and February. If to the capacity of these furnaces we add the capacity of the building furnaces which are to be ready for blast in January and February, 1906, it will be found that within the next 90 days, furnaces with an annual capacity of about 1,000,000 tons will probably be running.

The Zinc Industry of the Rocky Mountain Region.*

BY W. G. SWART.†

For many years the zinc industry of the Rocky Mountain region consisted almost wholly of efforts on the part of the miner to sort out or mill out, and throw away, enough zinc to bring his lead or copper ores below the penalty limit set by the silver-lead smelters. About eight years ago this was changed through the purchase by European zinc smelters of some Leadville ores for their zinc contents. This was followed by a shortage of ore supply in the Joplin district, coincident with an enormous increase in demand for spelter, forcing the American zinc smelters to turn to the West for an adequate ore supply. The Rocky Mountain States have so far not been able to furnish ores of as high a grade as Missouri, nor will they ever do so, save in exceptional, scattered instances. This has retarded the industry in these States far more than can be realized by the layman.

Among the common metals, the metallurgy of zinc is the least advanced, and requires the cleanest ores, unless iron furnaces be considered. A copper furnace can be successfully run on ore carrying 1% copper; a lead furnace on 5% lead; but a zinc furnace calls for at least 30% zinc, and 40 to 50% is much more apt to be profitable. Lead and copper furnaces are also built of great size, and charged like iron furnaces automatically in carload lots. The zinc retort still holds but a few hundred pounds and must be charged by hand with a shovel. The consumption of fuel is also from 8 to 20 times that of the lead or copper furnace. All these, and the further important factor that impure zinc ores produce low-grade metal or oxide, give the clean zinc ores a great advantage, and it is therefore not strange that the Joplin ores have always been standard, and have formed the basis of American spelter production, while the low-grade Western ores have remained untouched, or have been grudgingly shipped to the lead and copper smelters for their precious metal values, paying there the heavy zinc penalty with which we are all so familiar. From the standpoint of the lead and copper smelters this penalty has ample justifica-

*A paper read before the American Mining Congress, El Paso, Tex., Nov. 14-18, 1905.

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tion, for zinc is probably the most detrimental element in their furnace charge. It is perfectly safe to say that the average smelter manager would be as glad to eliminate zinc from his furnaces, as the miner would be to escape the penalty. It is also safe today to make the statement that these two objects are at last accomplished, and Western zinc ores of almost any composition can be successfully dressed and profitably marketed.

This is largely the result of the increased demand for spelter mentioned above, and the consequent effort on the part of the zinc smelters to keep up their output by modifying and adapting their methods to these lower-grade ores. This has taken time and money, and there have of course been disappointments and failures. Progress is shown by the fact that the first Western shipments carried a minimum of 45% zinc. Ores are now being regularly shipped assaying from 30 to 35% zinc.

Lead and iron are the impurities causing most trouble to the zinc smelter. Since these are the very metals that are most desirable for the lead or copper smelter, and zinc the least so, one says naturally "Separate them and sell each to its own smelter." It is along exactly these lines that the future of the Rocky Mountain industry lies. Most of the Western ores are complex sulphides, mixtures of galena, pyrite and blende, occurring in a variety of gangue rocks. In many instances hand sorting or simple concentration in jigs or on tables will give shipping products, but in the majority of cases some further or different treatment is necessary. This means that when, after trial, older and well-known processes fail to yield clean products, as they usually do, the newer methods must be utilized. Zinc blende has too nearly the specific gravity of many of its associated minerals to be successfully removed by jigs or tables, and such work must be supplemented or replaced.

There are several methods now offered to the miner for the accomplishment of this purpose. All these methods are comparatively new and mistakes will be easy and costly, hence the miner should understand thoroughly that the work of selecting and installing a plant for handling zinc ores belongs strictly to the experienced engineer. This cannot be too forcibly stated. No two zinc ores are exactly alike, and since it is not possible to adapt the ore to the process, the process must be adapted to the ore. This is work for an expert and success depends on its recognition.

In a non-technical paper of this length and character only a bare reference can be made to the several processes now used or proposed, and the technical literature of the day must be consulted for details by those interested. It seems advisable, however, to call attention briefly to the more prominent methods.

A number of chemical processes, based on leaching the ores both before and after roasting have been tried. Such processes are extremely attractive and are likely in the future to be entirely successful, but the fact remains that there is no such plant in commercial operation to-day in America, and work along these lines ought only to be attempted by strong companies having plenty of money for experiment.

In Australia successful commercial work has been done with what are known as "flotation processes," which depend for their operation on the selective lifting action of small bubbles of hydrogen gas on wet crushed ore. Experiments along these lines have also been conducted in America, but there is nothing commercial offered in this country as yet.

While these and other wet methods are full of promise for the future, the fact is before us that the only successful mills in operation in the Rocky Mountain region are those using magnetism or static electricity. There are at least twelve such mills in the West at present, with a daily capacity of about 430 tons. Half this tonnage may be taken as zinc concentrates, which may be assumed to average 45% zinc. The indications are that in another year this will be doubled.

I may be pardoned for dwelling on these facts, for I have spent the past six years working exclusively on this zinc-ore problem. As an engineer, I am perfectly free to admit my unvarying preference for wet work, but I cannot escape this fact that electricity is to-day making the Western output of zinc ore, and the separation is being done dry.

If put into the shape of high-grade concentrate, zinc ores are worth more per unit than are lead ores, but low-grade lead ores can be marketed and smelted directly, while zinc ores cannot; hence the stipulation "high grade," and the broad assertion now made that in almost every case zinc ores must be dressed before shipment. Not only is this necessary to raise the grade of the zinc product, but to produce at the same time a by-product as valuable as possible, carrying the gold, silver, lead and copper, so that they may not be lost, but made a source of profit.

As a general statement, it is safe to say that any zinc ore can today be handled successfully and many an old abandoned mine made to pay. There are, of course, exceptions, and the whole matter is so new that the statement made above will bear repeating, viz., if failure is to be avoided, an expert must be consulted.

In Missouri ores carrying 3 or 4% zinc, with no other values, are mined and milled at a profit. At present it will usually not pay to handle a Western ore carrying less than 10% zinc, provided there are no other recoverable values. One mine in Colorado is working a 7% zinc ore, but there is also recovered about $3 in gold, silver and lead.

Methods are daily improving. It is not too much to say that in three years ores carrying 5% zinc should be worked, in which the zinc will represent the sole profits, though not the sole value. Such ores are not being touched now, but we all know them to exist in large bodies, and as the knowledge of proper treatment spreads they will inevitably come into market.

The vital point in the whole matter is the recognition of the facts that since zinc is penalized at the lead and copper furnace, and lead, iron and copper are likewise treated at the zinc furnace, they must be separated and sold as cleaned products in the high market. Exceptions must be made here also, since the new zinc smelter at Pueblo buys mixed ores, and so do the Belgian furnaces; but it will be found that the prices offered are usually such as to make it profitable to the miner to separate his products before shipment. Even the smelters just mentioned prefer the high-grade material, and will pay accordingly for it. It is a fortunate thing for the miner that his gold and silver values usually follow the lead, copper and iron rather than the zinc, for the zinc smelters do not ordinarily recover values nor pay for them in low-grade ores.

Several things, aside from new processes, have contributed to the present activity and opportunity. The price of spelter has been uniformly high for some time, and bids fair to remain so as long as general financial conditions are good. Many of the European mines have been obliged to curtail production on account of decreased ore reserves, causing the European smelters to look abroad for ore supply. The Western railroads have been generous in the matter of lower freight rates on these zinc ores, reaping their reward in the building up of a promising new business.

It has been suggested that the opening of these large zinc deposits will lead to the establishment of zinc smelters in the West. This is, of course, possible, but there are certain considerations that must not be overlooked. Cheap labor, cheap transportation, and, above all, cheap fuel, are essential to zinc smelting. Unlike lead or copper smelting, it usually pays to haul zinc ores to the fuel rather than the fuel to the ores. If Western smelting can be made to pay, it will come in time; but it will not pay to wait for it, and meanwhile the miner should make the most of his opportunities and recognize the fact that in his heretofore troublesome zinc ores he has today a valuable asset.

As to the future, only a prophet dare speak, and my tongue is not that of a prophet. It is already known that this Rocky Mountain region contains enormous zinc deposits. A prominent mining engineer has estimated three million tons of zinky ore in Leadville alone, actually exposed; but it must not for a moment be supposed that all of this, or a tenth part

of it, can be thrown on the market for years to come. Other extensive deposits are already opened in Utah, Idaho, Montana, South Dakota, New Mexico and Arizona, but they are apt to be even slower in coming into the market. One thing is sure, however: The zinc industry of the Rocky Mountain region is today on a firm basis and is certain to expand and add increasing amounts to the world's tonnage as the years go by. This is certainly worthy the attention of every man interested in mining. Fortunes exist in these deposits, and a fortune in zinc counts just as many good gold dollars as a fortune in lead or copper.

Acidimetry.

In the *Zeitschrift für angewandte Chemie* (1905, No. 38, p. 1520), G. Lunge publishes an account of some very careful tests which he has made of some of the principal methods of standardizing acids for volumetric analysis.

He fully endorses the value of sodium oxalate for the standard substance, as recommended by Sörensen. He differs, however, from this author on some details of manipulation. According to Lunge, the use of the spirit lamp is unnecessary, provided the crucible is set in a perforated asbestos plate. This fully protects the material from the sulphur in the gas. For the indicator, Lunge recommends methyl orange as being much more convenient than phenolphthalein, and quite as accurate.

Lunge has also once more examined the standardization with sodium carbonate, prepared by careful ignition (as prescribed by him), at 270° C. He was unable to detect any sodium hydroxide; he concludes that the carbonate is in every way a satisfactory substance for standardization. The same cannot, however, be said with confidence of the bicarbonate, proposed by North and Blakey (*Jour. Soc. Chem. Ind.*, 1905, p. 396).

In one of the new galleries recently added to the Royal Museum at Brussels, is a skeleton of a prehistoric miner, discovered in the chalk hills of Obourg some years ago. The explorers came upon the remains of a very ancient tunnel, made evidently by searchers after the flints which are found in the chalk, and which were used for tools, spear heads and the like by the primitive inhabitants. At the end of the adit they found the skeleton of an early miner, who had, apparently, been buried alive by a fall of the chalk—showing that "falls of roof" were fatal accidents then, as they are now. The skeleton of this ancient Belgian miner has been arranged in the exact position in which he was found, with the chalk, the flints and his primitive tools around him.

Petroleum is reported in Tayabas province, Cebu, Philippine Islands, but no wells have yet been driven to prospect this field thoroughly.

The Hampton Water-Hoist.

In this JOURNAL (Sept. 30, 1905; p. 588) we published a description of the water-hoist in use by the Lackawanna company in the Keyser valley, near Scranton, Pa. The machinery for operating this device is not without interest; its large size and the heavy duty it is required to fulfill render it of importance mechanically, aside from its effect upon the economical operation of the workings. The mechanical details of the hoist and its automatic devices were designed and built by the Wellman-Seaver-Morgan Company, of Cleveland, Ohio, who guaranteed the machinery to accomplish the desired results. Most of the electrical controlling devices were furnished by the Electric Controller & Supply Company, Cleveland, Ohio. In the original specifications the Delaware, Lackawanna & Western Railroad Company called for the hoist to be operated by an alternating-current motor of 800 h. p., and the question of starting, stopping and reversing so large a motor had at the outset to be met. The duty to be performed by the hoist called for the raising of 4,000 gal. of water per min. to a height of 500 feet.

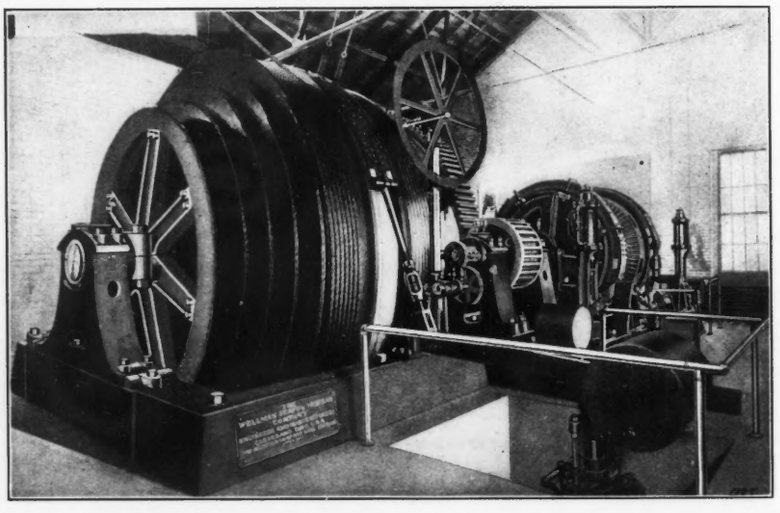

FIG. I. HAMPTON WATER HOIST.

The amount of starting current required for a large motor of this type is enormous, and would greatly interfere with the proper running of the power plant; on this account the motor was designed to run continuously in one direction, friction clutches being provided for controlling and reversing the load.

Fig. 1 and 2 show a front and side view of the hoist. The general arrangement consists of a motor driving a pair of bevel wheels through a single bevel pinion. The bevel wheels run loose on a shaft and are fitted with the Webster, Camp & Lane friction clutches. The operating mechanism for the clutches is so designed that only one clutch can be thrown in at a time, but both clutches can be out at the same time. Throwing in one clutch runs the drum in one direction; throwing in the other clutch reverses the motion of the drum.

To the shaft on which the bevel wheels run there is keyed a pinion meshing with the main gear on the drum shaft. The drums are of the cylindro-conical type, 10 ft. at the small diameter and 16 ft. at the large diameter. At a hoisting speed of 550 ft. per min., the drum makes about 15 r. p. m. There is one main brake located between the drums. All of the clutches and brakes are operated by auxiliary air cylinders fitted with oil cushions; the compressed air is furnished by a motor-driven air-compressor, and the necessary tanks are located near the hoist. The hoist is controlled by a mechanical device shown in Fig. 2. This consists mainly of a drum rotated by means of a friction drive from the motor through a sprocket chain. The drum shaft transmits its motion to a secondary shaft running at variable speed, which in turn operates a secondary stop. The main hoisting drum shaft operates a traveling nut, which is so located with respect to the controller drum that at either end of its travel it releases a stop and allows the controller drum to make a quarter turn; this movement, through suitable electrical connections, operates the solenoids on the clutch valve, releasing the clutch and the solenoid on the brake valve setting the brake; the further movement of the controlling drum is arrested by the secondary stop. This stop is released by the variable-speed shaft and its connections, which have been given a predetermined time movement corresponding to the interval for emptying the bucket. The further movement of the controlling drum releases the brake and throws in the reversing clutch, thus starting the hoist in the opposite direction, and also starting the traveling nut on the controlling mechanism in the opposite direction. At the end of the hoist the cycle of controlling movements is repeated, making the hoisting operation continuous and automatic.

The main brake is of the gravity type, and to be released the current must be on the selenoid operating the valve, so that air can be admitted to the underside of the brake piston. If for any reason either the supply of current or of air pressure is interrupted, the valve drops, and the weights on the brake lever set the brake.

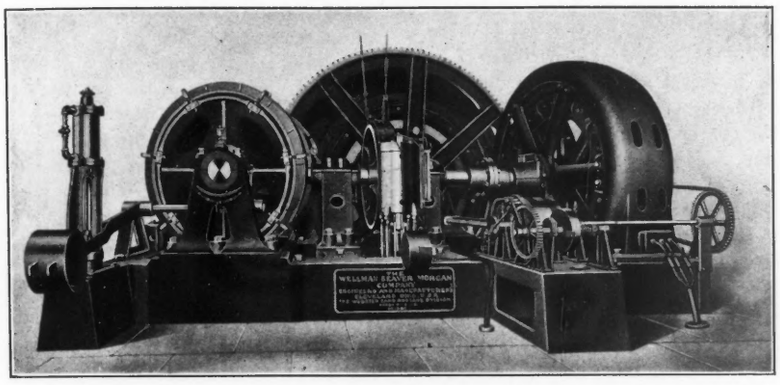

FIG. 2. HAMPTON WATER HOIST.

The clutches are designed so that they are thrown out by weights. As is the case with the brake, either clutch can be thrown in only when the current is on the solenoid, and the air pressure admitted under the piston; if either current or pressure fails, the clutch is off. The motor shaft is fitted with an emergency brake operated by a weight controlled by a solenoid; any interruption in the flow of current to the motor sets the brake and stops the motor. Any interruption of the flow of the current to the motor sets the brake and stops the machine, throws out the clutches and puts on the brake. A safety cut-out is provided for in the head frame, so that in case a bucket is carried beyond the proper height, the current is cut off.

Fig. 3 shows the head frame. It is 93 ft. from the base to the center of the sheave at the top, and is built of structural steel, roughly in the shape of the letter "A." From the head frame are suspended two buckets 6 ft. in diameter and 19 ft. 6 in. deep. The capacity of each bucket is 17 tons of water. In the bottom of the bucket are located two lift gates, with an area practically equal to the cross-section of the bucket. These gates are lifted automatically when the bucket reaches the top, and the water is discharged through the bottom into a spout fitted below the bucket, which deflects it to either side of the shaft.

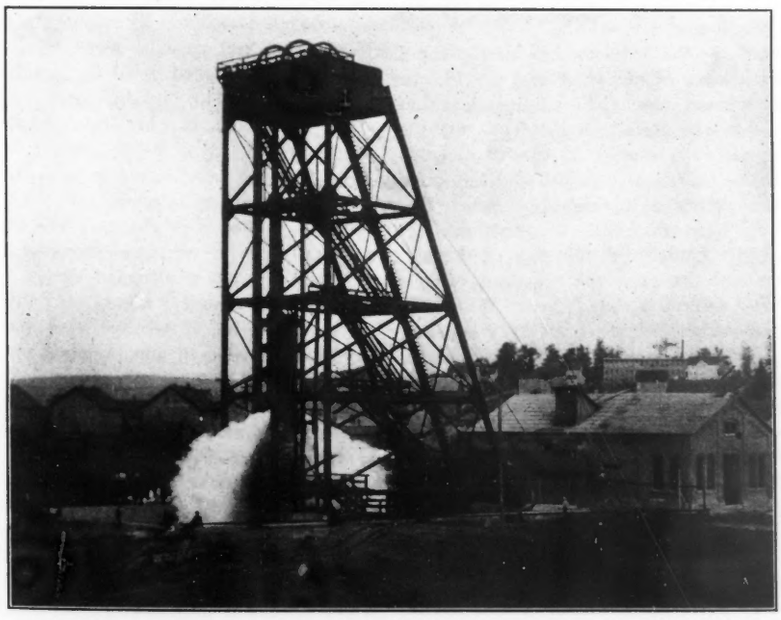

FIG. 3. HAMPTON WATER HOIST, HEAD FRAME.

Each bucket makes a round-trip in 1 min. 50 sec., the total lift being 555 feet.

In southeast New Mexico and some other places the surface over a considerable region is covered with a hard limestone float; on breaking open many pieces of this, globules of oil will be found.

The Savelsberg Process.

BY W. R. INGALLS.

There are in use at the present time three processes for the desulphurization of galena by the new method, which we have referred to as the "lime-roasting of galena." We have previously described the Huntington-Heberlein and the Carmichael-Bradford. The third process of this type, which in some respects is more remarkable than either of the others, is the invention of Adolf Savelsberg, director of the smeltery at Ramsbeck, Westphalia, Germany, which is owned by the Akt. Gesell. f. Bergbau, Blei. u. Zinkhüttenbetrieb zu Stolberg u. in Westphalen. The process is in use at the Ramsbeck and Stolberg lead smelteries of that company. It is described in American patent No. 755,598, issued March 22, 1904 (application filed Dec. 18, 1903). The process is well outlined in the words of the inventor in the specification of that patent:

"The desulphurizing of certain ores has been effected by blowing air through the ore in a chamber, with the object of doing away with the imperfect and costly process of roasting in ordinary furnaces; but hitherto it has not been possible satisfactorily to desulphurize lead ores in this manner, as if air be blown through raw lead ores in accordance with either of the processes used for treating copper ores, for example, the temperature rises so rapidly that the unroasted lead ore melts and the air can no longer act properly upon it, because by reason of this melting the surface of the ores is considerably decreased, the greater number of points or extent of surface which the raw ore originally presented to the action of the oxygen of the air blown through being lost, and, moreover, the further blowing of air through the molten mass of ore produces metallic lead and a plumbiferous slag (in which the lead oxide combines with the gangue) and also a large amount of light dust, consisting mainly of sublimated lead sulphide. Huntington and Heberlein have proposed to overcome these objections by adopting a middle course, consisting in roasting the ores with the addition of limestone for overcoming the ready fusibility of the ores, and then subjecting them to the action of the current of air in the chamber; but this process is not satisfactory, because it still requires the costly previous operation in a roasting furnace.

"My invention is based on the observation which I have made that if the lead ores to be desulphurized contain a sufficient quantity of limestone it is possible by observing certain precautions to dispense entirely with the previous roasting in a roasting-furnace, and to desulphurize the ores in one operation by blowing air through them. I have found that the addition of limestone renders the roasting of the lead ore unnecessary, because the limestone produces the following effects:

"The particles of limestone act mechani-

cally by separating the particles of lead ore from each other in such a way that premature agglomeration is prevented and the whole mass is loosened and rendered accessible to air; and, moreover, the limestone moderates the high reaction temperature resulting from the burning of the sulphur, so that the liquefaction of the galena, the sublimation of lead sulphide, and the separation of metallic lead are avoided. The moderation of the temperature of reaction is caused by the decomposition of the limestone into caustic lime and carbon dioxide, whereby a large amount of heat becomes latent. Further, the decomposition of the limestone causes chemical reactions, lime being formed, which at the moment of its formation is partly converted into sulphate of lime at the expense of the sulphur contained in the ore, and this sulphate of lime, when the scorification takes place, is transformed into calcium silicate by the silicic acid, the sulphuric acid produced thereby escaping. The limestone also largely contributes to the desulphurization of the ore, as it causes the production of sulphuric acid at the expense of the sulphur of the ore, which sulphuric acid is a powerful oxidizing agent. If, therefore, a mixture of raw lead ore and limestone (which mixture must, of course, contain a sufficient amount of silicic acid for forming silicates) be introduced into a chamber and a current of air be blown through the mixture, and at the same time the part of the mixture which is near the blast inlet be ignited, the combustion of the sulphur will give rise to very energetic reactions and sulphurous acid, sulphuric acid, lead oxide, sulphates and silicates are produced. The sulphurous acid and the carbon dioxide escape, while the sulphuric acid and sulphates act in their turn as oxidizing agents on the undecomposed galena. Part of the sulphates is decomposed by the silicic acid, thereby liberating sulphuric acid, which, as already stated, acts as an oxidizing agent. The remaining lead oxide combines finally with the gangue of the ore and the non-volatile constituents of the flux (the limestone) to form the required slag. These several reactions commence at the blast inlet at the bottom of the chamber and extend gradually toward the upper portion of the charge of ore and limestone. Liquefaction of the ores does not take place, for although a slag is formed it is at once solidified by the blowing in of the air, the passages formed thereby in the hardening slag allowing of the continued passage therethrough of the air. The final product is a silicate consisting of lead oxide, lime, silicic acid and other constituents of the ore, which now contains but little or no sulphur and constitutes a coherent solid mass, which, when broken into pieces, forms a material suitable to be smelted.

"The quantity of limestone required for the treatment of the lead ores varies according to the constitution of the ores. It should, however, amount generally to from 15 to 20%. As lead ores do not contain the necessary amount of limestone as a natural constituent, a considerable amount of limestone must be added to them, and this addition may be made either during the dressing of the ores or subsequently.

"For the satisfactory working of the process, the following precautions are to be observed: In order that the blowing in of the air may not cause particles of limestone to escape in the form of dust before the reaction begins, it is necessary to add to the charge before it is subjected to the action in the chamber a considerable amount of water—say 5% or more. This water prevents the escape of dust, and it also contributes considerably to the formation of sulphuric acid, which, by its oxidizing action, promotes the reaction, and, consequently, also the desulphurization. It is advisable, in conducting the operation, not to fill the chamber with the charge at once, but to first only partly fill it and add to the charge gradually while the chamber is at work, as by this means the reaction will take place more smoothly in the mass.

"It is advantageous to proceed as follows: The bottom part of a chamber of any suitable form is provided with a grate, on which is laid and ignited a mixture of fuel (coal, coke or the like) and pieces of limestone. By mixing the fuel with pieces of limestone the heating power of the fuel is reduced and the grate is protected, while at the same time premature melting of the lower part of the charge is prevented; or the grate may be first covered with a layer of limestone and the fuel be laid thereon, and then another layer of limestone be placed on the fuel. On the material thus placed in the chamber, a uniform charge of lead ore and limestone —say about 12 in. high—is placed, this having been moistened as previously explained. Under the influence of the air-blast and the heat, the reactions hereinbefore described take place. When the upper surface of the first layer becomes red-hot, a further charge is laid thereon, and further charges are gradually introduced as the surface of the preceding charge becomes red-hot, until the chamber is full. So long as charges are still introduced a blast of air of but low pressure is blown through; but when the chamber is filled a larger quantity of air at a higher pressure is blown through. The scorification process then takes place, a very powerful desulphurization having preceded it. During the scorification the desulphurization is completed.

"When the process is completed, the chamber is tilted and the desulphurized mass falls out and is broken into small pieces for smelting."

The accompanying drawing shows a side view of the apparatus used in connection with the process, which will be readily understood without special description. The dotted lines show the pot in its emptying position.

This process has now been in practical use at Ramsbeck for three years, where it is employed for the desulphurization of galena of high grade in lead, with which are mixed quartzose silver ore (or sand if no such ore be available), and calcareous and ferruginous fluxes. A typical charge is 100 parts of lead ore, 10 parts of quartzose silver ore, 10 parts of spathic iron ore, and 19 parts of limestone. A thorough mixture of the components is essential; after the mixture has been effected, the charge is thoroughly wetted with about 5% of water, which is conceived to play a three-fold function in the desulphurizing operation, namely: (1) preservation of the homogeneity of the mixture during the blowing; (2) reduction of temperature during the process; and (3) formation of sulphuric acid in the process, which promotes the desulphurization of the ore.

The moistened charge is conveyed to the converters, into which it is fed in thin layers. The converters are hemispherical cast-iron pots, supported by trunnions on a truck as shown in the accompanying engraving. Except for this method of support, which renders the pot movable, the arrangement is quite similar to that which is employed in the Huntington-Heberlein process. The pots which are now in use at Ramsbeck have capacity for about 8,000 kg. of charge, but it is the intention of the management to increase the capacity to 10,000 or 12,000 kg. Previously, pots of only 5,000 kg. capacity were employed. Such a pot weighed 1,300 kg., exclusive of the truck. The air blast was about 7 cu. m. (247.2 cu. ft.) per min., beginning at a pressure of 10 to 20 cm. of water (2¾ to 4½ oz.) and rising to 50 to 60 cm. (11½ to 13½ oz.) when the pot was completely filled with charge. The desulphurization of a charge is completed in 18 hours. A pot is attended by one man per shift of 12 hours; this is only the attention of the pot proper, the labor of conveying material to it and breaking up the desulphurized product being extra. One man per shift should be able to attend to two pots, which is the practice in the Huntington-Heberlein plants.

When the operation in the pot is completed, the latter is turned on its trunnions, until the charge slides out by gravity, which it does as a solid cake. This is caused to fall upon a vertical bar, which breaks it into large pieces. These are reduced to lumps of suitable size for the blast furnace by wedging and sledging. When the operation has been properly conducted the charge is reduced to about 2 to 3% sulphur. It is expected that the use of larger converters will show even more favorable results in this particular.

As in the Huntington-Heberlein and Carmichael-Bradford processes, one of the greatest advantages of the Savelsberg pro-

cess is the ability to effect a technically high degree of desulphurization with only a slight loss of lead and silver, which is of course due to the perfect control of the temperature in the process. The precise loss of lead has not yet been determined, but in the desulphurization of galenas containing 60 to 78% lead, the loss of lead is probably not more than 1%. There appears to be no loss of silver.

The process is applicable to a wide variety of lead-sulphide ores. The ore treated at Ramsbeck contains 60 to 78% lead and about 15% of sulphur, but ore from Broken Hill, New South Wales, containing 10% of zinc has also been treated. A zinc content up to 7 or 8% in the ore is no drawback, but ores carrying a higher percentage of zinc require a larger addition of silica and about 5% of iron ore in order to increase the fusibility of the charge. The charge ordinarily treated at Ramsbeck is made to contain about 11% of silica. The presence of pyrites in the ore is favorable to the desulphurization. Dolomite plays the same part in the process that limestone does, but is of course less desirable, in view of the subsequent smelting in the blast-furnace. The ore is best crushed to about 3 mm. size, but good results have been obtained with ore coarser in size than that. However, the proper size is somewhat dependent upon the character of the ore. The blast pressure required in the converter is also, of course, somewhat dependent upon the porosity of the charge. Fine slimes are worked up by mixture with coarser ore.

In making up the charge, the proportion of limestone is not varied much, but the proportions of silica and iron must be carefully modified to suit the ore. Certain kinds of ore have a tendency to remain pulverulent, or to retain balls of unsintered, powdered material. In such cases it is necessary to provide more fusible material in the charge, which is done by varying the proportions of silica and iron. The charge must be, moreover, prepared in such a manner that overheating, and consequently the troublesome fusion of raw galena, will be avoided.

The essential difference between the Huntington-Heberlein and Savelsberg processes is the use in the former of a partially desulphurized ore, mixed with lime and sulphate of lime; and the use in the latter of raw ore and carbonate of lime. It is claimed that the latter, which loses its carbon dioxide in the converter, necessarily plays a different chemical part from that of quicklime or gypsum. Irrespective of the reactions, however, the Savelsberg process has the great economic advantage of dispensing with the preliminary roasting of the Huntington-Heberlein process, wherefore it is cheaper both in first cost of plant and in operation.

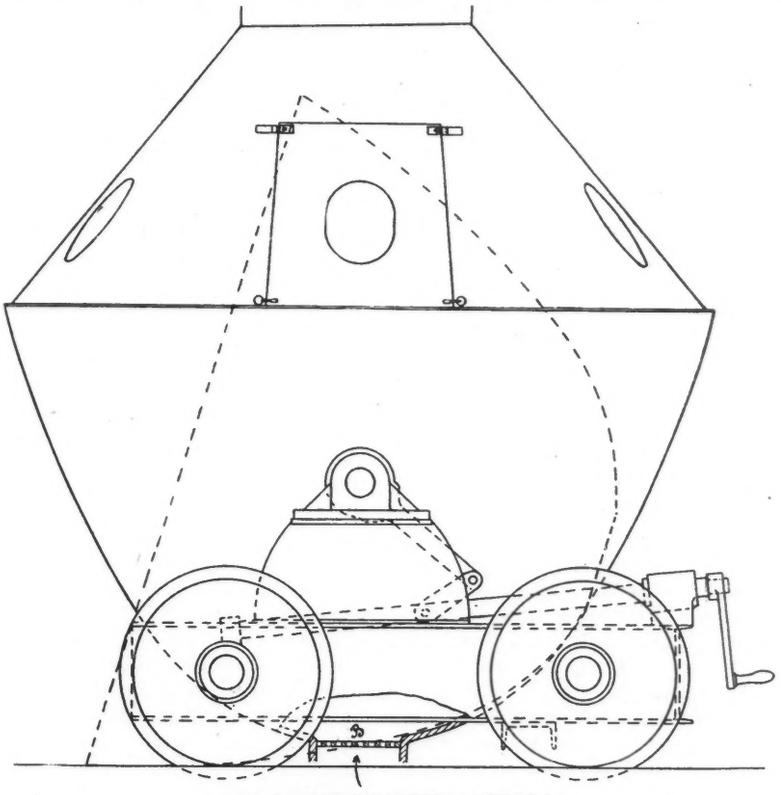

FIG. I. THE SAVELSBERG CONVERTER.

One of the first calculating machines was invented by the philosopher, Blaise Pascal, about the year 1642. It consisted of a series of wheels connected with one another and engraved with the figures 0 to 9. The carrying of tens was accomplished by hand, however; and the machine was found to be of little use in practice.

Uses of the Rare-Earths[1]—Part II.*

BY CHARLES BASKERVILLE.†

Alloys.—Small quantities of tantalum give to steel unusual hardness. An excessive percentage, while increasing the hardness, makes the metal brittle. Alloys of tantalum with boron, titanium, aluminum, etc., may be made of hardness approaching that of the diamond. The value of such alloys appears to be very great. At present the supply of metallic tantalum is so limited that the prices quoted are extremely high.

The history of many industrial applications of the principles of science has not seldom shown the development of a branch to a greater extent than the parent stem. So far this has not proved to be the case with the rare earths found with thorium and zirconium, although tons of these by-products have accumulated. They await the discovery of a commercial demand. The prices at which these rare materials are quoted in chemical catalogues and trade-journals are purely provisional and need not deter one inclined to exercise his ingenuity along these lines.[1] When the demand is created, it will be met as in the case of thorium. That many have already busied themselves with the problem appears from what follows.[2]

Therapeutic.—Attention was attracted comparatively early to the physiological properties of cerium salts and their applicability for medical purposes. Thus the eminent gynecologist, Simpson, in the early seventies of the last century, recommended cerium oxalate as an efficacious remedy for *Vomitus Gravidarium.* Although in succeeding years opinions differed widely as to the value of this preparation, it was nevertheless incorporated into the pharmacopœia of various countries. *Cerium oxalicum medicinale* contains, besides cerium, considerable quantities of other rare elements.[3] Subsequently the therapeutic application of cerium oxalate was extended to the treatment of sea-sickness, epilepsy, headache, etc. Several other cerium salts were introduced for medical purposes together with the oxalate. Thus Mackay recommends the use of cerium-ammonium citrate. Cerium hypophosphite is said to be applicable to phthisis.

According to the researches of Wasilief and Bokorny, the cerium salts possess poisonous properties. Drossbach, who conducted similar experiments on the salts

*Continued from this JOURNAL, Nov. 25, 1905, p. 964.

†Professor of chemistry, College of the City of New York, New York.

[1] A. B. Frenzel, of Denver, has offered a prize of $250, through the "Electro-Chemical Industry," for the best process for the treatment of the rare-earth minerals.

[2] Anton Waegner has written an interesting monograph entitled "Uber die technische Veraenderung der seltenen Erden," *Die Chem. Ind.*, XVII, No. 12 (1904).

[3] Apparently the "British Pharmacopoeia," 1898, intended to recommend the commercial cerium oxalate and not a pure preparation, for it states: "It usually contains some lanthanum and didymium oxalates."

of other rare elements, observed the bacteriacidal effect of such preparations. A practical process mentioned by the latter, for the preservation and disinfection of decaying substances, calls attention to the use of diluted solutions of lanthanum, yttrium, erbium, and ytterbium salts.

According to later investigations conducted by J. Schmidt, the use of *didymium chloridum,* $DiCl_3 (H_2O)_6$ as an antiseptic in veterinary medicine gave unsatisfactory results. Among the various rare earth antiseptics that have been suggested, may be mentioned the nitrates of cerium, lanthanum, "didymium," the compound salts of cerium with bismuth, cerium oxalate and salicylate (as a sprinkling disinfectant), and the disulphates.

Rare-earth preparations have not been sufficiently tried in medicine to warrant their adoption as yet. Systematic investigations on the physiological action of these substances, assisted by the writer, are under way at the laboratories of the Medical College of Cornell University, and of Physicians and Surgeons of Columbia University.

An American patent was recently granted Armand Muller-Jacobs for the use of zirconium nitrate for the preservation of food, etc. "The substance is immersed in a suitable concentrated solution of a zirconium compound capable of emanating radio-active rays." As zirconium compounds emit no radio-active rays, that have been recognized as yet, the preservative action is doubtless due to something else.

In this connection it should be explained that no statements are given in this article as to the use of radio-active preparations in medicine, which include thorium, as that subject has been dealt with in detail by the writer elsewhere.[4]

Pigments.—The oxides of certain of the rare earths are characterized by colors, hence repeated proposals have been made for their use as pigments. For instance Strohecker suggested the use of the cerium oxides (obtained by him from the Hainstädt cerite clays) for painting purposes. According to Müller, the cerium colors of Strohecker proved to be mixtures of iron oxide, lime, clay, etc. A process for making rust-proof colors by means of peroxides of cerium earths is due to Kosmann. According to the patent the peroxides of the cerium earths must be ground, singly or in mixtures, with linseed-oil varnish, with the addition of a siccative. The register of patents also contains a process, of the Rummelsberg chemical factory, of Berlin, for the production of colors from rare earths. According to this process, the dark-brown powder obtained from the glowing of præseodymium salts of volatile acids (præseodymium peroxide) yields an earth color of excellent covering and durability.

The application of pure præseodymium compounds as pigments is now out of the question on account of the expense. It is possible that mixtures of the oxides, which are readily obtained as by-products in the treatment of various minerals, monazite for example, may be used. It remains to be determined, however, whether these bodies possess sufficiently unique and durable tints to warrant the cost. The colors of the mixed oxides vary from a cream to reddish-brown and even black (0.5 to 1% of præseodymium peroxide for the latter two), according to the presence and amount of præseodymium.

Dycing.—A number of propositions have been made looking to the application of the peroxides of the rare metals in the textile industry. In 1898 a process was submitted to the *Societé Industrielle de Mullhouse* in a prize essay. According to Kosmann, colors are produced by simply boiling the web with solutions of cerium salts, and then treating it with an ammoniacal hydrogen-peroxide solution. Thus yellow and orange are produced from cerium, straw-yellow from lanthanum and "didymium" salts, and some doubtful brown colorations also. Kosmann also describes in this essay some special methods for the modification of the colors obtained by means of salts of the heavy metals, tannic acid, etc. According to the experiments of Brylinske, and of Wägner and Müller, the yellow shade produced by oxidized cerium compounds is of poor appearance, and deficient in fastness from soaping. The latter also investigated the mordanting effect on wood of quite pure cerous, ceric, "didymium," and lanthanum salts toward alizarin dyestuffs.

Barnes, in extending his work on the use of titanium oxide as a mordant for wool, noted that zirconium oxide with alizarin produced a color very much like one produced by chromium. According to him, cerium does not appear capable of yielding a mordant of wool. When wool is boiled in a solution of a cerium salt it does not take on any color in the dyebath. He produced colors on cotton with a cerium mordant, but they were quite worthless, being readily destroyed by weak acids.

Mordants.—Otto Witt gave the first detailed directions for the use of the rare earths as mordants. His researches were confined to the use of cerium sodium nitrate. The color was developed by steam. The cerium mordants were also investigated by Matschak and Scheurer; Brylinske, also, studied yttrium salts. Gandourine considered the sulphates of "yttrium, lanthanum, erbium, cerium and didymium."

Kruis, Böttger and Bühring have maintained that cerium disulphate is an excellent developer of aniline black. Witt, on the contrary, states that the double nitrate of cerium has no effect on the production of aniline blacks. He attributed the effect to impurities, possibly vanadium. According to him, the colors produced on the material, mordanted and passed through boiling soda solution, are tolerably fast to soap. The shades given were intermediate between those given by chromium and iron mordants.

Baskerville and Foust used the sulphates, acetates, and hydroxides of lanthanum, neodymium, and præseodymium. Their summary may be quoted. Although there is mordanting, the colors "produced were not of a bright shade, and not always very fast to washing. The rare earths can have little practical application as mordants, for the following reasons: (1) because they do not possess the mordanting action to a degree which would allow competition with known mordants; (2) because the supply is somewhat limited, and would not admit of extended use; (3) their cost, which, even in the event of the first and second considerations being favorable, would bar their practical use extensively."

Glass Coloring.—Schott and Glinzer, in Jena, succeeded in introducing oxides of cerium, "didymium," and erbium into molten glass, in quantities of over 10%. Zsigmondy examined, with reference to thermal conductivity, a glass in which the calcium oxide was partly replaced by cerium and "didymium" oxides. Its thermal conductivity equaled that of lime glass. Witt obtained yellow-colored glass, resistant to heat, by additions of 1 to 3% of cerium oxide. "Didymium," neodymium, and erbium oxides color molten glass red to violet; præseodymium, from yellow to yellowish green. The glasses gain no practical value through this coloring, but they offer a certain scientific interest, inasmuch as they afford a convenient means for observing the absorption spectra of the respective earths with which they are colored.

On the coloring properties of the oxides of neodymium and erbium is based a process, by Drossbach, for decolorizing glass. If we add to the molten glass a salt of neodymium or erbium, the rose-red coloration produced by these ingredients removes from the glass its usual bluish-green tint.

Fireproofing.—Nernst has recently indicated a possibility of applying a number of the rare earths for the production of fireproof utensils and vessels.

Catalytics.—Imray secured an English patent for the use of oxygen compounds of the rare earths as a contact material, with or without the addition of platinum, for the production of sulphur trioxide. Baskerville and Davis independently discovered this also. The best process so far made known appears to be that of Hölbling and Ditz, who make use of the residue resulting from the manufacture of thorium salts, as a contact substance

[4] "Radium and Radio-Active Substances," with especial reference to their application in medicine, Williams, Brown & Earle, Philadelphia, Pa.

for the production of sulphuric acid and its anhydrides. A certain definite proportion of didymium sulphates is required, according to later reports, for securing a maximum yield.

Ditz and Margosches passed hydrochloric-acid gas over a heated contact-mass consisting of a number of chlorides of the rare earths. Under favorable conditions (at a temperature of from 350° to 450° C.) about 75 to 90% of the hydrochloric acid is said to be decomposed with the liberation of chlorine.

Electric Batteries.—The construction of a storage battery, devised by Welsbach, depends upon the electromotive behavior of the cerium oxides. The electromotive force of a reversible battery (consisting of zinc amalgam, zinc sulphate, cerous-ceric sulphate, carbon) is said to exceed that of the lead accumulator; although it is doubtful if this cell can compete with the lead cell in its results. The cerium-zinc-sulphate electrolyte, which may be regenerated, can be used advantageously as a substitute for the chromic-acid solution in the immersion battery. According to Bauer and Glaessner there is no hope of practically producing cells from aqueous solutions of cerium salts. This does not, however, preclude the use of cerium oxides as catalyzors in cells with fused electrolytes.

Reagents.—Recently Foerster called attention to the use of cerium sulphate as a technical oxidizing agent for chemical preparations. Meister, Lucius and Brüning have patented the use of cerium compounds as oxidizing agents for aromatic hydrocarbons. By means of the dioxide, toluene has been converted into benzaldehyde. Anthracene, by means of ceric sulphate, is converted into anthraquinone; naphthalene, into naphthoquinone and phthalic acid. Muthmann and Most used cerium salts for electrolytic oxidation in preparing organic compounds.

Photography.—Lumière and Seyemitz found ceric sulphate an excellent oxidizing agent in reducing photographic reproductions. When acidified with sulphuric acid, ceric sulphate keeps indefinitely, and acts uniformly upon the plate without causing striæ or fogging.

The Lumière brothers proposed another application of the cerium salts to the photographic art, based on their sensitiveness to light. Thus if a paper, wet with cerium nitrate or cerium sulphate, be exposed to light, a reduction from ceric salts to cerous salts takes placé on the illuminated portions of the paper. If this copy be developed with certain substances of the aromatic group (viz., phenol, amido-benzoic acid, etc.), vividly colored pictures are obtained. According to later discoveries, the sensitiveness (to light) of paper prepared with cerium salts far exceeds that of paper prepared with salts of iron or manganese.

General.—In recent years Muthmann, Hofer, and Weiss and Stockem have investigated exhaustively the utilization of the metals of the rare earths. The metals were obtained by electrolyzing fused chlorides in copper crucibles, water-jacketed, with carbon electrodes. The cerium thus obtained gives brilliant sparks when scratched with steel. The pyrophoric bodies thus produced, as well as those alloys of Welsbach, which possess a similar property, have so far not been put to any extensive use that is well known. However, Escales has secured a patent for the production of lighting masses, based upon the reduction by means of magnesium and aluminum. He, also, patented a process for obtaining metalloids or alloys of the rare earths, which are said to possess even greater reducing powers than aluminum itself.

Siemens and Halske secured patents for the production of electrically incandescent bodies from the rare earths. Sander produced on conductors of the second class metallic films or crusts. This was accomplished by the reduction of the oxides or other compounds of the rare earths by means of potassium, sodium, or magnesium in a vacuum, or in the atmosphere of an indifferent gas.

Stewart and Hasting secured a number of United States patents for making a plastic mineral composition, which included the rare elements.

Investigators in the rare-earth field have been most anxious to secure more satisfactory reagents to be used, not only for the detection, but also for the separation of this "nebula of elemental matter," as Crookes once named the yttria earths. A recounting of the numerous researches along these lines is beyond the scope of this article. A limited number of reactions have been observed with cerium which are of a contrariwise service. The result is cerium and its compounds now serve to a degree as reagents in analytical chemistry; as such they have a value, like arsenic, osmic, molybdic and tungstic acids. The other rare earths so far have given results which exclude their consideration in this respect.

Sonnenschein (whose announcements were verified by Djuberg), found cerium dioxide to be an excellent reagent for the qualitative detection of strychnine and other alkaloids. A solution of a minute quantity of cerium dioxide in concentrated sulphuric acid is colored intensely blue by the slightest particle of strychnine. Other colors are produced by other alkaloids. According to Plugge the reverse of this reaction is an excellent test for cerium.

Boussingault suggested that cerium phosphate, which is insoluble in nitric acid, be used for the quantitative separation of phosphorus in iron and steel. The method has not been applied practically with success.

Sonnenschein also recommended the substitution of ceric solutions for potassium permanganate in volumetric analysis. In this connection, Job says that the strong oxidizing action of these solutions is more effective in certain cases than the permanganate.

At present the pages of the purely scientific chemical journals contain more contributions to our knowledge of these rare earths than at any time in the history of chemistry. This promises the knowledge which brings utility.

Tin in West Australia.

Tin ore has been mined for several years past on the Greenbushes and Pilbarra mining fields, West Australia, the output of these fields being about 200 tons of tin per annum. Some recent discoveries of tin in the Wodgina district are attracting attention, and it is possible that within the next few years, West Australia will become an important tin producer. A. G. Maitland, Government Geologist,[1] describes this as follows:

The Wodgina tinfield is situated on the headwaters of the western branch of the Turner river and within the limits of the Pilbarra goldfield, about 74 miles from Port Headland. Geologically, the field consists of a series of sedimentary and bedded igneous rocks, skirting an extensive granite mass, which occupies a very large area of country. These sedimentary beds are very much faulted, and have a prevailing dip to the west; they occupy a very rugged range, which rises to considerable altitudes above the level of the surrounding plains. The sedimentary rocks are pierced by granite and pegmatite veins (in reality offshoots from the mass previously described), which invariably form the matrices of the tin ores. Wherever the pegmatic veins have been opened up, it is invariably found that the tin occurs on either wall of the vein as a band (of more or less width), consisting of mica and tourmaline in varying proportions, though in one case the occurrence of tin ore in the vein itself was noticed. The bed of the ravines and the slopes on the hillsides carry detrital and residual tin and tantalite everywhere over the whole area occupied by the granite and pegmatite veins. A careful inspection of the surface shows that the tin lodes are numerous, and occupy a considerable area of country; it remains to be proved, however, whether they can be profitably mined, for operations have yet hardly gone beyond the most rudimentary prospecting stages.

In the Pennsylvania oilfields, where the separate strata have a remarkable persistency of identity, many that are oil-bearing at 1,000 ft. or more depth can be identified miles away, where they crop out on the surface; but no oil stains can be detected in such surface rocks except where erosion has actually cut into the oil horizon.

[1] "Report on the Wodgina Tinfield," Mines Department, Perth, West. Aus., 1905.

Mining in India.

During the year 1904, the average number of persons working in and about mines regulated by the Indian Mines Act was 107,382, of whom 71,510 worked underground and 35,872 on the surface. Of these, 70,320 were adult males, 31,828 adult females, and 5,234 children under 12 years of age. Compared with the preceding year, an increase of over 4% (5,187 workers) is shown. Apart from definite figures, there is ample evidence that the demand for labor at coal (and some other) mines is increasing, and that Indians are more willing to work underground. The only reduction is in the number of persons employed in the manganese mines. Proper weight cannot be given to the fluctuations in the number of persons working until mining becomes recognized as the permanent occupation of a larger class of labor, and until more reliance can be placed upon the accuracy of the returns from which the figures are collated. At present, many East Indians who work in the mines do so only casually, as when a slackness in agriculture or other caste occupation gives them leisure. Some of the persons employed at a Bengal colliery live 30 miles from the pit. They walk the distance, through a rough jungle, stay at the colliery for six or seven days, and then return home for a week's rest. Others live from 10 to 15 miles away, and come irregularly to the mine; they stay there for 24 hours, of which they will spend 18 underground, working a double shift. The table (given herewith) is a summary of the mines (regulated by the Indian Mines Act) during 1904:

Province.	Average number working daily in and about mines producing:			
	Coal.	Manganese.	Limestone.	Total including workers of other minerals.
Bengal	75,749	—	—	83,296
Central Provinces	1,803	2,010	1,917	5,839
Madras	—	1,980	—	8,798
Assam	1,339	—	—	1,339
Baluchistan	1,072	—	—	1,072
Panjab	1,945	—	45	3,526
Burma	94	—	—	2,732
Bombay	—	125	—	780
Total, 1904	82,002	4,115	1,962	107,382
Total preceding year	79,561	6,942	1,884	102,195
Difference	+2,441	-2,827	+78	+5,187

Accidents.—During 1904, at mines regulated by the Indian Mines Regulation Act of 1901, there were 60 separate fatal accidents, involving the loss of 73 lives. Compared with the average of the preceding three years, this is a decrease of 10 in the number of accidents and a decrease of 12 in the number of deaths. Of the persons killed, 61 were males and 12 were females. There were 14 surface accidents; 24 were caused by falls, and two by explosion of fire-damp. In coal mines there were 49 accidents and 55 deaths, the percentages being 0.77 below ground, 0.45 above ground, and 0.67 below and above ground. The death rates for coal mines, at first sight, compare favorably with the death rates of these mines in other countries. For instance, the death rate per 1,000 persons employed below ground in English coal mines for the ten years ending December 31, 1903, averaged 1.47; the conclusion drawn from this might be that the English coal miner runs twice as much risk as his Indian brother. But the figures may be misleading, unless allowance is made for sources of error. The death rate of persons working below ground per 1,000,000 tons raised was 7.27, the average English rate for ten years being 4.15. This death rate varies with the hardness of coal and with other difficulties, as well as with the efficiency of the miner. However, it must be conceded that at present the natural conditions (which obtain at the majority of Indian coal mines) would encourage an expectancy of a low death rate. Fire-damp is uncommon; no deep coal is being worked; the roof of most of the seams is strong sandstone; the joints, slips and smooth partings in the roof and coal are few; and sudden crushes (which cause so many accidents in England) are uncommon in India. But there appears, in many cases, to be a lamentable neglect of discipline, of reasonable elementary precautions and of efficient supervision. Unless there is improvement in these respects, very serious disasters are inevitable when the mines become deeper, larger and are worked at a greater pressure.

A New French Coalfield.

The new development which is now engaging the attention of French engineers is the result of recent borings in French Lorraine, in which locality an extension of the Saar (German) coalfield has been definitely proved to exist.

The Saar coalfield has in itself only a small exposure, but an unknown prolongation toward the southwest beneath newer strata. Moreover, the limits of practical coal mining are abruptly reached along a line of fault (a boundary fault), which appears to extend from near Saarbrücken to the Moselle river at its confluence with the Meurthe. The question of the extension of the coal measures, beneath the newer strata to the northwest of this fault, was first considered in the early part of last century. Little progress was made, however, until quite recently, when the International Boring Syndicate (which had already been operating with great success upon the banks of the Rhine) turned its attention to the district.

By the mining laws of Alsace-Lorraine, each discovery of a bedded mineral deposit by boring, entitles the discoverer to a concession of 219 hectares (500 acres). Up to 1901 this company had put down seventeen borings, and had proved coal in fifteen. All these are now in German territory, and will ultimately more than double the productive area of the Saar coalfield.

Naturally, operations of this magnitude in Germany attracted attention across the French frontier. Indeed, the French were actually forced, by commercial necessity, to prospect for coal on their side of the line. In 1903 the Société de l'Industrie Minérale considered boring in French soil. Prominent mining engineers recommended Eply, near Pont-à-Mousson, as a promising site; a borehole was actually begun in 1904, and entered Carboniferous rocks at a depth of 680 m. Unfortunately, an accident at 759 m. left it doubtful whether this boring was in the comparatively barren Ottweiler beds (which lie on the top of the Saar coal-bearing series), or whether it was near the richer Westphalian series, with its seams of gas coal and valuable coking coal.

A seam has quite recently been reached at Abaucourt, which promises to throw light upon this question. It seems practically certain that between Pont-à-Mousson and the Meurthe confluence, the Saar coking coals will be found at an accessible depth between the Jurassic rocks by which they are covered. It is all the more an important discovery, for the district in question is part of the valuable Minette iron-ore district.

France already produces about two-thirds of her requirements. An addition to her coal resources (of the magnitude promised by the discoveries alluded to above) would render her independent of imported fuel.

Diamonds in New York.

The close resemblance between the peridotite dikes in many parts of the State of New York, and those in the Transvaal and Orange River colonies, South Africa, has often been remarked. Recently Dr. Daniel S. Martin has examined some of the most prominent dike rocks in New York[1]; he found that, while the material composing them is practically identical with that in the South African peridotites, yet in New York the diamond is conspicuous by its absence. The only gems hitherto known for certain to accompany the New York peridotites are pyrope, olivine, and topaz. It has been reported that diamonds have been found in the drift deposits south of Syracuse, N. Y. The owner of a sand bed near that city claims to have found in the alluvion a good-sized diamond which he sold for $250. Topaz occurs in the drift; and it is believed the gem above referred to was an exceptionally brilliant topaz. It may be said, however, that the formation at Syracuse is likely to be diamondiferous, and it is possible that systematic prospecting operations would result in the discovery of genuine diamonds.

[1] "Peridotite Dikes of New York," Onondaga Academy of Science, New York, Oct. 24, 1905.

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CONTENTS.

DEPARTMENTS.

THE EXPLOSION in the Wyoming coal mine, described in our news columns, appears—from such accounts as have been received—to have been a dust explosion, caused by a blown-out shot. The mine, we believe, is not a gaseous or fiery one; but the nature of the coal makes it a dusty mine. Carelessness in placing a shot, and the probable absence of precautions against dust seem to have been the direct causes of this accident.

The Welsbach Light.

Since the English Welsbach company was reorganized three years ago, and its finances placed on a business-like footing, the progress of the Welsbach light has been remarkable. The city of London has just discarded the electric light for street lighting, and has substituted high-pressure Welsbach lights; and the same change has been made at some of the large railway stations. These changes have not been effected by "pulls," but are solely due to the saving in cost and the absence of hard shadows. It is interesting to note also that the South London Gas Company is negotiating for the purchase of monazite deposits, so as to render itself independent of the ring, as it intends to supply mantles as well as gas. Altogether, the outlook for the monazite business in England is encouraging.

Improvements in Anthracite Mines.

More new work is in progress now in the anthracite coal country than in many years past. Not only are many improvements being made in existing mines—new shafts, hoists, breakers and machinery—but some new collieries are being opened, and some old ones re-opened after being abandoned for years. This is especially the case in the center and the upper end of the Wyoming district of the anthracite region; though there is also new work going on in the older Lehigh district. In another year or so, the output of anthracite coal can be considerably increased, if it is needed.

The re-opening of some abandoned collieries at a profit is made possible by more systematic methods of mining, by the use of electric power, and above all by the closer sizing and marketing of coal as now practiced. In other words, about 30 per cent. of the screened coal, which was formerly wasted, is now used, and even the remaining culm is beginning to be utilized in generating electricity.

One of the results of these improvements is the gradual passing of the breaker-boy, who has been by turns a picturesque and a lamentable figure in all descriptions of the anthracite mines. He is being superseded by the use of the mechanical slate-pickers—labor-saving devices which have been described in this JOURNAL, and which form a feature of all the new breakers. Their general introduction will be hastened in some degree by the new child labor law of Pennsylvania. The total transfer of the work of slate picking from the breaker-boy to the machine, however, will furnish no cause for regret.

Ontario Mineral Property.

The question of mining leases and the tenure of mining property in Ontario is being very actively discussed at the present time, and the Provincial Government has submitted the case to the people in different mining districts. Final consideration will be given by a general convention which is to meet shortly in Toronto. Of course, impetus has been given to the discussion by the recent discoveries in the Cobalt district, and other parts of northern Ontario; but it has long been a question of importance. The main point, which the Government is seeking to find and adjust, is the adoption of some system which, while liberal to the prospector, will prevent the tying up of mineral land in the future, as has been the case under the system prevailing in the past. It is a difficult point, and will require careful consideration and discussion.

The Chicago Coal Conference.

The recent conference of coal operators in Chicago, about which much has been said, was hardly a success. The object was the formation, through the various State and local associations, of a central representative organization, which would meet the coal miners and negotiate with them, when the time comes to arrange a new mining contract. The intention was that this central body should formulate the demands of the operators, and be empowered to negotiate with the United Mine Workers—representing the operators in convention, just as the union represents the miners.

The conference appointed a committee to organize such an association or committee. It cannot be considered a success, however, since Western Pennsylvania and

a large part of Ohio were not represented at all; while West Virginia sent only a delegate to watch the proceedings, without power to join in any positive action. The new association therefore, will represent only the coal operators of Illinois, Indiana, a small part of Ohio, Kansas, Iowa and the Southwest; these are producers of not more than one-third of the coal mined under the Inter-State Agreement, which expires next year. Pennsylvania and Ohio will act independently at the coming joint convention; while West Virginia has never been organized, nor come fairly under the agreement at all.

The result seems to be that the central districts, in which under the present agreement the mining rates are on the screened-coal basis, are not prepared to help the Illinois and Indiana operators to secure the same basis, instead of paying on run-of-mine coal, as they now do. It is generally believed that the Illinois operators want to make this change in the new agreement. They recognize the mistake made in accepting the run-of-mine basis when the present agreement was made, and the great difficulty they will have in forcing a change now. In this, apparently, they are to have no help from the operators to the east of them, who evidently consider the advantages they now have in competition for trade of more immediate importance than the presentation of a united front to the miners. Quite possibly they are right from their point of view; but their action will give the miners a certain advantage, which their leaders will surely see and take.

Silver.

Silver has reached a high price this week—65⅝ cents in New York, and 30 5-16 pence in London. This is the highest level since 1896, when the price almost touched 32 pence in London. Since then it has only once passed 30 pence; this was in 1900. The present rise does not appear to be at all a speculative one, but is based on commercial reasons. One of these is the large demand in the East. For nine months of the present year the shipments to India from London showed a decrease; but recently there has been heavy buying of the metal for that country, both on government account for coinage, and on private account. India has had a prosperous year, and that always increases the demand. There has also been an increase in the shipments to China, which has more than offset the small takings of silver by the Straits Settlements since the change of currency there. Besides this there has been a movement to the East which does not appear directly in the published returns. Early in the year Russia was a heavy buyer of silver in the London market. Most of this doubtless found its way to Manchuria and into China. Japan, which had been out of the silver market for several years, also made some purchases, which probably had the same ultimate destination.

Besides this demand from the East, the call for silver for use in the arts has been large. Good authorities state that the sales to manufacturers and the probable consumption have reached unusual dimensions. This is the result of general trade activity and prosperity. Silver keeps its hold as a favorite metal for household use and decoration; when times are good and money plentiful, it is bought freely in its various manufactured forms.

These causes combined, and the fact that there has been no considerable increase in production, have advanced the price. It is probable, therefore, that there will be no large decline for some time.

Mexican Dynamite Monopoly.

This topic is, unfortunately, no novelty in the columns of this JOURNAL. The continued scarcity of dynamite in Mexico is causing mining men much trouble, and the failure of the Mexican National Explosives Company to keep its promises, in regard to ample supplies of explosives, is severely censured. It will be remembered that the company last year obtained a concession for the monopoly of the explosive-making industries in Mexico; this was fortified by fiscal barriers in its favor. Factories were erected for the manufacture of fuse, caps, detonators, dynamite, and for the explosives which were expected to be capable of meeting the ordinary demands of the mining industries; but the output has been kept down by serious accidents on three different occasions. Although promises were made that explosives would be imported to augment the output of the company's works to supply needs of mining men, yet the company found it more favorable to its own interests to have a sharp demand for dynamite; it advanced the rates, and miners all over the Republic are now complaining of the difficulty experienced in obtaining sufficient explosives to meet the urgent requirements in the mines, even when offering very high rates. Discontent with this condition of things is widely prevalent, and steps are being taken to petition the Government to terminate the monopoly.

As was anticipated, this concession is developing abuses similar to those which the South African dynamite monopoly occasioned in the Transvaal.

Article 28, in the Mexican constitution, specifically states: "There shall be no monopolies nor privileged places of any kind; nor prohibitions with titles of protection to industry. Those only shall be excepted which relate to the coining of money, to the post offices, and the privileges which, for a limited time, the law may concede to inventors or perfectors of some improvement."

Consequently the present monopoly exists in direct opposition to the spirit and express provisions of the Mexican constitution; and this fact, coupled with the undoubted harm it is inflicting on the most important of the Republic's industries, should impress upon the Government the imperative need of the cancellation of the monopolistic concessions. The continued permission of the control of an article of such prime importance as dynamite is in mining—"the bread of mining life"—is a serious economic menace. In view of the vigorous growth of mining enterprise in Mexico during the past few years, and the bright prospects for the future, we trust that the Government will, of its own initiation, at once terminate the explosive monopoly, and thereby continue to enjoy the fullest confidence of investors in Mexican mines. The correction of this anomaly of scanty dynamite cannot be made too quickly, and this JOURNAL speaks for hundreds to whom present conditions are working a hardship.

The Hargreaves-Bird Process.

A record of the many promising and commercially valuable processes that have been crippled or even entirely killed in their youth by bad business management would form instructive reading. We do not now refer to the general axiom of industrial chemistry that a knowledge of science must be combined with a knowledge of natural resources in order to avoid commercial disaster, but to the cases where processes of undoubted industrial value have been hopelessly stultified by association with incompetent man-

agement. The professional world cannot generally judge the value of a new process for itself, but leaves it to the inventor and his moneyed supporters to establish its value. Consequently, if those responsible for the process make a failure through their own incapacity, the professional world is apt to attribute the blame to the progress, without taking the trouble to inquire into the actual causes.

These remarks are prompted by reading the recent history of the Hargreaves-Bird process for producing alkali and bleach electrolytically from brine. In 1898 we gave a detailed account of this process, which owes its power of keeping the chlorine and sodium separate to the special mineral diaphragm employed. In the following year works were built on a large scale, at Middlewich, Cheshire, England, and to all outward appearances the future success of the process was assured. When the Electrolytic Alkali Company was floated for the purpose of building these works, the terms of purchase from the inventors and their financial backers were quite reasonable, for the vendors took their payment in ordinary shares, and we believe that they hold their shares intact still. Moreover, the process is simple and scientific, and the products are undoubtedly of high grade. In fact, the company can easily dispose of as much soda and bleach as it can produce, owing to the quality of its products. Yet the company has never paid any dividend on its ordinary shares, and has only partially paid the dividends on the preference shares. During the past year also, the necessity has arisen for the issue of debentures. Consequently, among scientists and investors, the process is put down as a failure, and the British technical journals prove conclusively to their own satisfaction that the power consumed eats away all possible profits, etc., etc. Nobody, of course, can absolutely say that this process or that would be a success if properly managed; but in this particular case we can safely say that it has never yet had a chance of proving its value, owing to the unfortunate constitution of the directorate and staff. At every meeting of shareholders the proceedings resemble a Donnybrook fair; there are personal feuds between members of the staff, and there has been a great lack of harmony among the members of the board of directors. The individual members of the board are all honorable gentlemen, but owing to the want of tact on the part of some, and the want of business-like alertness on the part of others, their combined action has been rendered valueless. In fact, there is the want of a strong man. All this internecine warfare goes on under the very shadow of the works belonging to Brunner Mond & Company and the United Alkali Company, who look on, like Gulliver, with contemptuous indifference at the petty politics of Lilliput. Some day, perhaps, the process itself will get a chance.

The Estimation of Zinc.

Early in 1903, a committee appointed by the American Chemical Society, sent to a large number of chemists in the United States representative samples of three typical zinc ores, with the request that they determine zinc and iron in them by the methods they used in their regular work. Forty-two chemists reported, most of them employing modifications of the ferrocyanide titration for zinc. The extremes of the results reported (disregarding a few obviously wild figures), together with the correct result as determined by the chairman of the committee were as follows:

	Zinc			Iron		
	A	B	C	A	B	C
H	59.73	19.57	33.87	3.26	21.92	13.03
L	56.03	12.20	30.29	2.10	18.04	10.04
T	58.25	18.16	31.48	2.38	20.35	10.77

In the above table, H indicates the high, L the low, and T the true result. Sample A was Joplin blende; B, New Jersey franklinite-willemite; and C, mixed sulphide ore from Colorado.

The discrepancies were so great that the committee would not attempt to draw a final conclusion as to accuracy of methods, but it remarked that even a superficial examination of the tables makes it obvious that some of the methods in common use for the estimation of zinc are not by any means adapted to universal application. This has always been, of course, well understood by expert chemists; surprising as it may appear, it clearly has not been understood by many professional assayers.

"The results as a whole are certainly disgraceful," says the committee, "and for this the present methods of teaching are largely to blame. Instead of teaching analytical chemistry, most of the schools teach what one instructor has well called 'cook-book methods,' that is schemes of analysis which give the student no ideas of the principles of analytical methods. . . . . One-fifth of all the analysts represented showed the effects of this kind of teaching and either use methods which contain no means of separating manganese and copper in ores that contain large amounts of those interfering elements; or use methods that will not decompose the ores at the start. . . . . It is certainly not to the credit of the analysts that such enormous differences should exist in so simple a determination as iron."

These remarks by the committee go directly to the point. Everyone who has required check estimations of zinc by different chemists has experienced discordancy in results as great as has been found by the committee of the American Chemical Society. The reason is ignorance of the chemists, misapplication of methods, sloppy short cuts to save time without thought as to the consequences. There is nothing mysterious about the determination of zinc. There are numerous methods which will give accurate results, if they be scientifically employed. Intelligent application, showing a thorough understanding of the chemistry of the subject step by step, is the chief requisite. The recent investigation of the committee of the American Chemical Society teaches this especially.

At the same time, a commission appointed at the International Congress of Applied Chemistry at Berlin, in 1903, to collect all methods of determining the important metals, and recommend for international use those which were considered the best, has been at work. The study of zinc determination was assigned to H. Nissenson, chief of the central laboratory of the Stolberg-Westphalia company, one of the large miners and smelters of zinc ore in Germany. An abstract of his report was published in this JOURNAL, November 25, 1905. The results obtained in the analysis of a wide variety of zinc-bearing material by the gravimetric - hydrogen - sulphide method, the Schaffner method, ferrocyanide method and electrolytic method were remarkable for their close agreement. Out of 24 samples, analyzed by the four methods, the maximum discrepancy was 0.34 per cent., this being in the case of a blende containing arsenic and cadmium and about 49 per cent. of zinc. The conclusion was therefore arrived at that all of the standard methods would give accurate results if the conditions be carefully complied with.

Metallics.

Considerable quantities of nitrites often get into distilled water in the laboratory, due to the presence of burning Bunsen lamps.

Iron nodules, which prove so annoying to the operator of mining machines in the East, do not occur in the North Dakota lignite, and there are no hindrances to the use of drills and undercutting machinery.

In smelting tin ores, or other materials which contain tin, slags are produced which contain iron and tin, and from which the tin is recovered only with the greatest difficulty. These slags frequently contain 15% of tin.

A good lubricant for drawing sheet metal in a press consists of 1 qt. of whale oil, 1 lb. of white lead, 1 pt. of water, and 3 oz. of the finest graphite. These are well mixed and applied to the metal with a brush before it enters the dies.

German-silver makers seem to be of the opinion that electrolytic nickel is superior to the other grades of this metal. The desirable qualities of samples of german silver made from electrolytic nickel are stated to be due to their freedom from carbon.

For some unexplained reason, the amount of phosphorus in an alloy containing zinc must be very small, otherwise blowholes will result in the casting. When a large quantity of phosphorus has been used castings are often completely filled with such blowholes.

Although quartz itself, as found in nature, is as brittle as glass, yet when melted and blown into vessels, it withstands the sudden changes of temperature that metals will endure. A red hot quartz vessel may be plunged into water without cracking, although to every appearance it is glass. These vessels will also stand a very high heat without softening.

The steel chimney of largest diameter in the United States is at the smelting works of the Copper Queen Consolidated Mining Co., at Douglas, Ariz. This is 200 ft. in height, 25 ft. internal diameter, and 34 ft. diameter at the base. The steel chimney of the Compania Minera de Penoles, at Mapimi, Mexico, is 300 ft. in height, 14 ft. internal diameter and 24 ft. in diameter at the base.

The object of the copper in marine paint is to poison the marine growths which attack the surface of the vessel. Barnacles are the most injurious of these low forms of animal life, as they actually become attached to the vessel; they soon become poisoned. One of the best known varieties of marine paint contains mercury and arsenic, in addition to copper. All of these are well known poisons.

Casting nickel anodes in sand is usually considered the best practice. It gives an open grain which is much desired in nickel-plating, for the nickel anode then dissolves more evenly in the nickel bath. The anode cast in a chill mold does not dissolve evenly, probably on account of the presence of iron and carbon in the anode, which cause the surface to chill. It gives a hard, close "grain skin" to the anode.

A method is now being introduced into the tin industry of the Straits Settlements which renders it possible to keep the tin content of the slag as low as 0.5%. The tin slags are smelted in a reverberatory furnace with sulphide of lead (galena); an alloy of tin and lead is obtained. As the tin slags contain considerable iron, the sulphur in the lead ore serves to make a matte of it; the tin-and-lead alloy may be drawn off from underneath.

A peculiar obstacle is encountered in the use of electrolytic nickel. The cathode plates are so tough that they must be cut by means of power shears. To cut the plates into pieces sufficiently small, so that they will pack well in the crucible requires the expenditure of considerable labor. Mills, which are not equipped with power shears, will find much difficulty in the use of this variety of nickel, as it is simply impossible to break it, and shears must be used.

The cost of the fuel for melting brass in crucibles varies with the establishment. Some foundries have a furnace too large for the crucible, and hence coal is wasted. In brass rolling mill practice, 3 lb. of metal have been melted with 1 lb. of coal. This, however, is exceptional and the average is about 2 lb. of metal with 1 lb. of coal. The average brass foundry practice is pound for pound. The brass rolling mills use hard coal for melting and so do many of the brass foundries.

Plane table work has been satisfactorly done on sheets of thin zinc, instead of paper which becomes very dirty in the field and is likely to get wet. The lines are first penciled on the zinc. After the day's work is done they are engraved with a sharp stylus. When the sheet is completed a mixture of lamp-black and linseed oil is applied by means of a piece of cotton waste. The surface is finally wiped bright with a dry piece of waste, which causes the engraved lines to stand out sharp and black.

The cathode plates of nickel, as now produced, have the dimensions of 3 by 4 ft. and are about ¼ in. thick. They are quite pure and run from 99.25 to 99.85% of nickel. It is probable that an average of 99.50% of nickel may be depended upon. As the metal is deposited from an aqueous solution which is free from carbon, there is no danger of introducing carbon into the cathode nickel. In this respect it is superior to the commercial grain, button, or shot nickel, as these varieties invariably contain more or less carbon. This hardens german silver, or similar nickel alloys, and causes them to crack in rolling. It is expected that electrolytic nickel will be extensively used in the manufacture of german silver.

Reinforced concrete is coming more and more into use for the construction of large chimneys. Two large chimneys of this type were erected on the Pacific coast within the last year. The first, for the Portland General Electric Co., is 230 ft. in height, 12 ft. inside diameter, with thickness of shell of 7 in. and 5 in. The second, for the Tacoma smelter, is 306 ft. high, 18 ft. inside diameter, with thickness of shell of 9 in. and 7 in. On account of the cost and the difficulty of obtaining any of the patent reinforcing bars at short notice on the Pacific coast, ordinary tee bars were used for both the vertical reinforcement and the hoops. Owing to the small thickness of the walls, and especially between the reinforcement and the surface, no stone or gravel was used. The mortar, of which the shell was composed, was a 1 : 3 mixture of portland cement and sand, mixed in a continuous mixer. The inside dimensions of the chimney were designed by Kidder's formula. Three desirable features, which may be secured in a concrete chimney, are: smoothness of interior surface, low conductivity of heat, and ability to resist high temperatures. The employment of this construction is rapidly increasing.

The suction gas producer has advantages over the pressure type for certain purposes, especially gas-engine operation. In this apparatus the fire is started by a small blower, which is shut off when the fire is well under way. The gas is then admitted to the engine, and the suction of the engine piston furnishes the draft through the fire, and keeps the fuel at the point of incandescence. The gas leaving the producer passes the condenser, the heat of the gas forming the steam. The whole is then led directly under the grate, and with the air drawn in forms the power gas. The gas then passes through the scrubber, where it is cooled and most of the dust taken out, from there through the sawdust cleaner, where all the remaining impurities are extracted. The engine using the gas is equipped with governor control on the admission of both air and gas. Anthracite is the best fuel for the apparatus, although coke and bituminous coal can be used with slightly less satisfactory results. The claim is made that a horse-power hour can be secured with 1 lb. of anthracite for small units, and for the larger units this amount often drops as low as 0.8 lb. Only a few plants have been installed in this country thus far, but in Germany they are growing in favor each year.

Colliery Notes.

The Schuylkill coal trade dates from the year 1825, when 6,500 tons were sent down the river. Small quantities had been shipped during the three preceding years, but that year marks the commencement of the trade from this region.

The first discovery of coal in this country was in the Richmond (Va.) field, and is reported to have been at some time previous to 1750. Tradition relates that the first deposit was found by a small boy who was engaged in digging bait for fishing.

Heavy deposits of lignite occur near Sidney, Mont., 15 miles west of the North Dakota line, and on the Yellowstone river. On the creeks which empty into the Yellowstone from the south, notably Charbaneau creek, heavy beds of lignite are also said to outcrop.

The old-time coal-cutting machine, in the Pennsylvania bituminous field, was known as an "iron miner." As early as 1866 we read that "a great many . . . are now in successful use, driven or operated by steam, water, or compressed air. The air they breathe—when worked by condensed air—improves instead of vitiates the mine."

Carbon monoxide gas, or "white damp," CO, is found mostly in the abandoned working places in a mine, where the supply of air is limited. This gas is also produced in large quantities by the explosion of powder, the supply of air being limited. Its presence is made known by the increased brightness of the lamp flame, which reaches upward in a slim tapering blaze. The gas is extremely poisonous, ½ of 1% being fatal when breathed but a short time.

In locating a shot on an airway, it is good practice not to place the shot in such a position that the force of the blast will be directed against the air-current. The projection of the blast against the air-current increases the heat energy developed in the explosion. In case of a blow-out shot taking place under these conditions, the force of the shot is opposed by the weight of the entire air-current between the shot and the intake of the mine. The effect is somewhat similar to that of the water hammer that occurs in a long line of water pipe when the flow of water is suddenly shut off.

The immediate danger to life in all mine fires is the suffocation of the men at work in the mine. Whether the fire is on the surface or underground, the first duty of those in charge is to send word to the men to come out of the mine by such passageways as afford the best means of escape. Prompt measures should be taken to prevent, as far as may be possible, the smoke of the fire from entering the mine. A line of pipe should be laid quickly to convey water to the fire. As far as practicable, the circulation of air should be cut off from the fire, and the smoke of the fire conducted directly into the return airway.

The common causes of underground mine fires (aside from spontaneous combustion) are the ignition of gas feeders by the flame of a shot; ignition of timber frames or brattices by the sparking of electric wires or the burning out of an electric fuse; the ignition of timber frames, brattices, hay, oil, waste, and other combustible materials by the flame of an open light; the accidental ignition of powder or oil; the explosion of oil vapor in the air cylinder or receiver or pipe line of an air compressor.

Mines with tender roofs are responsible for most accidents from falls of roof. Mines working on thick seams of coal, where the upper strata of coal are "dropped" behind the first advancing face, are also fruitful in accidents. Pillar and stall workings furnish more accidents from falls of roof than the long-wall system. This class of accident is also augmented by carelessness in drawing props. The first-mentioned cause of accidents can be largely diminished by employing special timbermen and keeping the timber well up to the face. The French system of driving iron bars into the coal to secure the roof before falling is very effective in preventing accident from a loose roof.

The belief, so often expressed, that lignite beds outcropping on erosion slopes are certain to thicken as the mine goes back into the hill, is hard to account for, except in the optimism which is an endowment of a large part of our race. While in many cases the beds doubtless thicken away from the outcrop, the reverse will as often prove true. The lignite beds being in general lens-like, it is impossible, without drilling, to determine whether the outcrop represents a section near the edge of the lens or across the center. In the former case, the lignite will thicken as the drift goes into the hill or bank till the center of the lens is reached, while in the latter it will become thinner.

A majority of the beds of North Dakota lignite show no great difference in fuel value from top to bottom. In some instances, however, the variation in the composition of the lignite in a given bed is considerable. Not infrequently the upper foot or two are inferior, and are left for roof in mining. The loss in this case is not as great as might be expected, for it is often more economical to leave coal for a roof than to timber. When the lignite lies directly under the glacial drift (as at the Henchett mine, 10 miles southwest of Velva) the upper portion shows deterioration. Shaly layers sometimes occur, which, if mixed with the coal from the rest of the bed, bring up the percentage of ash for the whole very considerably. Sulphur in any form is present commonly only in traces.

Correspondence and Discussion.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.

Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the columns of this JOURNAL.

Letters should be addressed to the Editor.

We do not hold ourselves responsible for the opinions expressed by correspondents.

The Dynamite Situation in Mexico.

Sir—The mining men of Mexico are now suffering from a combination of monopolies represented by the American Dynamite trust, the Mexican National Dynamite Company and the Mexican duties of $210 per ton. And this is a country where it is claimed the Government will not allow a monopoly; but it is different when the Government is interested, and when the head officials are shareholders.

When the Mexican National Dynamite Company was about ready to put its product on the market, the Government placed a duty of $210 per ton on all dynamite, and also gave to the new company the exclusive right to import dynamite free of duty, supposedly to make up any deficit that there might be between the capacity of its own factory and the consumption. At this time the American Dynamite trust had about 3,000 cases in the Republic; it was greatly inclined to remove this, and to quit the Mexican market. But it soon found that it is better business to sell at the fancy prices that soon prevailed.

Then it was not long before a terrible explosion occurred at the Mexican factory, followed soon after by a second which practically put the young monopoly out of business and, for the time, at the mercy of the American trust, which it now seems has taken full advantage of its opportunity, entering into an agreement with the Mexican company, whereby the latter becomes practically the selling agent of the former, thus getting the dynamite in free of duty and saving the American company the cost of maintaining separate agencies.

In the meantime the Mexican company seems to be making no great effort to get its factory into working order, being apparently satisfied with the profit which it is obtaining, taking the prices prevailing in the Parral district as a basis. When the Parral miner can obtain 40% dynamite there, he pays $17.65 Mexican a case for it. This same sells in the States at $3.75 gold (or, with exchange at 2.02, $7.57 Mexican), on which freight, at most, would be about $2.00 Mexican, and agents' commission of $1.50; making a total of $11.07, or say $11.15 as cost laid down in Parral, together with commission. This, as against $17.65, gives a clear profit of $6.50 per case, or about $2,500 Mexican per car for the Mexican Dynamite Company, and with no expense on its part. This is far better, perhaps, than could be made by running

the factory. Added to this, there is even a far worse condition caused by an absolute "dynamite famine" in many districts. This has come to such a pass in the Santa Barbara district of the State of Chihuahua, that the mine operators have signed and sent, Nov. 6, 1905, by wire to the President of the Republic, a petition; of which the following is the substance:

"During the past week our straits for dynamite became so severe that we were compelled to telegraph Your Excellency asking for relief. We took the liberty to suggest to Your Excellency such action as would, in our opinion, most speedily bring the relief sought.

"During many months we have patiently suffered losses and hardships caused directly by the incapacity of the Dynamite Company to fulfill its promises to supply us with dynamite, in the hope that the Government might succeed in causing the company to meet its obligations. Now, we find ourselves absolutely without dynamite in this community; many workmen are idle, and others about to become so by the suspension of mines which are unable to procure dynamite.

"We respectfully protest against a continuance of the conditions which cause us to sustain these losses, and the hardship of having our labor scattered through our inability to give permanent employment on account of a lack of dynamite.

"We respectfully protest against being, by government action, placed so absolutely in the hands of any monopoly, be it the Mexican National Dynamite Company, the American Dynamite trust, or a combination of both, for our supply of an element so essential to our industry as dynamite.

"We respectfully protest against the exorbitant tariff fixed for the sale of dynamite in this country; this tariff being based upon prices fixed by the American Dynamite trust at a time when exchange was exceedingly abnormal.

"We believe a fair amount of competition should be permitted to all such industries within the Republic.

"We do not believe the industry, which is probably the most important to the welfare of the Republic, should be sacrificed to any monopoly.

"We, therefore, most respectfully and most earnestly appeal to Your Excellency to cause to be abolished such conditions, where they exist.

"We beg that the import duty now charged upon dynamite be suspended for a term of twelve months.

"We beg that, during this time, independent corporations be encouraged to establish competitive dynamite factories within the Republic.

"We beg, as an additional relief from the hardships under which mining is conducted, that the, so-called, State tax of 1.8% be abolished.

"We believe that with these aids, the mining industry may be placed upon a plane from which future expansion may be planned with security.

"Finally we cannot urge upon Your Excellency with too much emphasis, the vital importance of speedy action, such as shall enable the miners to buy explosives in the open markets of the world, during the period which may be occupied in establishing competitive factories."

I am sure that this JOURNAL will be glad to assist us in presenting the real state of affairs in this matter of dynamite supply.

A. B. C.

Santa Rosalia, Chih., Mex.
Nov. 29, 1905.

Graduates of Mining Schools.

Sir—In a recent issue of this JOURNAL (Sept. 23, 1905) you refer, editorially, to the matter of an oversupply of mining engineers.

In his recent contribution (*Trans.* Am. Inst. Mining Eng.), Samuel B. Christy has given a careful study of conditions, requirements and training of mining engineers; his views will probably meet with general assent from those who are in touch with the mining industry.

It is my observation that the mining industry has come to be more and more under the direction of mining graduates. That process is not yet complete, nor has the mineral industry attained its full growth. The professions of law, of medicine and of civil engineering have largely been protected and conserved for technically trained men. The mining industry has been wide open, possibly wisely; still the mining graduate has had to break the ground in competing with men who can ably conduct mining affairs, with their years of experience and their application of native ability. I would not suggest that graduates of mining engineering will increase their employment by shutting these men out (as some other professions have done); but, given an education as good as the mining schools are now giving, they will, by application and experience, displace many of their untechnical competitors. By their training they are prepared to rapidly acquire the skill and experience which others have had to gain more slowly. By no means is it the object of a mining course to make a new class of specialists—technical mining engineers—who will all find employment under that specific name and title. But, after struggling through the probationary term of the working or office departments, many do pass on to the business and administrative positions, for which their scientific training has not unfitted them.

Mining pays better salaries to men of medium skill than many other undertakings. Such positions, even if they do not call for a use of all the theory of the mining school, will yet be better filled by men of good training, and they will raise the mining industry to a more exact science than it now is, at the same time creating a more congenial and larger community of men of the same desirable caliber.

The mining industry can well afford this introduction of more technical men; it would both raise the standard of the industry and also increase its successes.

Not only do the mines call for engineers, but, quite frequently, the engineers make new mines possible. Their introduction in large numbers may have the effect, first of all, of displacing many practical men; but its ultimate effect will be to greatly increase the industry, and in such a way as is demanded by the wants of civilization.

We must not forget that it is only a comparatively short time since technical graduates, in large numbers, entered the various fields of industry. These graduates are making other graduates of their own class indispensable. Their effect upon the skilled professions is now very great. It concerns not a caste, but a demand for efficiency; one must train to meet this demand for highly qualified men. The technical men who are already in active work are creating technical industries which demand the men who can keep them going. The introduction of large numbers of science graduates will neither destroy nor oversupply the field of operation; any more than the application of steam, water and electrical power has done in the field of human industry.

If they had nothing but the known places at the top of their professions to work for, engineering graduates would have a small field indeed. There is not always room at the top; but there is a good deal of room a little lower down; and this is bound, by the present production of trained men, to be occupied by technical graduates. It may be said that these positions are not sufficient prizes for the attainment and ability usually shown by the science graduates. If this is so, what is the alternative? Where is a better opening? Mining at the present time appears to offer a larger field than many other professions, and with no more danger of overcrowding; because it is an industry which may be made to expand through the ability of its members to create new fields of operation.

J. C. GWILLIM.

Kingston, Ont., Nov. 25, 1905.

Mixed Sulphide Ore Treatment.

Sir—Regarding the letter of H. Randolph Guggenheimer, recently published in this JOURNAL (Oct. 28, 1905, p. 788), kindly allow me to make the following correction:

In my previous letter (published in this JOURNAL Sept. 2, 1905, p. 407), I did not intend to state that the use of the Blake machines was altogether abandoned by the Colorado Zinc Company, but rather that the Blake electrostatic separator is

"no longer in operation on tailing from the Wetherill separators in the mill of the Colorado Zinc Company." This statement was given me by an officer of the Colorado Zinc Company.

In any event, a retreatment of the tailings from our separators, if the same are made from Colorado mixed sulphides, is not required to keep the tailings below 10% zinc; this is shown by the results obtained by the mills in Colorado using our separators, and also by the test published in our previous letter.

WETHERILL SEPARATOR CO.,
FRANZ MEYER, General Manager.
New York, Nov. 22, 1905.

Control of Fire in Sulphide Ore.

Sir—In a recent issue of this JOURNAL (Nov. 11, 1905, p. 865), in an article "On the Control of Fire in Sulphide Ore," it is stated that a method of fire extinction, therein briefly noticed, was put into practice at the Iron Mountain mine of the Mountain Copper Co. in California by Mr. Shaw. In justice to myself, kindly allow me to make the following statement:

The records of this company on file show that such a system was designed by me, with the necessary machinery therefor, and that the method was put into practice at our mine by the regular mine officials. This method was pronounced by them a success before Mr. Shaw was ever employed underground. Of course, it is a common occurrence for the same idea to be evolved by several independent workers, but in this case I would merely make a fair claim in view of our records.

LEWIS F. WRIGHT,
General Manager Mountain Copper Co.
San Francisco, Nov. 18, 1905.

Fossilization.

Sir—I mail you today a fossil crab that was picked up on the shore of Panama. There is a place where the embryo paleontologist can be shown "how it is done." The process of fossilization is clearly illustrated. At this point, the sea has a way of making land or rock for a time, and then cutting it out; the cycle takes several years. In the process of making rock, the waves heap up great quantities of shells on the beach, beating and grinding them into powder. In this fine material there are buried crabs and other kinds of marine animals. In time the fine calcareous sands become cemented into a kind of soft rock. Later the sea, encroaching upon this deposit, washes out the fossils and throws them upon the beach. The specimen I mail you is one of them. It belongs to a well known living variety.

R. D.
Panama, Republic of Panama,
Oct. 18, 1905.

New Publications.

Bulletin No. 20, Geological Survey, Western Australia. Pages, 127; 8½ by 5½ in.; paper; illustrated. Perth, 1905: A. Curtis, acting Government Printer.

Report of the Board of Water Supply of the City of New York to the Board of Estimate and Apportionment. Pages, 20. 6 by 9 in. New York, 1905: Martin B. Brown Company.

Salient Geological Features of British New Guinea. By A. Gibb Maitland. Pages, 26; illustrated; 8½ by 5½ in., paper. Perth, W. A., 1905: The Western Australian Natural History Society.

Les Explosifs de Sureté. By V. Watteyne, Chief Inspector of Mines, Brussels, and S. Stassart, Chief Engineer of Mines at Mons. *Annales des Mines* de Belgique; X (1905), 4, pp. 1039-1098; illustrated.

Les Gisements Pétrolifères des Etats-Unis. By M. A. Vicaire, Professor at the Saint-Etienne School of Mines. *Bulletin* de la Société de l'Industrie Minérale, IV, 3, 1905, pp. 681-849; and to be continued.

State Geological Survey of North Dakota. Third Biennial Report. By A. G. Leonard, State Geologist. Pages, 220; illustrated. 6 by 9 in. Cloth, $1. Bismarck, No. Dak.: Published by the State Geological Survey.

Journal and Proceedings of the Royal Society of New South Wales, Vol. XXXVIII. Pages, 480; illustrated; 8½ by 6 in., cloth. London, E. C., 1905: George Robertson & Co., 17 Warwick Square, Paternoster Row.

The Copper Deposits of Missouri. By H. Foster Bain and E. O. Ulrich. *Bulletin* No. 267, United States Geological Survey. Pages, 41. Illustrated. Size, 6 by 9 in.; paper. Washington, D. C., 1905: Government Printing Office.

Calcul d'un Cable d'Extraction à Section décroissante, en tenant compte des tensions dynamiques auxquelles il est soumis. By Michel Rodde, Chief Engineer of the Montrambert mines. *Bulletin* de la Société de l'Industrie Minérale, IV, 3, pp. 919-972.

Formation et Recherche Comparées des Divers Combustibles Fossiles (Etude Chimique et Stratigraphique). By M. L. Lemière, formerly Chief Engineer of the Montvicq collieries. *Bulletin* de la Société de l'Industrie Minérale, IV, 3, pp. 851-917; and to be continued.

The Lead, Zinc and Fluorspar Deposits of Western Kentucky. By E. O. Ulrich and W. S. Tangier Smith. Professional Paper No. 36. United States Geological Survey. Pages, 218. Illustrated. Size, 9 by 12 in.; paper. Washington, D. C., 1905: Government Printing Office.

Die Entwicklung der Freiberger Bergakademie. Inaugural address of the Rector, for the 140th academic year of the academy. By Dr. Erwin Papperitz, professor of mathematics, and K. S. Oberbergrath. Pages, 26. 6 by 9 in.; paper. 25 cents. Freiberg, Saxony, 1905: Craz & Gerlach (Joh. Stettner).

Pocket-Book of Mechanical Engineering. By Charles M. Sames. Pages, 168. Illustrated. 4 by 6¾ in.; cloth. $1.50. New York, 1905; Robert Drummond.

Contents.—Mathematics. Chemical data. Materials. The strength of materials, structures and machine parts. Energy and the transmission of power. Heat and the steam-engine. Hydraulics and hydraulic machinery. Shop data. Electrotechnics. Addenda.

Bradshaw Mountain Folio, Arizona. No. 126, U. S. Geological Survey. By T. A. Jaggar, Jr., and Charles Palache. Pages, 11, with illustrations and maps. 18 by 22 in. Paper, 40c. Washington, D. C., 1905: Published by the Survey.

This folio covers the south-central part of Yavapai county, Arizona. Prescott and Jerome are just north of the limits covered by this folio, but Valverde smelter is on the northern edge.

Die Elektrolyse geschmolzenes Salze Part II. (Vol. 21 of Viktor Engelhardt's "Monographs of Applied Chemistry.") By Richard Lorenz. Pages, 257; illustrated. 6½ by 9½ in. Paper, $2.50. Halle, Germany, 1905: Wilhelm Knapp.

Contents.—Faraday's law; the conduction and migration of ions; conductivity. This is the companion to Part I, which treated of "Compounds and Elements."

Lead and Zinc Deposits of Virginia. By Thomas Leonard Watson. Pages, 156. Size, 9½ by 6 in. Cloth. Richmond, Va., 1905: Board of Agriculture and Immigration.

This is the first volume of a series on the mineral resources of Virginia to be published by the Geological Survey of Virginia. It is a useful treatise on an interesting subject which has not heretofore had much lierature. It is for free distribution.

Mines de Houille rendues réfractaires à l'Ankylostome par des Eaux Salées de Filtration. By Dr. A. Manouvriez. Pages, 25. 6 by 9 in.; paper. Paris, 1905: Jules Rousset.

The author draws attention to the fact that germs of ankylostomiasis are never present in mines into which salt water percolates, although other conditions may be most favorable to the propagation of the disease. He recommends the scattering of coarse salt in damp mines as a preventive of this disease, or in dry mines, a sprinkling of a 2% solution of salt.

Architect, Owner and Builder Before the Law. By T. M. Clark. Pages, 387. Size, 6½ by 9 in.; cloth. $3. New York, 1905: The Macmillan Company.

Contents.—The architect and the owner. The architect's duties to his employer. The architect's position when the cost exceeds the limit. The responsibility of the architect for his own work. The architect's authority as an expert. The architect as agent for the owner. The architect's claim to compensation. Architects employed on commission. The sickness or death of the architect. The ownership of plans. The architect's duties toward the builder. The builder's duties toward the architect. The authority of the architect over the builder. The architect's certificate. The contract. Formal contracts. Contracts with corporations. Verbal and written contracts. The statute of frauds and limitations. Misrepresentation or mistake. The rights of the lowest bidder. The interpretation of contracts. How contracts may be modified. The abandonment of contracts. Completion, acceptance and delay and forfeiture. Risk and responsibility. Forms of contract.

This is a new edition of a standard work, which gives a clearer idea of the legal relationship between the architect and the owner, the architect and the builder, and the owner and the builder than any other work we are acquainted with. Its accomplished author knew how to present his subject in a way that the professional man, ignorant of legal technicalities, would have no difficulty in understanding; while his style is so engaging that the work can be read with interest even by the layman. It is a book that is almost as valuable to the engineer as it is to the architect, inasmuch as wherever the author writes "architect" the word "engineer" can in most cases be substituted with equal pertinence.

California State Miners' Association.

SPECIAL CORRESPONDENCE.

This year the association held its annual convention in an interior mining county instead of at San Francisco, as usual. That the experiment was *not* successful is evidenced by the fact that the convention decided to hold the next session at San Francisco, thus returning to "first principles." In fact, there was only one county in opposition to the metropolis, and it was a valley county. Therefore the plan of the San Francisco men to defer to the mining counties and let them, in turn, entertain the delegates and manage the convention and association, was a failure, and San Francisco will again shoulder the responsibilities.

The people of Nevada City and Grass Valley entertained the visiting delegates right royally and with great hospitality. They gave them receptions, banquets, balls, lunches, etc.; gave them opportunities to visit famous mines, and did everything anyone could expect and more. But the elaborate nature of the entertainment provided by the Nevada county miners rather dampened the ardor of representatives of other mining counties.

It has been shown by this experience, however, that to get together a large number of delegates, the convention must be held in San Francisco, where the delegates would rather meet than elsewhere. Several of the large mining counties, such as Amador, Calaveras, Sierra, Plumas, Trinity and others, sent no delegates to Nevada City this year. As a result, the entire convention did not number over 150, and of these 51 came from San Francisco.

Even Nevada county itself, where the convention was held, showed a representation of only 21 delegates. Many other mining counties were not represented at all. Usually, at San Francisco, a convention numbers from 600 to 1,200 delegates. The miners, who are shut up in the mountain region most of the year, like to come to "the City," but will not pay their own expenses to go to other interior towns.

The fact is apparent that there has been a waning interest in the association for several years, and only the energy of the retiring president, Mr. Benjamin, has kept up what life there is. It seems that, after the hydraulic mining question was settled, for which cause the association was originally organized, the other objects created less interest. The resolutions adopted this year were not especially new, nor was there any business of any great moment brought before the convention. The technical papers read were of interest and value, and were prepared by men well up in their respective topics. As far as enjoyment was concerned, the delegates were given all that the hospitality of mining towns could possibly provide; but to achieve important results, the convention must have questions of moment to solve. Had the convention been held in this city, four times as many delegates would doubtless have been present.

It is all very well to talk of an association of this kind being run solely by "practical miners," leaving out professional and business men altogether; but the fact is that at a convention it is the talkers and writers who do the business. The practical miners are not usually talkers or writers, and sit quiet while business is being done, taking little active part either in committees or on the floor.

President Benjamin was urgently asked to accept office again, but positively refused, and subsequently a dozen men, prominent in the mining industry, in turn were offered the presidency, but declined on one plea or another. This is decidedly different from the early days of the association, when there were dozens of candidates anxious to obtain the nomination.

The presidency finally fell to Alf Tregido, superintendent of a quicksilver mine in Solano county; he was formerly, however, engaged in active mining in Nevada county, and was the first president of the Nevada county Miners' Association. It was mainly for this reason he was chosen, for now he hails from a "cow county," where there are one quicksliver mine, a few limestone and cement properties, and no gold mines whatever. Mr. Tregido is a popular man among the miners, active and energetic; he is a Cornishman. The proposed new secretary, Mr. Butler, is from the same place, and is at present a resident of Nevada county.

It may be said, confidently, that unless the association as a body accomplishes more next year than it did last, and that, unless more interest shall be manifested in the future and more funds be provided, its existence will be terminated, notwithstanding all the benefits it has accomplished for the mining industry of California. The business men of San Francisco have become tired of supporting it, financially and morally; the interior counties show no disposition to afford much assistance in any way. This being the case, it would seem as if the usefulness of the association were about ended; but we hope for a better future.

Questions and Answers.

Lime Kilns.

What is the best design and construction of continuous lime kilns, using wood as fuel, for a daily production of 20 tons?

A. W. V.

Answer.—Kilns in which the fuel is charged in layers alternating with layers of lime rock, and kilns in which the fuel is burned in separate fireplaces are both used in the United States. The former are cheaper in first cost and in operating expense, and they yield a product which is good enough for ordinary purposes. The kilns with external fireplaces on the other hand yield a whiter and more evenly burned product, and this type is now employed at most of the large lime-burning plants.

A modern lime kiln of the separately fired type consists of a cylindrical steel shell, say of ¼ in. plate, lined with two to three thicknesses (16 to 24 in.) of brick; the thicker the lining, the less the loss of heat by radiation. The walls of the shaft are vertical. The shaft rises from the ground to a height of 35 to 50 ft. About 8 ft. above the ground level there is a steel platform supporting two fireplaces (on opposite sides of the shaft). The fireplaces are attended from the platform. Below the latter the shaft terminates in a steel "cooling cone" from which the burned lime is discharged by means of a draw-gate into a shallow car.

For an output of 20 tons of burned lime per day, a kiln 6 ft. in diameter and 43 ft. in height would be required.

The induction motor, from its construction, is suitable for operation in dusty, dirty places, such as coal breakers, where a machine with rubbing contacts would be out of place.

Copper Mines of Norway.

The oldest mines, according to *L'Echo de l'Industrie* (Oct. 15, 1905), are those at Röros, first opened in 1646, in which the ore is either chalcopyrite or cupriferous iron pyrite. The development of these mines has recently been stimulated by the installation of a new water-driven electric generator centrally located.

The ore, carrying about 5% copper, is smelted in water-jacket furnaces, yielding a first matte of 37% copper. This is then concentrated by the Manhes-Bessemer process to 78% matte; it is then enriched by bessemerizing to 95½% black copper, which is afterward refined. The Röros mines have afforded between 600 and 700 tons of copper annually, besides exporting 20,000 tons of pyrite ore. A Norwegian company owns them.

The Sulitjelma mines (at Salten, in the north, yielding the same kind of ore) were opened in 1887. They employ 600 to 700 workmen and afford 350 tons of copper annually, besides exporting 30,000 tons of ore. They are owned by a Swedish company. Other potentially productive deposits in the same neighborhood need only the capital to develop them.

The copper mines at Aamdal, in Telemarken, yield copper pyrite which is concentrated before being exported. These mines are old and have been worked by Norwegian and English owners; they have recently been bought by an American company.

Besides these, there are many other earlier producers, which are now neglected. Important ones, as those at Vigsnaes, were worked by a Belgian-French company between 1865 and 1894; in that period the mines yielded 900,000 tons of cupriferous pyrite. Work was suspended when a depth of 2,410 ft. was reached. Copper-bearing pyrite is abundant, but in many localities it is too remote from railroad facilities.

Abstracts of Official Reports.

Anglo-Sicilian Sulphur Co., Ltd.

The ninth annual general meeting was held on Oct. 13, at London. William T. Brand (the chairman) stated that the gross profits for the year under review were £138,150, as against £187,908 last year, a decrease of £49,758. The expenses were £25,134, against £26,818, a decrease of £1,684, and on July 31 last the investments showed a small decrease in value. The net profits were £113,016, against £158,428, a decrease of £45,412. This was accounted for by the sales of sulphur for delivery during the financial year being considerably less than last year, owing to the competition which arose with sulphur produced in America. The profit per ton sold had been about the same as last year. The net profits of 1904, however, exceeded those of any other year of the company's existence by £37,915. The net profit of £113,016 had been apportioned as follows: A dividend of 6% per annum, less income tax, on the preference shares, £42,000; a bonus of two-thirds of a penny per share, free of income tax, upon each preference share, £1,944; and a dividend of 6d. per share for the year, free of income tax, upon the 700,000 ordinary shares, £17,500; these together absorbed £61,444. The report placed £14,203 to the capital guarantee fund, and £33,368 to the reserve for the eventual depreciation, if any, of the stocks of sulphur. The capital guarantee and general reserve funds had been further increased by £3,648 15s. 4d. and £1,287 15s., respectively, being interest received and accrued upon such investments as had been specially appropriated to those funds, making the total reserves under these heads as follows: Capital guarantee fund, £126,242; general reserve fund, £151,480 15s.; reserve for eventual depreciation of stocks, £172,467 13s. 2d.; total, £450,190 8s. 2d. The company has a considerable stock of sulphur, and had it not succeeded in making terms satisfactory to the company in regard to the control of production in Sicily, it would have disorganized markets in which to realize its stocks. The consumption is generally fair, and it is increasing in America. In France, however, although the vintage was good, owing to the low price of wine and to climatic conditions, the consumption of sulphur was checked during last season; the refiners had been left with considerable stocks of sulphur on hand, and this would probably curtail somewhat the shipment of sulphur to that country next year.

The total of all exports of sulphur from Sicily, for the eight months ending Aug. 31, was 338,623 tons (metric); the stock on hand (Sept. 1, 1905) was 383,087 tons (metric).)

New Induction Motor.

The expiration of the basic patents on induction motors, which prevented competition in this country, has seen the development of a number of new motors of this type, brought out by companies which have heretofore confined themselves to direct-current machinery. The Commercial Electric Company, Indianapolis, Ind., has recently developed a new constant-speed induction motor.

The motor is made after designs by H. M. Hobart, and is intended for constant-speed work. The bearings are self-oiling and self-aligning, and are reversible to allow the machines to be inverted. The linings are duplicate and interchangeable, so that replacing of the bearing is easily effected.

The shaft is of crucible steel, of large diameter and short between bearings; it is ground and the bearings are polished. The rotor is forced on the shaft with hydraulic pressure. Ventilating apertures are provided across the faces of the stator and rotor, so that free circulation of air is secured. The starting current is small for motors of this type.

The motors referred to are made in standard capacities from 5 to 200 h.p. For smaller sizes, single-phase, self-starting induction motors are made in capacities of 1 to 5 h.p. The machines are made for all standard voltages in both two- and three-phase forms and for operation on 25 or 60 cycles.

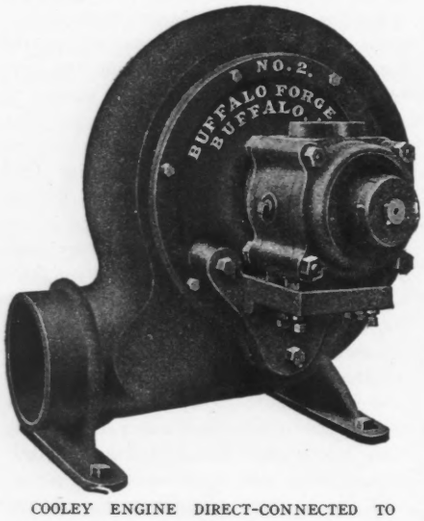
Rapid Determination of Silicon in Steel.

H. Rubricius (*Stahl u. Eisen,* 1905, XXV, p. 1012) describes a modification of this process. Five grams of steel cuttings are dissolved in 40 c.c. of dilute (1 : 2) sulphuric acid warmed to 50° or 60° C. in a beaker of 300 to 400 c.c. capacity. After the first violent evolution of gas has ceased, the walls of the beaker are rinsed with a very small quantity of water, and the beaker is heated over wire gauze until practically the whole of the water is expelled. Under these conditions, ferrous sulphate separates in the form of a voluminous mass, and the mixture can be boiled without any danger of spirting or bumping. If the cuttings have not completely dissolved, further successive additions of small quantities (not sufficent to dissolve the separated ferrous sulphate) of water (or of nitric acid) are made, and the mixture boiled after each addition. The residue of ferrous sulphate and sulphuric acid is cooled, diluted with 100 c.c. of water, a few cubic centimeters of hydrochloric acid is added and the whole is heated to boiling. The solution is then diluted to 200 c.c., filtered, and the residue of carbon and silica is washed, with hot water, with hot dilute hydrochloric acid, and again with hot water. The filter is then incinerated, the ash and residue ignited, and the pure silica weighed. It is stated that if the prescribed conditions be adhered to, the results obtained agree well with those obtained by other methods.

The drill frequently penetrates hundreds of feet of solid salt in drilling wells for petroleum. The salt is often as clear as glass, as hard as rock and is frequently interstratified with shale, as is frequently the case with coal. In the region where there is a stratum of salt above the petroleum, there is often salt water in the petroleum stratum. Especially is this the case where the material between the surface and the oil stratum is mainly limestone. The latter material, being very unyielding, its cleavage allows an easy access of water, often to a great depth; while clayey shales, being more plastic, often exclude all water from penetrating more than a hundred feet or so from the surface.

A Buffalo Blower and Cooley Engine.

The combination of blower and engine shown in the accompanying illustration is unique in that it is so compact in form. The diminutive size of the engine is the most apparent departure in its construction. The small space occupied by the engine is made possible by its construction; the moving parts consist of a spider and four roller valves. When running, these valves roll upon the bore of the cylinder, and are held there both by steam pressure and centrifugal force. Their action is that of check valves between the pressure and exhaust, and they are arranged to automatically take up their own wear. The bearings are rollers of generous proportion; there are no take-ups, wedges, set-screws, springs, or mechanical packing to require attention. The Cooley engine shown in this cut is a 3 h.p. and runs at 2,600 r. p. m., but is only 8 by 9 by 8 in. in size, and weighs but 43 lb. Either steam or compressed air can be used with equal efficiency.



COOLEY ENGINE DIRECT-CONNECTED TO BLOWER.

The blower to which the engine is connected is a No. 2 Buffalo "B" volume type having a 6-in. discharge. The bearings are of the oil-ring type. They are dust-proof, and proportioned to keep wear and heating at a minimum. This type of blower is designed to run for long periods at high speed without attention.

Such a machine direct connected to an engine which gives speeds necessary for moderate pressures, would be useful in mine ventilation, blowing forge fires and other work where the requirements of speed, air delivery and pressures are similar.

This set is self-contained and requires small floor space. It is designed and put upon the market by the Buffalo Forge Company, Buffalo, N. Y.

The porosity of an oil stratum seldom has sufficient continuity for one well to drain from points more than half a mile distant.

Lithopone Manufacture.

To keep lithopones white and prevent them from turning black or yellow in the sunlight, R. Alberti (Goslar, Germany, Eng. Pat. 13,455, June 29, 1905) suggests that an alkaline-earth, alkali peroxide, or hydrogen peroxide be added to the lithopone after it has passed through the incandescent process and has been washed—this may be done at the ordinary, or at slightly elevated, temperatures. If barium peroxide is used, about 2% is necessary. The peroxide may be also added to the dried lithopone before reduction.

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 notice of the patent appeared.

Week ended Nov. 28, 1905.

805,448. MAGNETIC SEPARATOR FOR ORES.—Henry F. Campbell, Melrose, Mass.; Jeanette L. Campbell executrix of said Henry F. Campbell, deceased.

805,489. GAS-RETORT BENCH.—Silas B. Russell, St. Louis, Mo., assignor to Parker-Russell Mining & Manufacturing Company, St. Louis, Mo., a corporation of Missouri.

805,501 and 805,502. METHOD OF PRODUCING CHEMICALS IN ELECTRIC FURNACES.—Edward R. Taylor, Penn Yan, N. Y.

805,520. TRAVELING CONVEYER SYSTEM.—Charles Berghoefer, Chicago, Ill.

805,521. CLAM-SHELL BUCKET.—Charles Berghoefer, Chicago, Ill.

805,555. PROCESS FOR REFINING COPPER-NICKEL MATTE.—Noak V. Hybinnette, Westfield, N. J.

805,563. MANUFACTURE OF STEEL.—Horace W. Lash, Cleveland, Ohio, assignor to the Garrett-Cromwell Engineering Company, Cleveland, Ohio, a corporation of Ohio.

805,564. MANUFACTURE OF STEEL.—Horace W. Lash, Cleveland, Ohio.

805,577. TREATMENT OF ORES AND THE LIKE.—James Nicholas, Waterloo, England.

805,599. ORE-SEPARATOR.—Lois J. Vandervoort, Guthrie, Okla.

805,635. APPARATUS FOR LIXIVIATION PROCESSES.—Alfred W. Constans, Nelson, Canada.

805,653. APPARATUS FOR CLEANING MANUFACTURED GASES.—Leon P. Lowe, San Francisco, Cal.

805,654. SIGHT-COCK FOR GAS-FUR-FURNACES.—Leon P. Lowe, San Francisco, Cal.

805,657. GLASS-ROLLING APPARATUS.—Anton Meyer, St. Louis, Mo.

805,671. HOT-AIR APPLIANCE FOR HYDROCARBON BURNERS AND FURNACES.—Arthur H. Saffell, Bakersfield, Cal., assignor of one-half to Richard J. Powers, San Leandro, Cal.

805,685. MINING-MACHINE.—John Swanson, Mystic, Iowa.

805,694. METHOD OF ELECTROSTATIC SEPARATION.—Philip H. Wynne, Boston, Mass., assignor to Charles Henry Huff, Brockton, Mass.

805,701. PROCESS OF RECOVERING SULPHUR.—Ralph Baggaley, Pittsburg, Pa.

805,702. APPARATUS FOR PRODUCING VITRIFIED BRICKS, TILES AND OTHER ARTICLES.—Ralph Baggaley, Pittsburg, Pa.

805,703. MACHINE FOR STAMPING COPPER.—Ralph Baggaley, Pittsburg, Pa.

805,711. APPARATUS FOR LOADING AND UNLOADING SHIPS.—Franklin B. Ciark, Washington, D. C., assignor to the American Loading & Unloading Machine Co. (Inc.), of Virginia.

805,728 and 805,729. PROCESS OF PERFECTING CASTING STEEL INGOTS.—Robert W. Hunt, Chicago, Ill.

805,737. APPARATUS FOR CHARGING FURNACES.—Edward W. Lindquist, Chicago, Ill., assignor to Ralph Baggaley, Pittsburg, Pa.

805,738. TILTING MOLD FOR CASTING COPPER PLATES.—Edward W. Lindquist, Chicago, Ill., assignor to Ralph Baggaley, Pittsburg, Pa.

805,783. ELECTRIC FURNACE.—John S. Dorian, Niagara Falls, N. Y., assignor to Cora M. Dorian, Niagara Falls, N. Y.

805,833. MACHINE FOR APPLYING FLUX TO CYLINDRICAL BODIES.—Charles H. Ayars, Salem, N. J., assignor to Ayars Machine Company, Salem, N. J., a corporation of New Jersey.

805,834. FURNACE FOR REFINING COPPER.—Ralph Baggaley, Pittsburg, Pa.

805,835. FLUXING COPPER ORES.—Ralph Baggaley, Pittsburg, Pa.

805,836. METHOD OF PRODUCING IRON.—Ralph Baggaley, Pittsburg, Pa.

805,854. MAGNETIC ORE-SEPARATOR.—Eric Hedburg, Joplin, Mo., assignor, by mesne assignments, to American Reduction Company, Chicago, Ill., a corporation of Arizona.

805,880. APPARATUS FOR DISSOLVING AND SEPARATING VALUES CONTAINED IN ORES, ETC.—Charles H. Rider, St. Louis, Mo.

805,885. MINING-MACHINE.—William H. Sexton, Sullivan, Ind.

805,896. FINISHING-CONVERTER.—Charles M. Allen, Lolo, Mont., assignor to Ralph Baggaley, Pittsburg, Pa.

805,906. ATTACHMENT FOR DREDGERS.—Herbert P. Francis, Oroville, Cal., assignor of one-half to said Francis and one-half to Richard Saville, Oroville, Cal.

805,931. TUYERE-PLATE FOR BESSEMER CONVERTERS.—Louis N. McDonald and Henry C. Morgan, Youngstown, Ohio.

805,939. RABBLING DEVICE FOR ORE-ROASTING FURNACES.—Christopher C. Wilson, Denver, Colo.

805,953. CEMENT-BURNING KILN.—Guy D. Helmick, Fort Russell Wyo.

805,955. COMBINED MOUNT AND DERRICK FOR ENGINES AND WINDING-SPOOLS.—Henry A. Hettinger, Bridgeton, N. J.

805,969. SEPARATION OF METALS.—Noak V. Hybinette, Westfield, N. J.

805,985. GAS-PURIFIER.—Mathias F. McNelly, Chicago, Ill.

806,006. PROCESS OF MANUFACTURING CALCIUM.—Otto Ruff, Berlin, and Wilhelm Plato, Colberg, Germany.

806,012. ROCK-DRILL.—Grant W. Smith, Ottumwa, Iowa.

806,045 and 806,046. METHOD OF CONVERTING MATTE.—Ralph Baggaley, Pittsburg, Pa., and Charles M. Allen, Lolo, Mont.; said Allen to said Baggaley.

806,047. METHOD OF SMELTING AND CONVERTING ORES.—Ralph Baggaley, Pittsburg, Pa.

806,048. HEAT-TRAVEL CONTROLLER FOR FURNACE-WALLS.—Ralph Baggaley, Pittsburg, Pa.

GREAT BRITAIN.

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

Week ended Nov. 18, 1905.

17,816 of 1904. ORE-SEPARATION.—F. E. Elmore, London. The use of a vacuum for increasing the efficiency of the process for floating metallic sulphides by means of bubbles of air or gas, and thus separating them from gangue.

25,858 of 1904. ORE-SEPARATION.—A. J. F. de Bavay, Melbourne, Victoria. Apparatus to be used in bringing thin films of ores upon the surface of water, by means of which the metallic particles are floated and the gangue sinks.

241 of 1905. BRIQUETTE FURNACE.—B. Wagner, Berlin. Improved furnace for burning briquettes made by binding fine coal together with water solutions.

3,806 of 1905. BRIQUETTING PRESS.—J. Treadwell, San Francisco. Improvements in briquetting presses, in order to regulate the supply of material between the plungers.

5,394 of 1905. SAFETY-LAMP.—W. Davies and R. Beale, Rhondda, Wales. Means for automatically extinguishing miners' safety-lamps immediately they are opened.

14,998 of 1905. SAFETY-LAMP.—J. Prestwich, Manchester. An improved miners' safety-lamp, in which the gauze is not opposite the flame, but glass chimneys, and the gauze above and below.

Personal.

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

Mr. Jesse C. Scobey, of Denver, is at present in New York.

Mr. T. F. Cole, president of the Oliver Iron Mining Co., is in New York.

Mr. George G. Blackwell left New York Dec. 2, on his return to Liverpool, England.

Dr. Wilhelm Wunstorf has been appointed geologist in the Berlin Geological Bureau.

Mr. Regis Chauvenet, of Denver, is at present examining coal lands in Southern Colorado.

Mr. C. W. Purington, of Doveton & Purington, expects to return to Denver from Alaska about Dec. 20.

Mr. D. E. Woodbridge has returned to Duluth, from a visit of two weeks at the Bingham, Utah, copper camp.

Mr. H. B. Tifft, representing the J. Geo. Leyner Engineering Co., of Denver, Colo., has been in Arizona for a month past.

Mr. R. Kenyon, well known in mining circles in Mexico, has gone to Ecuador to take over the management of a gold mine.

Mr. Hudson H. Nicholson arrived in Denver last week from a professional trip to Southern Mexico and left for Oregon.

Mr. J. P. Graves, manager of the Granby mine in British Columbia, was in Michigan recently, looking over the copper mines.

Mr. R. E. Helmore, of Bay City, Mich., was in Parral, Mexico, recently, on his way to El Oro, where he has mining interests.

Mr. R. E. Walker, who has been connected with C. D. Lane, of San Francisco, Cal., is in Arizona looking over mining properties.

Mr. G. A. Wayland, chief engineer of the Arizona Smelting Works at Humboldt, Ariz., has returned from a short honeymoon trip.

Mr. Frank Robinson, of Los Angeles, Cal., who has been examining some mines near Thumb Butte, Ariz., has returned to Los Angeles.

Mr. Enoch Stanford, formerly of Harrisburg, Pa., has been appointed general superintendent of the Duplex Metals Co., at Chester, Pa.

Mr. C. A. Bohn, general manager of the Encinillas Mines, Ltd., Mexico, and the Santa Rosalia smelter, Mexico, has resigned his position.

Mr. Carl Davis, formerly superintendent of the Centre Star and War Eagle mines, at Rossland, B. C., is now managing a mine in South Africa.

Mr. Glen George, formerly Lecturer in Coal Mining at the Royal School of Mines, London, has been appointed Chief Mining Surveyor to the Bengal Coal Co., India.

Mr. C. L. Shaw, formerly with the New York & Nevada Copper Co. at Ely, Nev., is now superintendent for the Arizola Mines Co., at Casa Grande, Arizona.

Mr. Axel Sahlin has removed from London to Brussels, Belgium, and the main offices of Julian Kennedy, Sahlin & Co. are now at 52 Rue du Congrès, Brussels.

Mr. John Stanton, of New York, recently completed one of his regular trips of inspection to the Lake Superior copper properties with which he is closely identified.

Mr. Richard L. Lloyd, manager of the smelter of the Green Consolidated Copper Co. in Sonora, Mexico, spent a few days in Butte, Mont., in the latter part of November.

Mr. W. A. Paine, of Boston, president of the Copper Range Consolidated Co., recently made a trip of inspection to the Lake Superior copper mines in which he is interested.

Mr. O. F. Westlund, recently manager of the Aguascalientes plant of the American Smelting & Refining Co., is now manager of the Angangueo Co., with offices in the City of Mexico.

Messrs. A. C. Werden and F. H. Summeril, of the Western Trust & Guarantee Co., of Chicago, are in Prescott, Ariz., arranging to visit the several properties owned by that concern.

Mr. Paul H. Hebb, of Seattle, Wash., who is largely interested in mines in Alaska, has been investigating the Burnt River mining camp, near Baker City, Ore., with a view to investing there.

Mr. Carles A. Olson, who for several years has been superintendent of one department of the Crane Co., Chicago, has been promoted to the position of general superintendent of that company.

Dr. Howell, formerly agricultural chemist to the Victorian government, has been appointed agricultural adviser to the Mount Lyell Mining Co., in connection with the manufacture of superphosphate.

Mr. W. Pellew Harvey, of Pellew Harvey & Fell, London, and formerly of Vancouver, B. C., has been elected a technical director in the Cobar Gold Mines, Limited, which owns mines in New South Wales.

Mr. Harry Gardner has resigned his position with the United States Mining Co., to take charge of the electrical and engineering department of the Quebradillas Mining Co., Mexico, to take effect December 1.

Mr. James W. Neill, consulting engineer for the Pittsburg & Montana Copper Co., who lives in San Francisco, is in Butte, Mont., having gone there to look after matters pertaining to the company, and examine the property of the East Butte Copper Co.

Mr. A. E. Weinberg has returned to Sydney, N. S. W., having completed an extended tour through the Etheridge mining district, North Queensland. Mr. Weinberg will shortly draw up a report on the mines he inspected on behalf of English investors.

Mr. J. B. Hobson, of Bullion, Quesnel Forks, B. C., has returned to British Columbia from the East, whence he went on business connected with the transfer of the hydraulic gold mine of the Consolidated Cariboo Hydraulic Mining Co. to New York capitalists.

Mr. Robert K. Painter has resigned his position as manager of the Cabin Branch mine at Dumfries, Va., and has been appointed by the Newfoundland Syndicate general superintendent of its mining properties. His headquarters will be at Pilley's Island, Newfoundland.

Mr. Harry Coulby, manager of the Pittsburg Steamship Co., of the United States Steel Corporation, has been at Duluth this week, looking after the details of salving the several ships of the company's fleet lost and grounded in the terrible storm of Tuesday week.

Mr. E. Fleming L'Engle has been appointed ore purchasing agent for the Arizona Smelting Co., with office in Prescott National Bank Building, Prescott, Ariz. Mr. Edward W. Brooks has been appointed ore purchasing agent for the company, with offices in Phœnix, Arizona.

Mr. Samson W. Hall, manager of the property of the Madison Lead & Land Co., operating lead mines near Fredericktown, Mo., spent the last week of November in Butte, Mont. His visit was for the purpose of seeing a Hancock jig at work in the Butte Reduction Works.

Mr. L. J. Sheppard, of Calumet, Mich., formerly manager of the Tamarack Cooperative Association's general store, has been appointed chief purchasing agent for the Calumet & Arizona Mining Co. and allied corporations, and will make his headquarters at Bisbee, Arizona.

Mr. J. M. Ruffner, manager of the North Columbia Gold Mining Co., and Mr. O. T. Switzer, manager of the British America Dredging Co., both operating in the Atlin district of British Columbia, recently came down to Victoria and after spending a few days there left for the States.

Mr. Chas. W. McMeekin, a mining engineer with the Britannia Copper Syndicate, has returned to Vancouver, B. C.,

from a visit to the Mt. Andrews mine, Prince of Wales Island, Southeast Alaska, whence he went to examine the development work there in progress for the syndicate.

Mr. N. D. Daru, Barrister-at-Law, a distinguished Indian student at the University of Bombay, who last year secured the B. S. degree in mining and metallurgy in the University of London, has been sent to Canada by the Government of India, to be trained in the methods of the Canadian Geological Survey.

Mr. A. W. Armstrong, manager of the railway department of the General Electric Co., at Schenectady, has been in Duluth, the past week, in conference with the Duluth, Missabe & Northern road as to the electrification of its main line from Duluth docks to Proctor. This is a distance of about six miles, and is on a 2% grade down to the docks.

Mr. W. W. Leach, formerly of the Geological Survey Department of Canada, and for some time past with the Crow's Nest Pass Coal Co., at Fernie, B. C., has been apointed chief engineer for the West Canadian Collieries, Ltd., of Blairmore, Southwest Alberta. This company is a British corporation, and owns some 20,000 acres of selected coal lands in the Blairmore-Frank district.

Mr. F. Brian, consulting engineer for Messrs. Heyl & Patterson, Inc., of Pittsburg, Pa., contractors for the steel trestle and tipple lately erected at the Crow's Nest Pass Coal Co.'s colliery, at Coal Creek, East Kootenay, British Columbia, met with an accident while examining part of the plant. As a result of a fall he fractured three ribs. He was removed to the hospital at Fernie, for treatment there.

Mr. E. H. Wright, auditor, general freight and passenger agent of the Copper Range Railroad, has resigned. Mr. F. R. Bolles, of Milwaukee, formerly traveling freight agent for Chicago, Milwaukee & St. Paul, succeeds him in position of general freight and passenger agent. Mr. Wallace Tedford has been appointed auditor. Mr. Geo. Williams, commercial agent, has been appointed division freight and passenger agent, with headquarters at Calumet, Michigan.

Mr. J. M. Deetrick has been made general superintendent in charge of the Northern blast furnaces and Mahoning Valley and Atlantic works of the Republic Iron & Steel Co., with headquarters at Youngstown, Ohio. Mr. Deetrick announces these appointments: G. E. Huggins, superintendent of the Mahoning Valley works; Robert W. Coates, superintendent of the blast-furnaces in the Shenango Valley and Atlantic works: P. J. Moran, superintendent of blast furnaces in the Mahoning Valley.

Obituary.

Joseph C. Foley, who for 16 years has been identified with gold mining in the Rainy River district, and who was recently appointed manager of the Shakespeare mine at Webbwood, dropped dead Nov. 25, while in the mine.

J. N. Tisdale, who had been connected with a number of mining companies, and who had recently been manager of the Alaskan Snettisham Mining Co., a new concern, disappeared from the hotel where he was staying in New York, on Nov. 6. On Nov. 29 his body was found in the Harlem river. The cause of his death has not been ascertained.

Dr. F. G. Fricke died in Pittsburg, Nov. 27; he retired from business a few months ago. on account of ill health. He was born in Germany and came to the United States in 1863, enlisting for the Civil War in a New York regiment. He was wounded in the battle of Strawberry Hill and remained in a Washington hospital until the end of the war, when he returned to Germany. In 1872 he again came to the United States, and after traveling through the South came to Pittsburg as chemist for the Carnegie Steel Co., at its Braddock plant. Later he took a similar position at Lucy furnace, where he was engaged until 1883, when he opened a laboratory on his own account, dealing chiefly with iron and coal analyses.

Joseph R. Laughrey, one of the best known coal and coke operators in western Pennsylvania, recently died from consumption at his home in Dawson, Pa., aged 60 years. He was born in that vicinity, and after receiving a training in the public schools he began working in the mines of Brown & Cochran. Later he was made shipping clerk of the Sterling works. For 10 years following 1875 he was superintendent of the two works. In 1885 he was made general manager of the Brown & Cochran properties. He held that position until three years ago, when he was succeeded by his son, James S. Laughrey. He was one of the promoters of the First National Bank of Dawson, a director and vice-president of the Washington Coal & Coke Co., and a director of the Dawson Supply Company.

James B. Oliver, president of the Oliver Iron & Steel Co., Pittsburg, died at his home at Shields, near Pittsburg, Nov. 28, after a brief illness, of pneumonia. Mr. Oliver was born in Allegheny, April 4, 1844, and was the third son of Henry W. and Margaret Oliver, who had emigrated from Ireland two years before and settled in Allegheny City. His education was secured at the public schools of the First Ward. At the age of 20 he entered the office of Lewis, Oliver & Phillips as a clerk and began his life as an iron manufacturer. In 1866 he was made a member of the firm, in which his brothers, Henry W. and David B., were partners. In 1880 W. J. Lewis retired and the business was continued under the name of Oliver Brothers & Phillips, and in 1887 was incorporated as the Oliver Iron & Steel Co., of which Mr. Oliver had for many years been the president and active head. He was also president of the Oliver & Snyder Steel Co., the Monongahela Natural Gas Co., and the other corporations which together form what is generally known as the Oliver interests. Mr. Oliver was a member of the Duquesne, Union and other clubs.

Societies and Technical Schools.

Western Pennsylvania Central Mining Institute.—The annual meeting will be held in Pittsburg, Dec. 20 and 21. Papers will be read and discussed on the following subjects:

1. Electric vs. Compressed Air Drills.
2. Electric vs. Compressed Air Pumps.
3. What are the Three Essential Principles Governing the Operation of Coal mines?
4. The Application of Mechanical Conveyors to Long-wall Mining.
5. Late Methods of Rib Drawing.
6. Should the Present Mining Laws be Revised, and How?

Mr. I. C. Roby, Uniontown, Pa., is secretary of the Institute.

American Mining Congress.—We repeat here, for reference, the list of officers for the ensuing year, as elected at the El Paso meeting: President, J. H. Richards, Boise, Idaho; first vice-president, Thomas Ewing, San Francisco; second vice-president, E. R. Buckley, Rolla, Mo.; third vice-president, E. A. Colburn, Colorado Springs, Colo.; secretary, James H. Calbreath, Denver.

Trade Catalogues.

Buffalo Steam Pump Co., Buffalo, N. Y., issues its new catalogue No. 87.

The Allis-Chalmers Co., Milwaukee, Wis., issues its catalogue No. 128, Crushing Rolls.

Wm. Ainsworth & Sons, Denver, Colo., issue their new catalogue of standard balances and weights of precision.

The Otis Elevator Co., 17 Battery Place, New York, issues a new catalogue describing its machinery and apparatus.

Truax automatic ore cars are described and illustrated in the catalogue of the Globe Iron Works, Stockton, California.

The National Electric Co., Milwaukee, Wis., issues a bulletin describing its polyphase induction motors and air compressors.

The Power & Mining Machinery Co., Cudahy, Wis., issues its catalogue No. 4, describing machinery for rock-crushing plants, and catalogue No. 5, entitled "Gold

and Silver Mining," together with six bulletins.

The Fort Wayne Electric Works, Fort Wayne, Ind., issues three new bulletins, on small power motors, single-phase motors and integrating wattmeters, respectively, and an instruction book for use in setting up induction motors.

Industrial.

The Jeffrey Manufacturing Co., of Columbus, O., has recently established a New England branch, with offices in the Oliver Building, at 141 Milk street, Boston, Massachusetts.

Work was begun recently on No. 2 furnace of the New Jersey Zinc Co., at Palmerton, Pa. The stack will be 70 by 14 ft., and will be used for the manufacture of spiegeleisen from zinc-ore residues.

The De La Vergne Machine Co., New York, reports closing contracts for 3 500-h.p. Koerting gas-engines for direct-connection to 325-k.w., 550-volt direct-current Crocker-Wheeler generators for the Boston Elevated Company.

Bowring & Co., 17 State street, New York, announce the completion of arrangements by which Cornes & Co., Yokahama and Kobe, Japan, act as their agents in that country, while they act as Cornes & Co.'s agents here.

It is stated that two additional furnaces may be added to the Carrie furnace plant of the Carnegie Steel Co., each of 600 tons capacity. If these are built they will be 22 by 85 ft. in size, and equipped with the Gayley dry blast plant. It is believed that two stacks of the same size will also be added to the Duquesne furnace plant.

Another plant is being established at Franklin for the manufacture of iron and steel bars for reinforced concrete work. The Rogers Shear Co., Warren, Pa., has secured a site near the plant of the Franklin Rolling Mill & Foundry Co., and will erect a rolling mill plant, installing an 18-in. train of rolls. The contract for mill, engines and boilers has been awarded.

The Allis-Chalmers Co., Milwaukee, Wis., reports closing contracts for 3 centrifugal pumps, each having a capacity of 10,000,000 gal. daily, for the Massapequa pumping station, Borough of Brooklyn Water Works. The contracts were let by Michael J. Dady, general contractor, Brooklyn, New York. The pumps will be driven by vertical cross-compound engines.

The business formerly conducted by the S. Rose Co., at 76 Nassau street, New York, has been transferred to a company of the same name. The S. Rose Co. has been incorporated with a capital stock of $50,000, for the purpose of dealing in carbon and bort for diamond tools and mining machinery, and also for the manufacturing of diamond tools and mining machinery, etc., as well as the development of mineral properties.

The Fulton Iron Works, of San Francisco, Cal., report the following recent orders: Air compressor and accessory equipment for the Kennedy Mining Co.; milling machinery for the Sierra Buttes mines, both in California; hoisting engine and Blake crusher for German Roth & Co., in Mexico; 2 electric hoists for the Llanos de Oro Mining Co.; mining machinery for the Butters-Salvador mines, both in Mexico; milling equipment, concentrators, etc., for the Coso Reduction Co.; tube mill for the California Ore Reduction Co., both in California; complete equipment for the Don Pedro gold mine in the same State; lead furnace and equipment for the Copthall Stores Co., Rhodesia, South Africa; and a hoisting engine, boiler, 2 air-compressors and 4 Wood drills for the Querobabi Mines Co., in Mexico.

Construction News.

Elmo, Wisconsin.—The Walker Mining Co., of this place, is in the market for rock drills.

Parral, Chihuahua, Mexico.—The Pittsburg Smelting & Refining Co. will erect a smelter here.

Apex, Colorado.—At the Ingram mine new shaft-buildings and a milling plant will be installed. H. Pollock, Apex, is manager.

Tolland, Colorado.—An air compressor plant is to be put in at the tunnel on the Andubon mine. J. W. Stright, Tolland, is in charge.

Kingman, Arizona. — The Kingman Smelting & Refining Co., capital $1,000,000, has been chartered here to erect a large custom smelter.

Golden, Colorado.—A 50-ton concentrating plant is to be put up at the Denver group in East Argentine district. A. A. Ireland, Golden, is lessee.

Batopilas, Chihuahua, Mexico.—The Batopilas Mining Co. will establish a reduction plant here. The Santa Gertrudis river will afford the power for operating the plant.

Deadwood, South Dakota.—The Globe Mining Co. will equip its mill with new machinery. A large pump will also be installed at the mine. Frank Ickes, Deadwood, is manager.

Attapulgus, Georgia.—The Lester Clay Co. is installing machinery for the development of fuller's-earth deposits, the daily output of finished product to be 30 tons. M. Graves is general manager.

Georgetown, Colorado. — The United Light & Power Co. has placed the sum of $100,000 for a large extension of the property in the hands of its management, with the expectation of doubling the capacity of the plant, and of adding every practicable economical feature.

Gomez Palacio, Durango, Mexico.—The Hidalgo Cement Co. has been organized here for the purpose of establishing a cement plant at Hidalgo, near here. The plant will have a capacity of 1,000 bbl. a day. Juan Brittingham, a wealthy manufacturer of this place, is interested in the project.

Windrock, Tennessee.—The Wind Rock Coal & Coke Co. will instal electrical haulage in its No. 1 and No. 2 mines. The company will need 60 tons of second-hand, 35-lb. steel rails; also copper wire, generators and fixtures, and boilers. The company's address is Windrock, Anderson county, Tennessee.

Zacatecas, Mexico.—Munos & Garcia will erect a cyanide plant for the purpose of treating the tailings that have been run into the Pedrenolilio lake from metallurgical works. The tailings will be obtained from the bed of the lake by means of dredges. The cyanide plant will have a daily capacity of 100 tons.

Santa Barbara, Mexico.—The Cia. Mina Tecolotes y Anexas, of this place, has decided to increase the capacity of its gas plants, the intention being to have all the machinery of mines and mill electrically driven. It is also understood that, commencing at an early date, the entire mill will be remodeled and enlarged to give additional capacity.

Fort Smith, Arkansas.—The Arizona Independent Vacuum Smelting Co., capital $150,000, has been chartered. The directors are John R. Boddie, F. L. McGahan, M. E. Chamberlain, R. C. Bollinger, W. B. Pape, J. M. Langston, Jr., Joe Alexander and others. This company will establish a plant equipped with the McGahan patent vacuum smelters.

Galena, Missouri.—E. R. Mower has secured a lease on 40 acres of the New Jersey Zinc Co.'s land, 1 mile south of Galena, and will sink a shaft to a depth of 250 ft. The ground is to be drained, and the old Stair mill will be kept in operation while the work of sinking is in progress. In addition to this work, it is announced, two more shafts will be sunk to a depth of 250 ft., and as soon as they are down to the ore two mills will be built.

Villa de Alvarez, Colima, Mexico.—The iron-ore deposits near here are to be developed on a large scale by El Mamey Iron Co., of Duluth, Minn. This company has a capital of $250,000 gold, and recently acquired the property from Charles H. Showers and Kent E. Keller, of St. Louis, Mo. Iron furnaces will be built at the mines, which are situated 27 miles from the port of Santiago, on the Pacific coast. The company will build a railroad from the mines to the coast. Thomas Bardon, of Ashland, Wis., is interested.

Special Correspondence.

San Francisco. Dec. 1.

The Anti-Débris Association continues its activity in trying to stop hydraulic mining even where Government licenses have been granted and débris-impounding works built. At a recent meeting some of the members of the executive committee drew attention to the question of dredge mining upon the Feather river, and it was decided to notify those so engaged to appear before the committee at its next meeting in order to discuss the question and endeavor to devise some means to prevent further injury by dredge mining.

As the Anti-Débris Association is a private organization, with no official authority whatever, the calling before them of men engaged in a lawful, recognized method of mining, seems a rather high-handed plan of operation. From this action, however, it is evident that the Anti-Débris people are going to give trouble to the dredge miners, just as they have for years harassed the hydraulic miners. At the recent Miner's Association convention not a single representative of the dredge men appeared, nor did their association even answer letters addressed them on the subject. They will doubtless, however, if they have trouble with the Anti-Débris people, call upon other miners of the State for assistance and backing, and try to invoke the aid of the Miner's Association.

The Governor of the State has now filled the vacancies in the board of trustees of the State Mining Bureau, and the full board is now as follows: Curtis H. Lindley, Fred W. Bradley, Louis Janin, E. A. Stent and Harold T. Power. All of these are first-class practical men and men of standing. The board is probably the best the Mining Bureau ever had. Thus far no meeting for organization has been held, owing to the absence from the State of one of the members of the Board. Lewis E. Aubury continues to hold the position of State mineralogist, though his term of office expired some months since, and this is construed by his friends as meaning that he will remain throughout another term, the Governor not having signified his intention of making any change.

Creditors of the Royal Consolidated Mines, Ltd., of California, have filed a petition in the United States District Court asking that the corporation be declared an involuntary bankrupt. This mine is at Hodson, Calaveras county, and holds the record for cheap mining and milling of free gold quartz ore. Other litigation concerning the property is still pending.

Fred Sciaroni and W. T. Mitchell, who were convicted about four weeks ago on a charge of wrecking the Angels mine, located at Angels Camp, have been sentenced to serve a term of five years each in the San Quentin prison. The mine is owned by James V. Coleman, who vigorously prosecuted the offenders. On learning that the foreman was about to be discharged, these men fired charges of dynamite in the underground works, doing some $50,000 worth of damage to the property.

J. M. Tully has commenced suit in Santa Clara county to remove Robert Neuberg, president of the Hydraulic King Placer Mining Co., and F. Kosanhi, secretary, from the board of directors. Plaintiff alleges that he is a stockholder in the corporation, which is capitalized at $125,000, and conducting mining operations in Plumas county. He further avers that it is the duty of the board of directors to make an itemized account and balance sheet on the second Monday in each month, which account is to be verified under oath by the secretary and president and posted in the office of the corporation. Plaintiff alleges that the Board failed to do this during the months of August, September, October and November; therefore he asks for the removal of the president and secretary.

The Nevada Power Co., which is supplying electric light and power to Tonopah and Goldfield, and which is soon to run to Bullfrog and Silver Peak, has applied to the Interior Department at Washington for permission to build a large reservoir at Middle Lake, on Bishop creek, in Inyo county, California. Rights to the lake have already been secured. The purpose of the company is to secure an even flow of water during the year, to insure the supply consumed by its generating plant.

After some 198 days of drought, the entire State has this week received a good soaking from the heavy rainstorms which have occurred. The first rains were quickly absorbed by the dry soil, but the following heavy downpour will doubtless set the streams running again. Then the reservoirs will soon begin to fill and the quartz and hydraulic mines start up once more.

Bisbee. Nov. 30.

The Calumet & Arizona mine is now shipping to smelters about 3,800 tons of ore weekly, the Lake Superior & Pittsburg about 1,000 and the Pittsburg & Duluth is commencing to ship from underground; it has been sending forward nothing but stocked ore at the rate of about 700 tons a week. Copper Queen is shipping to smelters about 10,000 tons a week. All the mines are looking well and a small increase in shipments is looked for after the new year, as No. 6 furnace of the Queen should then be in operation. November production of the two smelters has not been announced, but is about 11,200,000 lb. of copper.

At a recent meeting of the directors of the Shattuck-Arizona Mining Co. it was voted to spend at once $100,000 for betterments. These are to include a new and larger hoist, the enlargement of the shaft to three-compartment, a complete oil system for the mine plants, and a 3,000-ft. aerial tram from mine to the Spray railroad yards. The mine has about 3,000 tons of 10% ore in stock, which is to be shipped to the Queen smelter at once, and it is expected that small shipments can be maintained from this time on. No decision has been reached as to smelting capacity for the company, and nothing will be done about this for some time.

Denn shaft is now down 700 ft. and is sinking at the rate of 150-ft. per month. The entire time since surface work was begun at this property there has been an average monthly sinking rate of 106 ft., which is considered excellent. The shaft is 14 by 5 ft. inside timbers, and has been in crystallized limestone all the way.

Hoatson shaft of the Calumet & Pittsburg is now down 675 ft. There has been much rivalry between the crews working in this and those of the Denn, and a good deal of money is up as to which shall cut ore first. The odds now seem to be with the Denn.

In the 1,000-ft. level, north, of Lake Superior & Pittsburg, they have lately run into excellent oxide ores, and are now close to a connection with the Calumet & Arizona drifts in the Buckeye claim. This 1,000-ft. drift wil lbe about a mile long, and will aid very materially the development of intervening ground. Work of sinking the Cole shaft at this mine to 1,400 ft. begins next week. The shaft is now 1,2000 ft. deep.

One of the biggest floods that was ever known at Clifton is now in progress, and the mines are said to be suffering severely.

At the Old Dominion mine the new concentrator is to be enlarged to a capacity for 500 tons a day. A reverberatory furnace is to be installed after sufficient tests have proved its value, and a fourth blast-furnace will be blown in soon after the close of the present year. It is thought these improvements will give the mine a capacity for about 50,000,000 lb. of copper a year. Its production now is at the rate of about 2,500,000 lb. a month. A large amount of development has been done in the mine during this year.

Helvetia Copper Mining Co., with properties north of here, is soon to begin production. Its shaft is now 800 ft. deep; its smelting furnace has 200 tons a day capacity, and there is abundant oxide ore developed in the mine to keep it at work for some time.

Salt Lake City. Nov. 29.

The management of the Daly Judge Mining Co. has announced that the mill at that Park City property will be placed in operation again about the first of the new year. During the past two years the policy of the company has been toward development.

The Ontario tunnel at Park City is being drained rapidly, but it will probably be several weeks before much will be

known of the condition of the mine. The opening of the adit has caused profound satisfaction in camp.

Unusual activity in mining is reported from the La Sal mining district in southeastern Utah. Colorado capitalists are said to have been on the alert and have acquired property for development. The old mill built at Basin, Grand county, is to be started again.

The monthly statement covering the operations of the Daly West Mining Co. during October has been issued and shows total receipts of $132,964; disbursements, including $3,208 set aside for insurance and tax reserve, $61,121; net earnings, $70,943; dividend requirement, $36,000; addition to surplus, $34,943.

A conference, lasting several days, between officials of the Rio Grande Western, the American Smelters Securities, the Utah Copper, and the Boston Consolidated mining companies, resulted in a satisfactory rate on ore to be hauled from the mines of the camp to the smelters and mills at the new town of Garfield. While no exact figures have been released, it is said to run from 20 to 30c. per ton. The Rio Grande agrees to build all necessary switches and spurs to the mines without cost to the mining companies.

There has been a shortage of ore coming from the camp of Bingham this week, owing to a breaking down of motive power on the Copper Belt railroad, which is operated by the Rio Grande Western. The road is equipped with three Shay engines, which have been taxed to the limit of endurance owing to the rapid increase in traffic. As a result of the breakdown the Ohio Copper and Utah Copper mills were forced to close. The mines depending on the road are the Boston Consolidated, Bingham-New Haven, Yampa, Ohio and Utah Copper. New locomotives have been ordered, and the present uncertain condition will soon be overcome.

The Wiswell Milling Machinery & Mining Co., with a capital stock of $500,000, has filed its articles of incorporation. The object is to engage in the sale and manufacture of a new ore-concentrating device. John W. Morrison is president; John W. Ball, vice-president, and Frank H. Clark, secretary and treasurer, all of Salt Lake.

Several companies, allied to the American Smelting & Refining Co., have filed copies of their articles of incorporation with the Secretary of State of Utah, all being New Jersey concerns. The Garfield Smelting Co., formerly the Silver Lake Mining Co., has a capital stock of $1,000,000. Daniel Guggenheim is president; Edward Bach, secretary; G. M. Borden, S. R. Guggenheim, Samuel Guggenheim, Barton Sewall and Benjamin Tracy are mentioned as shareholders.

The Garfield Water Co. has a capital stock of $300,000, divided into $100 shares. John A. Keppleman is president; Ross A. Mackay, secretary. Other stockholders are Gilbert H. Montague, Neil A. Weathers, Millard C. Humstone, Mason A. Trowbridge and William A. Parker.

The Garfield Improvement Co. is the name of the third company. It has a capital of $200,000, divided into $100 shares, and will engage in a general townsite business. Its officers are the same as the Garfield Water Company.

The Sacramento Gold Mining Co., operating at Mercur, has shipped a carload of quicksilver, a by-product of the mine, to Philadelphia.

Judge Marshall, of the Federal court, has issued an order directed to the local management of the American Smelting & Refining Co., to permit the farmers interested in the smelter-smoke cases and their experts to enter the works of the company to ascertain what is being done to eliminate the smoke trouble, provided the visitors do not interfere with the operation of the smelter. Some time ago a committee representing the farmers, was denied admission to the works by the local manager, Charles W. Whitley, for which act he received severe censure. The other smelting companies granted the application, and the managers took pains to show the committeemen about and to explain to them what they were doing to eliminate the smoke trouble.

Denver. Dec. 1.

The property of the Gold Coin Mining & Leasing Co., at Cripple Creek, has been transferred to the Granite Gold Mining Co., whose property adjoins it on the north. The Granite Co. is a close corporation controlled by prominent parties at Colorado Springs, among them Tutt & Penrose and Charles M. McNeill, and has been a heavy shipper for some time. The plan is to work the Granite mine after this, through the Gold Coin shaft, from the 900-ft. level. It is not possible to state the price at which the sale was made, but as the plant of the Gold Coin mine alone represents an original outlay of about $200,000, a large amount is involved. It is generally understood that the mill of the Economic Gold Extraction Co., situated at the mouth of the tunnel, through which the Gold Coin property has been partly operated, is not included in the sale.

As the projected large drainage tunnel will necessarily be of greater benefit to the properties through which it runs, than to such as are located some distance from its route, and some properties might be involved in litigation with intervening owners while trying to connect with the tunnel, provision will undoubtedly be made in the contracts for such contingencies, and this matter is at present being considered by the projectors.

A company is being organized for the purpose of building a new railroad from a point on the Colorado Midland to the Cripple Creek district and thence to Pueblo. Engineering parties are in the field surveying the proposed route.

Manager Herron's official report of the Tomboy Gold Mines Co., of Telluride, for the past fiscal year announces a profit of $186,530. It also states that the yield rose from $7.01 per ton in March to $8.82 in September of this year, while the cost of reduction has been reduced about 15 per cent.

The Pandora Gold Mining & Development Co., which has recently acquired a long lease on 2,300 ft. of the Pandora vein, has started the milling of about 250 tons of ore at the Pandora mill of the Smuggler-Union.

The Keystone placer property at Telluride has closed down for the winter and is said to be on a paying basis at last. The production this year is stated at about $30,000.

The United Rico Mines Co. has completed its plans to open up its large holdings, and within a few days expects to finish the re-modeling of the mill, which will treat from 75 to 100 tons of ore daily.

At the annual meeting of the directors of the Colorado & Southern Railway Co., held in New York a few days ago, J. M. Herbert was elected first vice-president and general manager, with headquarters in Denver.

The Chicago, Burlington & Quincy Railroad Co. has incorporated the Denver & Beaver Valley Railway Co., in order to extend its line to Pueblo from a point on its St. Francis branch in Kansas. When constructed, that system will have its own line from the Colorado Fuel & Iron Co.'s iron mines in Wyoming to the bessemer plant at Pueblo.

It is understood that the Department of Justice has issued instructions to have all suits brought by the Government in the Gore Cañon case dismissed without prejudice, which will leave the Denver, Northwestern & Pacific Co. at liberty to continue the construction of the line to Salt Lake City.

A satisfactory adjustment of the differences between the Pike's Peak Coal Co. and the miners, over the demand to have a check-weighman, which the law provides for, has been effected by Deputy State Labor Commissioner Brake. The company is operating near Colorado Springs.

Leadville. Nov. 30.

The remarkable advance in the price of silver, coupled with the increased price for lead paid by the trust and the independent plants, has had a marked effect on this district. Most of the silver-lead mines have increased their production, and old properties that have been idle for many years are making preparations for an early resumption.

Major A. V. Bohn, manager of the Citizen's Mining Co., which is sinking a shaft on the Mammoth placer in Big Evans gulch, has reached a fine mineralized con-

tact and is confident that the shaft is nearing the ore zone. The discovery of mineral in this section of the district would be highly important, as it would open up an entirely new territory to exploration.

Operations have been resumed on the Long & Derry mine, on the hill of that name. This is one of the oldest properties in the district, but has been closed on account of litigation. The David Harum Mining Co., adjoining, has also startcd a new shaft.

One of the largest lead producers in the district at the present time is the Continental Chief, on Mosquito range, above timber line. The mine is being operated by Patrick Mulrooney, the owner of the Greenback mine, on Carbonate hill.

According to the best estimates, the production of the district for the month of November will be approximately 80,000 tons. The average value of the ore is $15 per ton.

The Sequin mine, on Hook hill, under the management of T. B. Wilgus, made its first shipment of ore a few days ago. The mineral is a lead-silver carbonate, and is taken from the Reindeer shoot.

The New Monarch mine, on Little Ellen hill, which is owned by the independent smelter at Salida, is now shipping about 200 tons per day of gold ore to its plant. The main shaft of the property is being sunk to reach the lower or sulphide levels.

The Fortune mine, adjoining the Resurrection, on Little Ellen hill, is now under lease to George R. Becker, and production has been resumed on a large scale.

A remarkable feature of the mining situation in the Leadville district is the rapidly increasing zinc tonnage. Six years ago Leadville's zinc production was very small. The entire amount was taken by a Cañon City concern, which utilized the product in the manufacture of paint. In order to ship this at all, it was necessary that the ore should be of high grade, with a certain percentage of lead. Since that time the zinc smelters have made a careful investigation of the Leadville field, and the result is a demand for the Leadville ores which is unprecedented. The two largest operators of the Leadville district, the Iron Silver Mining Co. and the Western Mining Co., are devoting most of their attention to the handling of zinc ores. Two years ago the ore shipped from the camp averaged about 45%. Today ore as low as 25% is handled profitably, and crude ore which is milled will run much lower. About 18,000 tons per month of zinc ore is produced.

The great tunnel that will connect Lake and Park counties, through the Mosquito range, will probably be commenced next year. Colonel James A. Shinn has just returned from the East and has announced that the preliminary plans have already been drawn up. This tunnel is primarily for the purpose of cutting the series of blanket veins in the property of the old Stormy Petrel Mining Co. In addition, however, it is believed that it will eventually be used as a railroad tunnel, materially shortening the distance between Leadville and Denver. At the point where the tunnel will cut through the range the great bore will drive through a perpendicular wall of work about 4,000 ft. in thickness.

The Silver Nugget mine, on Breece hill, operated by R. W. Spensle, has just encountered a vein of ore while sinking the shaft. The ore was struck 120 ft. from the surface. Water has interfered with the sinking operations, but a new plant of machinery to handle the flow will be installed.

Leadville will soon resume shipments of manganese. Some years ago, owing to the competition resulting from the importation of manganese brought as ballast from Cuba and shipped to the Illinois works, the production of 500 tons a day from this field was entirely cut off. The Colorado Fuel & Iron Co., at Pueblo, has recently come into the local market for manganese ore, and the production has now reached nearly 100 tons a day. The Cloud City Mining Co. is preparing to make extensive shipments to Pueblo.

Butte. Nov. 28.

Officers of the Pittsburg & Montana Copper have announced that the company's smelter will be enlarged during the coming year. The plant now contains one blast-furnace and three converters, two small and one large. Only the latter is in use. The company shipped 41 tons of copper East last week and will send out another carload the latter part of this week. Its gross output this month will aggregate about $120,000 worth of copper, silver and gold. The mines are yielding more ore than the plant can treat. Work in the new 1,200-ft. shaft is under way.

United Coper is now unwatering the Lexington mine and is making fair headway. It is also prospecting the Belmont with a view of discovering better and larger orebodies there. Nearly 3,000,000 lb. of copper a month is the output of the smelter.

The new Coram syndicate has about finished the acquisition of claims in the Butte district, and will round out the details of the proposed corporation in Boston within a few days. Its latest purchase is the Silver King, one of the best gold and silver producers in the city. The deal involving this mine will be closed tomorrow. The sum to be paid is $500,000. The property is owned by James A. Murray, a Butte banker; Silas F. King, of Butte, and the estate of Marcus Daly.

North Butte is expecting its new engine in a few days. Preparations for it are about complete. The company expects to finish the re-timbering of its shaft in a few days. It is raising ore almost continuously by way of the High ore shaft.

The Raven Co. has struck a shoot of rich ore in the east drift on the 1,200, and is following it. The ore is bornite and peacock copper. The company has large quantity of ore of lower grade.

East Butte Copper has opened a 9-ft. vein of coper ore in the Yankee Boy, on which it has an option, the strike being made at a depth of 250 ft. Considerable ore is being extracted from the various claims under the control of the company, but none of it is coming from below 300 ft. depth.

Amalgamated is developing new ground east of Butte, through which its west side veins are supposed to pass. It will sink several hundred feet and crosscut north and south, giving the property a thorough test. The sinking is being done on a 2-ft. vein of copper ore. It is also opening old ground in the southeastern part of the city. It has ore there. The company is shipping its daily quantity of 7,000 tons to the Washoe plant and 3,000 to Great Falls, but expects to increase the latter as soon at it can secure railroad cars to transport it, which will be early in December.

Calumet. Dec. 2.

Articles of incorporation of the Lake Copper Co., capital $2,500,000, in 100,000 shares of a par value of $25 each, were filed with the secretary of this State this week. The company is formed to acquire and develop the old Belt property in Ontonagon county. The company will issue 55,000 shares of its capital stock to the owners of the Belt lands in exchange for the deeds. There will be 15,000 shares issued to the public at $3 each, and the remaining 30,000 shares will remain in the treasury, to be issued at the discretion of the directors.

As illustrating the temper of the investing public regarding copper securities, the 15,000 shares of the Lake Co. were subscribed before the organization became generally known. Orders were received for three times the number of shares to be distributed, and as a result all subscriptions were cut. Not a share of stock was issued to parties outside of Houghton and Ontonagon counties. After the subscriptions were closed, Boston parties sent in large orders, but they were not considered. One house wanted 5,000 shares. The Belt mine, which the new company will open, is considered one of the most promising properties in the Lake Superior copper district. It is an old mine, but has not been worked for some time. Work on the property was first done in 1848. In 1882 the mine passed into the hands of an English company, but mismanagement caused a cessation of operations. The Belt is located east of the Hilton portion of the Adventure mine, and comprises about 1,890 acres. The cupriferous lodes of the Evergreen mineral belt traverse the property, and in addition there are other mineralized and unidentified beds. In former years work was distributed be-

tween a number of different points, making a scattering of shallow openings, some of which disclosed good copper values. It is the plan of the present management to re-open one of the old shafts. This opening is located advantageously and it is purposed to sink it from its present depth, 300 ft., to the 600-ft. level and possibly deeper, in order to permit a thorough exploration at good depth. Extensive diamond drill explorations are also planned. This work will begin on the outcrop of an unidentified lode and a cross-section eastward from that line to the boundary of the property, ,4000 ft. distant, will be made. By this means the various unidentified lodes will be revealed and the management enabled to form an accurate opinion of their respective values, ascertaining if there are other formations worthy of investigation. Already arrangements are under way for the starting of work and operations will be pushed with all possible speed. It is undecided whether the company will do the diamond drilling itself, or let a contract for the work. Machinery and supplies for the development of the shaft are being secured without delay, and sinking should be in progress within a very short time.

Hoisting at No. 2 shaft of the Osceola Consolidated Co.'s South Kearsarge mine is now being done with the new hoist. This engine was in use at No. 2 shaft of the North Kearsarge mine until that shaft went out of commission, after Nos. 1 and 3 had been enlarged to care for the entire production of the property. It was overhauled and provided with a new drum before being installed at No. 2 shaft, South Kearsarge. It is of sufficient capacity to last during the remainder of the life of that shaft, and should render economical service. The old engine which it displaces is of historical interest. It was built for the Osceola mine property by the Hodge Iron Co., in Detroit, 30 years ago. Later it was removed to No. 5 shaft of the Tamarack, and was used throughout the period of sinking that shaft, from which it was taken to the Kearsarge.

Service is now being rendered by the permanent hoisting engine at D shaft of the Champion mine. This is the first permanent hoisting engine installed by the Champion Co., as the engines provided for development purposes are of unusually high capacity, and have been capable of carrying on operations in the present depth. The permanent hoist at D shaft was completed several months ago, but delay in completing the boiler plant prevented it from going into commission before.

There still remains 100 ft. for the crosscut west from the shaft on the Mayflower property to penetrate before reaching the next amygdaloid lode of promise. The work is going forward at a depth of 580 ft. None of the lodes opened so far on the Mayflower have shown conditions of lasting promise.

At the Old Colony property, adjoining and under the same management as the Mayflower, work is confined to sinking. A depth of 750 ft. has been attained. Exhaustive investigation of the condition of the various lodes at the 600-ft. level was made, but nothing of real value was found. It is uncertain to what depth the shaft will be sunk, but this will depend largely upon the condition of the lode in which it is opened.

Sinking in the active shaft on the Elm River property has reached a depth of 750 ft. and the lode is showing more encouraging conditions. Up to a short time ago ground penetrated was hard and flinty, but recently the rock has become softer and more favorable for carrying copper values.

Duluth. Nov. 30.

The most severe storm in the history of Lake Superior swept over that lake last Tuesday, and resulted in the loss of more steel ships of the newer class than had ever been destroyed in an entire year. The Pittsburg Steamship Co.—the lake end of the United States Steel Corporation—was chief sufferer. The net results of the storm, so far as the Corporation is concerned, seem to be as follows: The steel ship *Lafayette*, valued at $225,000, and 454 ft. long, a total loss. This ship went on the rocks about 40 miles northeast of Duluth, and in less than 10 minutes after striking broke in two, and the parts separated at once, so rapidly in fact, that men could scarcely get from one end to the other. This was one of the ships built by the Carnegie Steel Co. in 1900, and was one of the finest vesels of the lake fleet. The steel ship *Mataafa*, valued at $240,000, and 430 ft. long, is a total loss. This ship had left Duluth with her consort a short time before the storm, and had been compelled to turn back. Upon reaching the harbor entrance the consort was dropped and laid at anchor outside through the entire storm, while the big steamer attempted to make port alone. The ship, though loaded with 6,000 tons of iron ore, was so light a plaything for the waves that they lifted her and dropped her with terrific force upon the bottom, at a point close to the harbor piers and where the water was more than 30 ft. deep. On acount of this she could not make the piers, and drifted on the beach, 500 ft. from shore and from a densely populated part of the city.

The steel ship *Wm. Edenborn*, built in 1900, valued at $255,000, and 498 ft. long, can possibly be released and re-built. This ship went on the rocks of the north shore, 40 miles northeast of Duluth. Wrecking operations have already commenced, and the salving of the ship will depend somewhat on the weather conditions for the next few days. The steel barge *Madeira*, consort of the *Edenborn*, was also lost 38 miles from Duluth. She was valued at $175,000, and was 436 ft. long. This ship was built in 1900. Steel barge *Manila*, built in 1890, valued at $155,000, and 436 ft. long, can probably be saved. This ship was consort for the *Lafayette*. Steamship *Crescent City*, valued at $210,000, 406 ft. long, and built in 1897, went ashore at the Duluth city pumping station, and can perhaps be saved. The steel ship *Coralia* and consort *Maia*, valued at $220,000 and $135,000 respectively, went ashore and are being released. The steel steamship *I. L. Elwood*, valued at $255,000, and built in 1900, struck the concrete piers coming into Duluth harbor and sank just inside the harbor. This ship has been raised. This makes 10 steel ships of the largest class, all belonging to the Pittsburg Steamship Co., that were either total losses or were more or less seriously injured by this storm. These valuations are all insurance figures and are low.

Other vessels wrecked during the same storm at the head of Lake Superior were the *R. W. England*, out this year, valued at $200,000, and 398 ft. long, which was driven half a mile out of water sufficient to float her, but is released. The steel ship *Monkshaven*, built in Scotland in 1882, and valued at $70,000, went on Pie island and is a total loss. This ship belonged to the Lake Superior Corporation, of Sault Ste. Marie, Ont. *Western Star*, valued at $250,000, grounded but released. The wooden steamship *Geo. Spencer* and barge *Amboy*, valued at $35,000 and $12,000 respectively, are total losses at a point about 40 miles from Duluth. They were the property of the Tonawanda Iron & Steel Co. The steel ship *Bransford*, valued at $240,000, and 450 ft. long, was stranded on Isle Royale and can probably be saved. In addition to these a number of smaller and less valuable vessels were lost on other lakes, while other big ones must go into docks. The total losses by this one day storm will probably amount to not less than $2,750,000. The Pittsburg Steamship Co. carries no insurance, on account of the size of its fleet, and the varying ports at which the vessels trade. Even with this loss the company's insurance fund is far from wiped out.

Platteville, Wis. Nov. 29.

The Platteville Lead & Zinc Co. paid another $15 dividend the early part of the month. The next regular monthly dividend, payable next month, will put the amount paid in dividends to $100,000. The original capitalization of this mine only amounted to $20,000.

The Cardiff Coal Co., which is largely interested in the Platteville district, has asked for bids for running a crosscut drift, 5 by 7 ft., for a distance of 200 ft. The mine is located in the Potosi camp.

It is the intention to sink the main shaft

of the Platte mine, in the Platteville camp, to the bottom of the vein in order to reach the richer run which has been located recently. The Platte has been shipping considerable ore, and as soon as the lower run is opened up it is estimated that the output will be doubled. The manager has installed a roaster kiln of his own design, which is reported as doing good work.

The Red Jacket Lead & Zinc Co. has been organized under the laws of Wisconsin, with a capital stock of $85,000, with Mr. Hodge at the head of the enterprise. It is the intention of the company to purchase the fee to the land and all existing mining rights. A complete equipment of modern machinery is to be installed at once, as there is enough ore on the dumps to keep a 100-ton mill going for some time. It has also been proved that there are veins below the water level. The Red Jacket lies in the richest part of the Centerville district.

An examination of several mines in the vicinity of the Cuba City camp has been made by an expert engineer in the interest of New York capitalists, involving in the neighborhood of 1,000 acres of mineral-bearing ground.

Recent developments in the neighborhood of Mifflin confirm the fact that the Mifflin-Linden camps will be among the large producers in the district.

The Acme Mining Co., a Wisconsin corporation, has been organized to carry on the operations at the mine, which is on the Segelke property, in the Platteville camp. Among the organizers are Fred. Krog, president of the Empire, and Dr. H. Gasser. Extensive prospecting and development work has been carried on all summer.

It is reported that the old Tippecanoe mine is to be started up again. Sufficient capital has been raised to equip the mine. J. V. Gardner, of Platteville, is the moving spirit.

Highland, the richest "dry-bone" camp in the district, is considering a peculiar condition of affairs. While excavating for drainage purposes on the main street, a body of ore was encountered, and several parties immediately applied to the village board for permission to sink a shaft in the main street.

A strike of dry bone is reported on the Williams land, near the Highland camp.

Until recently, it has been held by mining men that zinc did not occur below what is locally called "glass rock." This theory has been exploded by recent discoveries in the neighborhood of the Sally Waters mine, at New Diggings camp, where a 30-in. vein was encountered several feet below the glass rock.

The total shipment of zinc ore reported from the Grunow mine, at Mifflin, for the season, has been 3,500 tons.

Indianapolis. Nov. 27.

The Indiana delegates to the Chicago meeting of coal operators, after returning to their homes, made the announcement that the national organization will yet be formed. Secretary Penna, of the Indiana Operators' Association, says that "No district in the country is strong enough to prevent it."

The Indiana miners are preparing to meet the issue to be presented at the Indianapolis joint conference, when the committee of State commissioners of the Operators' Association presents its declaration of principles. There are several of these, and while they are not to be made public at present, it is understood that in the main they are directed against stampede strikes at mines. The operators say that unless there is to be better assurance against such interruptions of operations, it is idle to sign wage contracts in which there is a provision requiring continuance of work pending settlement of disputes by arbitration. The miners find excuse in the changed conditions at many mines which are not covered by the terms of the contract.

A circular has been sent from the headquarters of the Indiana miners to the 170 locals in Indiana, in which it is said: "As you are aware, the mine bosses and superintendents are holding a series of meetings for the purpose of establishing true uniformity and to go into our next conference to formulate a contract which will cover all conditions met with around the mines. Therefore, to be fully prepared to meet them, I beg leave to ask the following questions." Then follows many questions as to the best method of covering disputed questions as to conditions of labor. President O'Connor has contended for some time that by altering the old contract, interlining, etc., it has become complicated and open to varied construction.

It is given out that at the conference held in Chicago it was decided that no reduction or increases would be made in the wages of the mine workers at the Indianapolis joint conference, to begin Jan. 29. This conference was held prior to the hour fixed to organize the new organization of operators. At that time the new organization was thought to be practically assured, and the mine owners thought with such an organization they would be powerful enough to refuse to increase wages, and deemed it inadvisable to force a fight by asking for a reduction in the scale. It is now believed that another effort will be made to perfect a permanent organization, but not until the Indianapolis January meeting.

The car supply of the Indiana mines is not more than 40 or 50% of the requirements, and the matter having been called to the attention of the Indiana railroad commission, the latter has called the attion of the railroads to the urgent necessity of doing everything within reasonable limits to break the coal blockade and avert a probable famine. The commission holds that railroads chartered by the State certainly do owe their first duty to Indiana industries along their lines. A scarcity of coal in the markets affects the consumer seriously, while a glut at the mines, on the side tracks and in the yards of near-by distributing stations means a hard winter for the miners. The commission asks that there be an improvement in the coal-carrying affairs of Indiana roads.

It is pointed out that the railroads are interested in keeping the markets bare and the prices up; that the railroads are behind most of the big combinations that have been formed in Indiana during the last year. The number of coal-mining companies have been decreased one-third, and it is said that it is the railroads that are the actual owners of the mining properties today. The commission has asked the railroads to make every possible effort to facilitate the shipment of coal by interchanging freely at the junction and terminal points; by accepting cars with coal that originated on other roads; by assigning to mines at non-competitive points their proportionate share of cars, and by assigning to Indiana her full share of cars and equipments.

The Queen Coal Mining Co., of Jasonville, has filed articles of incorporation. The company proposes to open up new mines and develop coal lands in Greene county. The directors are James H. Persons, H. L. Hyatt and F. L. Persons.

A coal shaft has been sunk at Stendel, in Pike county, to a depth of 110 ft., where an 8-ft. vein of fine coal was found. This is the deepest shaft in the county.

Scranton. Dec. 5.

It is announced on semi-official authority that the Lehigh Valley Coal Co. will develope the two great anthracite valleys, the Quakake and Conyngham and the Nescopeck. This development will come through the Broad Mountain coal lands which have been frequently prospected by experts. Reports have been current year after year that the lands have been sought, but it is understood that the Lehigh Valley Co. now controls the valley. It is also announced that as soon as the leases of the Mill Creek, Dobson Coal, Midvalley and other companies expire they will be absorbed by the Lehigh Valley Coal Co.

Another big tract of coal land has been acquired by the Schuylkill Coal & Iron Co., which has purchased the coal reserve under 256 acres in Norwegian and East Norwegian townships and running through the center of the territory of previous operations. The company has now acquired a total of about 900 acres of virgin coal, which is claimed to be rich. The veins shown by boring are given as follows: Lewis bed, 8 ft.; Little Tracy, 3 ft.; Big Tracy, 6 ft.; Little Clinton, 3 ft. 8 in.; Little Diamond, 3 ft.; Big Diamond, 6 ft.; Little Orchard, 6 ft.; Big Orchard, 6 ft.; Primrose, 10 ft.; Holmes, 6 ft.; Four-Foot, 9 ft. 10 in.; Mammoth, 25 ft.; Skidmore, 7 ft.; Buck Mountain, 8 ft.

This gives a total of 117 ft. of workable coal. Several of the tracts acquired are bounded by Sharp mountain, which heretofore has been the terror of the individual operators. The many irregularities which prevail make mining a difficult problem. The seams are also steep, and in many places are overthrown and are sometimes lost in crushed coal. The basin is deep and the amount of gas the operators have to contend with is said to be greater than in operations in the Red Ash beds of Pittston and vicinity. These obstacles have proved to be insurmountable to the individual operator and great interest is displayed as to the future work of the new corporation.

One of the greatest feats in mining engineering in the anthracite region for many years was achieved last week when the old Garfield workings of the Henry Clay colliery, of the Philadelphia & Reading Co., were reached by a diamond drill for the purpose of draining the water confined therein. The old openings, which are more than two miles in extent, will now be drained at the rate of 1,500,000 gal. every 24 hours, through an opening of 4 in. in diameter, which was made by the diamond drill. This huge lake was tapped at an angle of 11%, and at a pressure of more than 1,000 lb., so that considerable discretion and nerve had to be exercised.

Madeira, Hill & Co., of Philadelphia, who purchased the stock of the Black Creek Coal Co., took charge of their new holdings on Dec. 1. They have also purchased a large piece of land near Harleigh and now control more than 1,500,000 tons of coal in their tract. The Harleigh breaker is to be enlarged and the facilities of the colliery will be increased to such an extent as to give employment to 600 men and boys. W. J. Thomas, of Pittston, will be the new superintendent.

The Scranton Steam Pump Co has delivered to A. Pardee & Co. one of its large compound condensing pumps for use at the Cranberry colliery. This, it is claimed, will be the largest mine pump in the anthracite region.

There is a misunderstanding among the miners in connection with the resolution to destroy the old powder cans, rather than sell them to the powder companies for 8c. each. Some of the miners continue to sell them, while others destroy them. A convention is to be held in Scranton on Monday next to agree on action.

The past week was characterized by some petty strikes. Two jig-runners were reduced to slate-pickers at the Morea colliery and induced 75 breaker boys to revolt, forcing 700 men and boys into idleness. When the fathers of the two ringleaders learned the facts the strike was promptly settled by some sharp vigorous paddling. The Richards colliery, of the Susquehanna Coal Co., was tied up by 200 miners going on strike because their demand for a supply-house at the slope was refused. At the Keystone colliery, in Plains, a tax collector stopped the wages of 200 men, mostly foreigners, for their unpaid taxes. The foreigners, who could not realize that others besides Americans have to pay taxes, demanded the return of the money, and, being met with a refusal, struck. They returned to work after losing more in wages, twice over, than their taxes amounted to.

At an inquest held in Pittston it was brought out that three Polanders had purchased their miners' certificates at a saloon for $1 each, and upon the strength of these certificates had obtained employment in the Twin Shaft mine. The member of the board who sold the certificates has been arrested.

After overcoming apparently insurmountable obstacles, the Scranton Coal Co. has completed the sinking of the new Richmond No. 2 shaft in Scranton, which has reached the depth of 600 ft. For a distance of 87 ft. the shaft had to be sunk through a bed of quicksand, and it was only by the exercise of great ingenuity and care that the task was successfully completed. It was also an expensive undertaking, owing to the extreme precautions which had to be adopted not only for the protection of the men, but for the safeguarding of the shaft itself. Heavy false timber work was installed as fast as the operations were conducted through the quicksand, and these in turn were replaced with massive concrete work. The shaft passes through six veins, the Rock, Fourtenn or big vein, Clark vein, and No. 1, 2 and 3 Diamond veins. The old shaft will be used as a supply and man shaft. The new shaft was necessary, owing to the increasing output, the old shaft proving to be too small, and the machinery for hoisting altogether inadequate. The new shaft will be equipped with a 30-ft. Guibal fan driven by a 18 by 24 engine, while the hoisting engine, equipped with a conical drum, will be 24 by 48. All the buildings will be of brick with concrete flooring.

The Scranton Coal Co. has made a great record with the Pancoast colliery, which it purchased four years ago. Then the daily output was 750 tons, and has at present reached more than 2,000 tons. It has recently undergone thorough renovation, owing to the breaker and the shaft-head, as well as the other buildings being destroyed by fire. It has new engine-houses, a new double steel tower, new breaker, with all the other buildings of brick and concrete. The cost was $250,000 in all.

Toronto. Nov. 30.

A large number of mining men attended the meeting held here, Nov. 27, preliminary to the mining convention which will begin Dec. 12. Thirty-two delegates to the convention were elected, including W. G. Trethewey, T. D. Ledyard, W. D. McPherson, Dr. W. T. Stewart, Prof. W. G. Miller, T. W. Gibson, director of mines, Dr. A. E. Barlow, C. C. Farr and Prof. Latimer. Among the resolutions adopted were the following: That any license issued shall entitle the holder to stake and hold locations in any part of the Province; that all crown lands, whether timbered or otherwise, should be open for prospecting; that no royalty nor special tax be levied on the mining industry; that the Government should offer a prize for a satisfactory method of treating refractory ores; that no bounties should be paid on iron or steel made from imported ores; and that contests as to location and ownership should be decided by a mining commission, sitting judicially, its decisions subject to appeal to the appellate courts.

The amalgamation of the Centre Star and War Eagle mining companies has been formally completed. A meeting of the shareholders of the Centre Star, held here Nov. 28, has ratified the agreement.

At the sittings of the tariff commission, at Brantford, Ont., Nov. 27, J. M. Kilbourne, of Owen Sound, on behalf of the cement manufacturers of the Dominion, asked additional protection for that industry. He gave figures showing that cement manufacturing represented an aggregate capital of $9,215,000, and furnished employment to over 10,000 people. The present duty is 12½c. per cwt., and he asked for an additional duty of 10c. per bbl. of 350 lb. cement.

Victoria, B. C. Nov. 27.

East Kootenay.—The new shaft-house and gallows frame at the St. Eugene mine, Moyie, are described by the *Moyie Leader* as being larger than those destroyed by fire a few weeks ago. The shaft-house is 210 ft. in height and more than 40 ft. in width. The house for the gallows frame is 100 ft. in height. Work has been commenced on the framing shed, which will run parallel with the shaft-house; this will be 35 by 100 ft. There are now 175 men employed at the mine, and the number is being steadily increased. After the new buildings and machinery shall have been completed the working force will be in excess of 300. It is intended to operate the mine on a larger scale than before the fire; 31 machine drills will be worked. The concentrating mill is being overhauled in readiness for a continuous run, to begin early in December.

Revelstoke.—The Prince Mining & Development Co.'s Standard mine, north of Revelstoke, is being opened up at the 400- and 550-ft. levels, some 200 ft. apart on the lead; crosscuts made in ore show a width of 25 ft. on one level and 22½ ft. on the other. The drifts are being extended, and underground development will be continued throughout the winter. One drift is more than 300 ft. in length, and this, with a depth of 550 ft. on the level,

gives a large body of copper ore of good grade in sight. Preparations are being made to put in a power plant as soon as it shall be practicable.

Boundary. — The Granby Consolidated Mining, Smelting & Power Co. has ordered from the Jenckes Machine Co., Ltd., of Sherbrooke, Quebec, the following additional machinery for its copper mine at Phœnix, B. C.: One 150-h.p. double-drum electric hoist; dimensions of drums, which will be conical in shape, 7 ft. diameter at the larger end, 5 ft. at the smaller end, and 5 ft. long. By means of friction clutches each drum can be operated independently; both drums are controlled by powerful brakes; capacity of hoist is a load of 10,000 lb., raised at a rate of 700 ft. a minute; shipping weight is in excess of 50,000 lb. One Farrel-Bacon crusher, B pattern; receiving opening of crusher, 42 by 30 in.; capacity per day of 10 hours, 1,400 tons of ore crushed to 8-in. cube; heaviest single piece of machine will weigh about about 78,000 lb. The Granby Co. already has in operation at its mines two crushers of similar make, size and capacity.

The recent cost of smelting ore at the Northport smelter has been made public. On the authority of the late general manager of the Le Roi Mining Co., it is stated to have been $3.37 per ton in September. For the purpose of comparison it is of interest to note that for the fiscal year ended June 30, 1904, the Le Roi Co.'s published statement of costs per ton showed "smelter expenses, $3.922, and depreciation of smelter plant, $0.183." The War Eagle Co.'s balance sheet for the year 1904 showed the cost of smelting at Trail as follows: "Direct smelting charge, including freight from the mine, $4.46 per ton."

Nelson. — The Kootenay Engineering Works, at Nelson, is constructing for the Canadian Smelting Works, Trail, a large lead-smelting furnace. The Forty-Nine Creek Gold Mining Co. is putting in a stamp mill on the Referendum, on Forty-Nine creek, about 18 miles from Nelson. The mill building has been erected and the machinery is arriving. When completed the capacity of the mill will be about 100 tons per day. La Plata Mining Co. is erecting a concentrator at its Molly Gibson mine, on Kokanee creek, which flows into Kootenay lake, about 6 miles east of Nelson. The installation of the machinery will shortly be taken in hand, the building being nearly completed. Between 60 and 70 men are employed on the property, mostly on development, shipments of ore to the smelter being restricted to sufficient to pay current mining expenses.

Coast.—The first cargo of copper ore shipped from the Mamie mine, Prince of Wales island, southeast Alaska, to the Britannia Smelting Co.'s works at Crofton, Vancouver Island, reached that company's smelter last week. The Mamie mine is owned by the Alaska Smelting & Refining Co., which is about to blow in the 500-ton furnace at its own smelter. An exchange of ore has been arranged between the Britannia Co. and the Alaska Co., the former needing the iron ore from Prince of Wales island, and the latter requiring silicious ore, such as the Britannia Co. has in abundance.

Mexico. Nov. 28.

Following close upon the American Mining Congress, held in El Paso the week before last, there will be a meeting of the mining men of Mexico, to convene in Mexico City about the middle of December, or as soon as is possible after the return of Pablo Martines del Rio from the United States. Mr. del Rio is president of the permanent committee, appointed at the convention held in Mexico City last March, and he will, at this meeting, present the recommendations of the permanent committee for the establishment of a Chamber of Mines, to represent and build up the mining industry of Mexico, to be a kind of bureau of information, to co-operate with the government and work for the most favorable legislation practicable. It will be the endeavor to have the Chamber of Mines permanently organized before the end of January, at Jaltipan, in the State of Vera Cruz.

Since the Phelps-Dodge Co. obtained the control of the coalfields of Dawson, N. M., and the El Paso & Northeastern railroad, which has been made a part of the El Paso & Southwestern system, this company is preparing not only to furnish coal and coke for its own mines and melters, but is seeking a market in all parts of Mexico, and as soon as its new ovens are completed at Dawson, it is the intention of the company to push its products, especially its coke, in a hard competition against the Mexican products, the Pocahontas coke, and other cokes and coals brought in from the states.

In Chihuahua W. C. Greene has acquired, for the Greene Gold-Silver Co., in addition to the Santa Juliana in the Jesus Maria or Concheño district, the properties of the Belem Mining Co., the Refugio Mining Co., and the Rosario of Ocampo, from John A. McShane, of Omaha, all of which will be under the management of Clarence Chase, who is starting a tunnel into the Santa Juliana mine, and increasing to 1,000 the number of men working on the road from Temosachie to Concheño, and to the Belem and Refugio mine.

London. Nov. 25.

In the JOURNAL of Nov. 11 you draw attention to two articles on the subject of Chinese labor on the Rand, one by Mr. Selwyn-Brown, who takes a very pessimistic view of the results obtained, and the other by Mr. J. H. Curle, who believes in the complete eventual success of the Chinese miner. This question is continually being discussed in London, but I have found such difficulty in finding anybody carrying a judicial mind on the subject that I have refrained from referring to the matter in these columns for some time. The Chinese labor question is used in England for political purposes. The Liberal Party are anti-Chinese, and at elections they send sandwich-men round carrying posters inveighing against Chinese slavery at 2s. a day, but as the poor sandwich-men only get 1s. 6d. a day, the argument does not seem convincing. Information from South Africa comes from several sources all prejudiced, either from mining men, mine managers, or mine-owners, who hate the Kaffir and Chinamen equally and do not care which they have so long as they will work; from Australians, who detest an imported Chinese labor, but love, by contrast, a Kaffir; or from Boers and others, who have an equal loathing of Rand magnates and all their doings. Mr. Selwyn-Brown's view of the subject is quite true in detail, but magnified a thousand diameters. He, of course, speaks as an Australian. Mr. Curle, on the other hand, is not affected by racial animosities but looks on the question from a purely economic standpoint.

It is perfectly true that in the early days of the importation the terms of employment were not fully understood by many of the coolies, and also that large numbers broke away and lived as desperadoes. The misunderstanding and mismanagement was almost entirely due to a want of familiarity, on the part of the white overseers, with the langauge and customs of the coolies. It is also quite certain that the early experiences of the coolies and the nature of the underground work were the causes of hesitation on the part of other intending emigrants.

As far as the success of the experiment is concerned, the best evidence in its favor is that of the mine-owners and the mining companies. If they say they are satisfied with the economic results, it is not for others to doubt their word. In the annual report of the Consolidated Gold Fields of South Africa, published last week, it is stated that coolies will do more drill work per day than the Kaffir, and that, though not of such exuberant vitality and stamina as the Kaffir, the coolie laborer is more dependable and of more regular habits. The engineers of the company report favorably on the Chinamen, and say that with a little more training and experience they will do better still. I think we may take it that from an economic standpoint, Chinese labor has so far been a success, but from the political and racial standpoint the question of its success or otherwise will never be settled at all.

General Mining News.

ARIZONA.

MARICOPA COUNTY.

Congress Mines Co.—This company now employs 170 men. The chief development at present is in drifting from No. 4 shaft on the 1,900 and 2,050 ft. levels; and in sinking No. 5 shaft. No. 2 mill will soon be started. The cyanide plant is treating 130 tons per day.

Oregon & Gilt Edge.—These properties in the Harquahala mountains have been developed by about 2,000 ft. of drifts, under the direction of Oliver L. Geer.

Rincon Mining Co.—This company has now two shafts down, and 3,700 ft. of drifting has been done, under the direction of L. Mortimer, superintendent. The company has a Fairbanks-Morse centrifugal mill, two Sturtevant crushers, four Wilfley tables, one slimer and one classifier. At the mine there is a Leyner air-compressor and two Fairbanks-Morse gasoline hoists. The concentrates are shipped to the Arizona smelter at Humboldt.

YAVAPAI COUNTY.

Coronado Mining Co.—This company has a tunnel in 1,060 ft., and is sinking a shaft 535 ft. to connect with the tunnel. Sullivan air-compressors are used, and James Reese is superintendent. There is near 1,600 tons of ore on the dump, chiefly iron sulphide.

Cash Mine.—The last run at this mine in the Hassayampa district yielded 356,325 lb. lead, 16,615 oz. silver and 3,184 oz. lead. Harrington Blauvelt is manager.

Gladstone.—At this mine, near McCabe, work is being pushed by Cecil G. Fennell, with about 80 men employed. This mine is developed to the 800-ft. level and sinking is now progressing between the 800- and 900-ft. levels, the purpose being to sink immediately to 1,000 ft. A hoist of sufficient capacity to sink to 1,500 ft. and lift a load of 6,000 lb. is being installed, and electric pumps for the purpose of pumping from the 800-ft. level to the surface with new dynamo are also in course of installation. This installation, when completed, will give the Gladstone a capacity of nearly twice its present output. This property has been pushed for the last two years; when the new smelter at Humboldt is completed, the reduced transportation charges should add to the profit of its operations.

CALIFORNIA.

AMADOR COUNTY.

Argonaut Mining Co.—Actual mining operations in this mine at Jackson have been stopped to save the scant water for drainage of the mine alone. The equipment to run by electric power is being pushed ahead.

CALAVERAS COUNTY.

Yellow Boy Mining Co.—This company near Murphy, operating the Buckhorn mine, has put in a hoist, rock crusher, etc. A vein 16 in. wide has just been opened up. There is not enough water supply to run the mill as yet.

North Star.—This mine, near Angels, owned by Otto Dolling, has been placed under bond to John L. Henry, of San Andreas. The mine has paid well with a small mill. The rock carries a good percentage of high-grade sulphurets.

Penn Copper Mine.—At this property, Campo Seco, some extensive improvements are being made at the smelter. Eight roasters of latest pattern are to be installed.

EL DORADO COUNTY.

Golden State.—At this mine near Georgetown, owned by F. W. and R. Cole, from a 18-in. seam some $10,000 has been cleaned up within the past week.

Live Oak.—At this mine they are taking out very rich gravel, plentifully sprinkled with small nuggets.

Gold Bend.—Operations have commenced on this mine, at Smith Flat, with good prospects.

Gopher-Boulder.—In this mine at Kelsey, Levitt & Reese have encountered a fine shoot of ore.

Oro Fino. — This mine at Shingle Springs, one of the oldest in the county, is being re-opened by the Hayward Estate and Lane.

HUMBOLDT COUNTY.

New Mill.—Fred H. Elder is installing a milling plant on his claim at Prospect, near Orleans Bar, and has purchased new engines for power purposes.

KERN COUNTY.

Yellow Aster Mining Co.—This company, at Randsburg, crushed 16,775 tons of ore last month. The company is developing water to increase capacity. One well is 1,535 ft. deep and a good water supply is expected from it.

SHASTA COUNTY.

Trinity Copper Co.—It is reported that this company will not, as expected, build a smelter on its property near Kennet, but will build a tram and ship its ore to the Mammoth smelter.

McCloud Mines.—The copper and iron mines on the McCloud river, owned by R. J. Jennings, will be vigorously developed by him during the winter.

Big Backbone Claims.—Geo. Graves intends prospecting these claims at Kennet with a diamond drill, thus following the lead of the Mountain Copper Co. in the same county, which has prospected many hundred locations by this method.

Dry Slide.—This property at Keswick, after being idle for two years, has been bonded to Chas. A. Marriner, of San Francisco. They have opened up a fine gold-bearing ledge at the bottom of a small shaft.

SIERRA COUNTY.

Tightner Consolidated Quartz Gold Mining Co.—This is the name of the new organization which will in future work the Tightner mine at Alleghany, which has been making a phenomenal yield. The company has purchased from H. L. Johnson, of Alleghany, a four-fifths interest for $250,000. Among the incorporators are ex-Senator John P. Jones, Samuel Jones, A. C. Hamilton and W. S. Harkness. A tunnel will be started from Kanaka creek to run 1,400 ft. on a cross-ledge and tap the main vein at 600 ft. depth on the pitch below the present workings. The pay shoot is 75 ft. long, and is principally "specimen ore," being very rich in free gold. Johnson bought the mine a year ago for about $12,000, and has taken out over $100,000 in addition to purchase price. The ore has been crushed in hand mortars, there being no mill on the claim as yet.

SISKIYOU COUNTY.

Mono Mining Co.—The mill of this company on Punch creek is now running steadily and the tailings are being cyanided in the new plant.

Siskiyou Copper Mining Co.—This company has been organized to develop the Cook and Green claims, adjoining the Blue Ledge copper mine, near the Oregon line.

Mabel.—The mill of this mine between Oak Bar and Scott Bar, operated by John Chase, has been started up on satisfactory ore.

TUOLUMNE COUNTY.

Rising Sun.—This mine, near Confidence, has been placed under bond to Joseph Maddox and partners.

Gross.—From this mine, at Tuttletown, considerable ore is being stoped out so as to have a large supply of ore on hand when there is sufficient water to operate the mill.

TRINITY COUNTY.

Enterprise Mining Co.—Owing to lack of water, the Enterprise mill of this company has been shut down and the Yellowstone mill is run nights only. The new compressor plant will be running inside a month, all the heavy machinery being on the spot.

Hayfork District. — The McCampbell Mining Co., G. W. Pelletreau, manager, has completed a two-mile ditch and flume to the mine. Geo. Van Gorden, superintendent of the Drinkwater Co., will shortly prospect the property for dredging.

Bonanza King.—This mine, six miles from Trinity Center, was bonded this summer by Volmers & Ellery to Treadwell Bros., of San Francisco. Just after starting to run the main tunnel ahead they came upon ore of surprising richness, and

have taken out about $60,000 in the past month.

Van Ness.—At this mine, in the Trinity Center section, about $40,000 has been obtained in the last month with a small crushing plant.

Dorleska Gold Mining Co.—This new company has taken over the properties of the Union Consolidated Gold Mines Co., at Dorleska, which has been operating for some years the well-known Dorleska mine. The principal place of business is at Los Angeles, and the directors are H. Z. Osborn, T. F. Hayes, C. Leonardt, Chas. Wellburn, H. S. VanDyke and C. N. Williams.

Cinnabar Mining Co.—At the Altoona mine, operated under lease from the Altoona Co., 20 men are now at work and 600 tons of cinnabar ore are being worked monthly.

COLORADO.

BOULDER COUNTY.

Grand Republic.—A. P. Ardourel formerly of Owen Sound, Northern Ontario, has organized a company to operate this property in the Sugar Loaf district, and machinery is being installed for heavier operations.

CLEAR CREEK COUNTY.

Manhattan Mining Co.—This company, operating the Kittie Ousley, in East Argentine district, is considering the advisability of erecting a concentrating plant of about 75 tons daily capacity. George Wing, Georgetown, Colo., is manager, and a contract has been let for hauling the higher grades to Georgetown sampling works.

Magnet Group.—This property, situated on Griffith mountain, near Georgetown, has been sold to a syndicate of Southern and Eastern capitalists for the sum of $250,000, a substantial payment being made down; the deal being made by Thomas Rodda and W. A. Lamb, of Idaho Springs. It is reported also the new purchasers are negotiating for the purchase of the Good Enough group of seven claims, the property being held at $50,000, and that they will work on a large scale, installing suitable machinery at an early date, and that a mill will be built to handle the low-grade product of the groups.

Denver.—This group, in East Argentine district, has been leased and bonded by A. A. Ireland, of Golden, and it is reported that during the coming season a new 50-ton concentrator is to be erected on the property. This bond calls for the payment of $20,000.

Gold Medal.—A two-years' lease and bond has been secured on this group by J. F. Young, of Idaho Springs, as the representative of Pittsburg and Beaver, Pa., capitalists.

GILPIN COUNTY.

O. K. & Castro Gold Mining Co.—Eastern and Denver capital is interested in the purchase of the O. K. group, on German mountain, Gregory district, the consideration being $50,000. The property was formerly owned by the estate of the late W. A. Buckley, of New York city. Alfred Anderson, Central City, is superintendent.

November Shipments.—The shipments of smelting and crude ores, tailings and concentrates from the Black Hawk depot to the Denver smelters and to outside points of treatment for the past month were 214 cars, or 4,520 tons, which is the lighest shipping month of the year. The chief cause is the failure of the Colorado & Southern road to provide cars for shipping the ores, the hindrance to shipments being estimated at fully one-quarter.

ROUTT COUNTY.

Grant.—Easterners have offered $25,000 for this property, situated on the head of Bear creek, but the owners will not sell for less than $50,000, as they have a property showing quantities of bornite copper, carrying values of from $25 to $60 per ton.

Tom Thumb.—Messrs. Milner, Metcalf, Whipple and Stuckey, of Steamboat Springs, are arranging for the resumption of operations on this property, at Hahn's Peak. The mine has produced silver, lead and gold ores ranging in values from $60 to $80 per ton, but has been shut down until the arrival of the Moffat Railroad. The owners will instal modern machinery for economical operations.

Royal Flush.—It is reported that Easterners have purchased this group at Hahn's Peak, paying for it $100,000, and they have also taken a lease and bond on adjoining property from F. E. Milner and associates. Machinery is to be installed and heavy operations planned.

SAN MIGUEL COUNTY.

Adams.—This group, comprising a group of several promising claims, located adjoining the Nellie and Ella, in Bear creek basin, 3 miles from Telluride, owned by former Governor Alva Adams and Frank Adams, his brother, has been recently leased to George Lee, of Denver, and Max Weiss, an experienced mining and mill man of Telluride. A few days ago the lessees put the 10-stamp mill, on Bear creek, a short distance below, and used in connection with the group, in operation, and it is saving satisfactory values. The ore is almost strictly free-milling, and nearly all the values are saved on the mill plates by amalgamation. One of the claims makes a bend and runs outside of one of the Nellie side-lines. This fraction was the subject of litigation in the State and Federal courts for several years between the North American Exploration Co., owner of the Nellie and Ella, and the Adams brothers, the latter finally prevailing. The vein is a large one, from 3 to 9 ft. wide, composed entirely of soft, brown quartz.

Alta Mines Leasing Co.—This company has a lease on the Alta mines and mill, in Gold King basin, owned by the Alta Mines Co., composed largely of Milwaukee capitalists. The usual force numbers from 70 to 75 men. The mill, comprising 20 stamps and a Huntington, has a capacity of 100 tons in 24 hours, and turns out about two carloads of concentrates, running in gold, silver and lead, but principally the two latter metals, daily. No attempt is made to save any gold values by amalgamation. The high-grade ore, consisting of several cars per month, is shipped in its crude state to the smelters. Jame L. Brown, of Telluride, one of the leasers, is superintending operations.

TELLER COUNTY—CRIPPLE CREEK.

Strattons Independence.—An ore-shoot, which was lost several months ago, and from which much ore was shipped, is reported to have been again opened up. The vein is of good width and yields well. Ore is now being broken in this mine at the rate of 3,000 tons per month. More than 30 sets of lessees are now working in the mine.

Findley.—In this mine, on Bull hill, on the 1,100-ft level of the Shurtoff claim, is a stope 30 ft. wide and 100 ft. long. During the current month machine drills have removed ore vertically but 4 ft.; but of 4 ft. from a stope 3 by 150 ft. means a great amount of ore. This shoot has been proven at several points between the 1,100-ft. and the 500-ft. levels, and it is thought it will continue to the surface. During the year the company has paid dividends every month, and has expended 40,000 in surface improvements.

Royal Oak Gold Mining Co.—The Finn lode claim of this company, on which an extension of the lease has been obtained by the Iron Clad Leasing Co., W. Van Fleet and E. A. Skinner, attorneys, Dr. B. F. Kuhn and Dr. F. S. Carlton, all of Elkhart, Ind., and Chas. B. Wider, superintendent, compose the Iron Clad Leasing Co. The lease runs to July 1, 1908, at 20% flat. The company propose to add 30 ft. to the depth, making the shaft 500 ft. deep, at which point laterals will be driven. The Finn is contiguous to the Hoosier Friday and the Mountain Chief; the Forest Queen, W. P. H. and Pride of Cripple Creek are also near-by. At the 200 ft. point, good indications have been encountered.

Katinka.—At this mine, on Guyot hill, the lessees are engaged in the construction of a three-compartment shaft. While sinking, a promising body of ore was encountered at a depth of 600 ft., but not enough development work has been done to determine the extent. The shaft will be sunk to 850 ft., where it is proposed to connect with the Mary McKinney workings.

IDAHO.

BLAINE COUNTY.

Alturas Mining Co.—At the recent annual meeting of the stockholders, the board of directors was authorized to issue $50,000 worth of bonds, the sale of which is to supply funds for the development

of the property. The directors elected were: C. C. Ruthrauff, W. A. Brodhead, Frank C. Mandell, A. Hayes and T. E. Picotte.

KENTUCKY.

BELL COUNTY.

Columbia Coal Co. — This company, which has been opening a tract of coal land near Middlesboro, has begun to ship coal. The head of the enterprise is Eugene Vowels.

MICHIGAN.

HOUGHTON COUNTY—COPPER.

All surface work not absolutely necessary in operating the mines was discontinued this week, owing to severe weather. Work at new explorations, where openings are not framed in, is difficult. There is a marked scarcity of experienced miners, which has existed several months. Activity of Lake Superior capitalists in the Warren district of Arizona, Butte and other sections has led many Michigan miners to migrate to those camps and secure employment in mines controlled by Lake people.

Arcadian.—Work at the new shaft is advancing steadily, but sinking has not reached a depth where the formation is free from surface disturbances. Every provision is being made for aggressive development. The temporary equipment is being installed rapidly and ample facilities will be provided to open the lode to sufficient depth to permit a thorough investigation of its condition.

Calumet & Hecla.—Provision is being made for heavy equipment at No. 20 shaft. This is the most southerly opening on the company's main tract of land at Calumet, being opened on the Kearsarge lode in extreme southeastern corner. Sinking was discontinued some time ago at 75 ft. to permit installation of large capacity machinery. The hoisting engine which was used in sinking No. 17 shaft, on the Osceola amygdaloid, has been moved to No. 21 and is being installed. The engine will be available to 2,000 ft. depth. A large boiler has been removed to the shaft and a combined boiler- and engine-house will protect the equipment. Air for drills will be piped from the main system, fed by compressors at Superior power plant. Like Nos. 19 and 20, the collar for No. 21 shaft is constructed of concrete, but as the overburden at the latter is only 6 ft. thick, the work was much more simple than at the former shafts. Connections have been made by the Copper Range railroad with the Hecla & Torch Lake railway, which is the private transportation line of the Calumet & Hecla Co., to facilitate delivery of logs from camps along Copper Range to Calumet & Hecla framing and sawmills at Lake Linden.

Centennial.—Considerable importance is attached to strike of rich ground in drift south from No. 1 shaft on 25th level. Owing to shape of property, the south boundary line diverging from line of No. 1 shaft, there is a constantly widening territory available in that direction with increasing depth. Eventually, deeper drifts can get under this newly discovered shoot of ground and work rich values. Some good stretches of ground have been opened in other drifts south from No. 1 shaft, but principal values are found to north. Some drifts on the lower levels reveal strong mineralization and indicate permanent values. Sinking in No. 1 shaft has reached a point 3,100 ft. from surface. No. 2 shaft is 2,750 ft. deep.

Franklin.—Rich ground continues to be opened in drift on 20th level of No. 1 shaft. The lode is 18 ft. wide and 4 ft. of this is as rich as the average ground in any Lake copper mine.

MONTANA.

BEAVERHEAD COUNTY.

Polaris.—Parties who have recently purchased this mine are making preparations to do extensive work. The machinery equipment will consist of three boilers, engines, power drills and a complete milling equipment.

JEFFERSON COUNTY.

A. S. Wright has purchased 20 claims adjoining the Kendall, Barnes-King and North Moccasin properties. The claims will be consolidated and taken over by a single company.

MISSOULA COUNTY.

Clinton.—Two carloads of machinery have been unloaded at this property and will be installed at once. Boilers, engine, hoisting plant and pumps comprised the shipment.

OHIO.

BELMONT COUNTY.

Pultney Coal Mines.—These mines, near Bellaire, have been sold to G. M. Jones & Co., of Toledo. The price is reported at $165,000. The tract includes 1,200 acres.

LAWRENCE COUNTY.

Symmes Creek Coal Co.—This company has been organized at Ironton, to develop coal lands in the Waterloo field. The capital stock is $5,000,000, and the incorporators are James B. Townsend, J, H. Lesher, W. P. Christie, W. L. Hardin and A. R. Johnson.

OREGON.

BAKER COUNTY.

Magnolia.—For several years this mine, which is in Granite camp, 14 miles north of Sumpter, and 25 miles west of Baker City, has been idle, owing to legal complications. The property was originally exploited by W. L. Vinson, of Baker City, managing owner of the Emma mine, and lessee of the Virtue. The anouncement is now made that the Magnolia will reopen in a few days.

Imperial.—Alexander Hamilton Sibley, of Detroit, Mich., and managing owner of this mine, in Cable Cove district, 20 miles north of Sumpter, and 25 miles west of Baker City, came out of camp where he has prosecuted heavy development work all summer, and left for the East this week. Since Sept. 10 last, Mr. Sibley and his men have sawed the lumber with their own mill, built bunk houses, commodious offices, private residences, blacksmith shops, tunnel covers and completed the new mill building. Just before leaving for Chicago, Mr. Sibley ordered a 100-ton roller mill from the Allis-Chalmers Co., which will be shipped at once, and put in the camp over the snow. The Imperial has more than 10,000 ft. of development work in tunnels, shafts, upraises, crosscuts, and a body of ore has been blocked out.

Geiser-Hendryx Co. — This company, operating several properties in the Bourne, 8 miles north of Sumpter and 20 miles west of Baker City, and one or two properties in the Rock Creek camp, 25 miles west of Baker City, is pushing work. The Tabor-Fraction at Bourne is becoming richer and richer every day. The Cracker-Oregon mill has been leased, and the Tabor ore will be milled there, being handled through the Eureka & Excelsior tunnel. Work will be started on the Victor and Midway mines in Bourne in December.

Highland.—This mine in Rock Creek camp, 25 miles west of Baker City, has opened an ore-shoot in the main level through three crosscuts made from an old drift that paralleled the vein. The new orebody has been cut 6 ft. and yields good quartz. The other body in the main tunnel is 400 ft. long, 14 ft. wide, and has 400 ft. of backs. The new machinery plant has been completed and the mill is in operation, handling 75 tons a day. As soon as the large electric plant is completed, the output will be increased.

PENNSYLVANIA.

ANTHRACITE COAL.

Philadelphia & Reading Coal & Iron Co.—This company's statement for the four months of its fiscal year, from July 1 to Oct. 31 is as follows:

	1904.	1905.
Earnings.....	$9,814,335	$10,439,030
Expenses..	9,253,502	9,872,381
Net earnings.....	$560,833	$566,649

The increase in gross earnings was $624,695, or 6.4%; that in net earnings was only $5,816, or 1%, owing to the advance of $618,879 in expenses.

Delaware & Hudson Co.—A number of improvements are being installed in the collieries of this company. At the Pine Ridge mine, in Miners Mills, a new washery with a capacity of 600 tons is now being completed and will be worked in conjunction with the breaker. The new shaft at Marvine colliery, Scranton, has reached a depth of 500 ft., and will be used for ventilation and as second opening.

A 28-ft. Guibal fan is being built at the same colliery and will be a duplicate of that recently installed in the Laurel Run colliery, both being built at the Scranton plant of the Allis-Chalmers Co. The new Baltimore breaker has been completed and is driven entirely by electrical power furnished by the power plant at Baltimore No. 5.

Enterprise Colliery.—Fire has again broken out in the Enterprise mine in Shamokin, which was officially declared, last week, to be extinguished, after a fight extending over twelve months.

BITUMINOUS COAL.

Washington county coal is in demand. Recently a tract of undeveloped coal land in West Bethlehem township was sold to Pittsburg capitalists for $176 an acre, which is the highest price recorded for similar property in that section.

For some time past agents of the United States Steel Corporation have been in Amwell and West Bethlehem townships, in the southern part of the county, taking up the available coal rights. It is now reported that they have closed for some 6,000 acres in the two townships and that the formal transfers will be made soon.

SOUTH DAKOTA.

LAWRENCE COUNTY.

Globe Mining Co.—At a special business meeting of the directors of this company this week at Chicago, J. Renken, of Sheldon, Iowa, resigned as president and director of the company, and was succeeded by E. J. Adams, of Beloit, Wis. F. E. Wade, of Lead, S. D., resigned as director and general manager, and was succeeded by Frank Ickes, of Deadwood. Another meeting is to be held soon to decide the future work of the company. The mill building is to be equipped with machinery; shaft unwatered and development work carried on at the surface.

Imperial Mining Co.—The Bertha mine has been unwatered and 40 tons of ore a day are being shipped to the mill in Deadwood.

Montezuma.—Slavonian laborers encountered a strike of free milling ore on the Montezuma mine, near Deadwood, owned by J. T. Gillmore, of that place. The strike was made while excavating the Homestake slime ditch.

Ogden Mill.—The Superior Chemical Reduction Co. will start its new process mill this week. Ore has been obtained from the Monarch mine, in Spruce gulch, for the first test. The mill has a capacity of 100 tons per day and is built on entirely new lines. The process is electrochemical. It is intended to crush the ore very fine, and by constant agitation keep it in contact with the cyanide solution.

Goldstake Mining Co.—The main tunnel of this company is into the hill 1,300 ft., crossing several highly mineralized strata. The second tunnel has been started on the Elkhorn side to intersect the main tunnel. O. U. Pryce, of Deadwood, is general manager.

TENNESSEE.

Negotiations are in progress for the purchase by the State of several tracts of coal lands, to be added to the area which the State already works with contract labor. The lands are in White and Fentress counties.

TEXAS.

WEBB COUNTY.

Cannel Coal Co.—This company, which has its headquarters at Laredo, is operating on the San Pedro river, and is shipping about 7,000 tons per month.

UTAH.

BEAVER COUNTY.

Newhouse Mines & Smelters.—Connections have been made between the tunnel, or 600 level, and No. 1 level through an upraise, which gives a better handling of ore. The tonnage treated by the mill has been increased from 500 to 700 tons. Immediately after the first of the year another increase will be made and about Feb. 1, mining on the surface with steam shovels will commence.

JUAB COUNTY.

Centennial Eureka.—This property of the United States Mining Co. has marketed during the year 2,820 carloads of ore, making the output in the neighborhood of 112,800 tons.

Gemini Mill.—There has been some delay in the arrival of the machinery for this plant, and consequently construction is hampered.

Uncle Sam.—Connections have been made with the main ore-bearing channel on the 500 level below the tunel. The ore is of a better grade than that opened on the 300 level.

SUMMIT COUNTY.

Creole.—This Park City property has resumed operations, after a shut-down of several months.

Little Bell.—Developments during the past week have been important. Some high-grade ore has been broken into, and the outlook for some extensive ore shipments is good.

TOOELE COUNTY.

Gold Hill.—This property, operated under a bond and lease by Capt. Duncan McVichie, manager of the Bingham Consolidated, and associates, is said to be showing some encouraging results.

WASHINGTON.

OKANOGAN COUNTY.

Prize Mining Co.—This company owns 28 claims and 233 acres of patented farming land on which is situated a mill-site and a 20-stamp experimental mill, for the Tatro-Delins electro-chlorination process. Electric power was promised, but not supplied. The concentrating tables are run occasionally, and the concentrates shipped out with occasional small lots of good ore to help pay expenses.

WYOMING.

UINTA COUNTY.

An explosion took place on the night of Dec. 1 in mine No. 1 at Diamondville, owned by the Diamond Coal & Coke Co. There were 18 men only in the mine at the time, and all of these were killed directly by the explosion, or suffocated by the after-damp. The full night shift had not yet gone into the mine, or the loss of life might have been much greater. It appears that the men killed were all together when the explosion took place. It is believed that the damage done to the mine workings was small. Rescuing parties had little difficulty in entering the mine and recovering the bodies. The accounts given indicate that the accident was a dust explosion, caused by a blown-out shot, which was fired just after the men had gone down.

Foreign Mining News.

AUSTRALIA.

WESTERN AUSTRALIA.

The production in October was 160,623 oz. fine gold, a decrease of 13,984 oz., or 8.7%, as compared with October, 1904. For the nine months ending Oct. 31 the total was 1,629,976 oz. fine gold, or $33,691,604 in value.

SOUTH AMERICA.

BRAZIL.

During the past fiscal year the English company operating the Ouro Preto Gold Mines, Brazil, crushed 75,660 tons valued at $5 per ton. It is estimated that there are 208,000 tons of ore at present in sight in the workings, which is of higher grade than the ore treated during the year just closed. The average working cost last year amounted to $5 (U. S.) per ton.

Coal Trade Review.

NEW YORK, Dec. 6.

ANTHRACITE.

The hard-coal market shows a sharp burst of strength with the advent of a cold spell. This, with the shortage of cars, has cut down available supplies of all kinds of coal to a minimum. Coastwise shipments to New England shoal-water ports have ceased and Lake transportation is about closed for the winter. The anticipated beneficial effect of this last upon car supply has not materialized, and improved conditions needs not be expected for a month yet; even then, severe winter weather may prolong the straightened conditions.

The prices on large lots remain as follows: $4.75 for broken and $5 for domestic sizes. Steam sizes: $3 for pea; $2.25@$2.50 for buckwheat; $1.45@$1.50 for rice

and $1.30@$1.35 for barley, f. o. b. New York harbor shipping points.

BITUMINOUS.

Demand for soft coal along the Atlantic seabord continues greater than the supply Aside from special reasons, of which the weather is the greatest, it is the general impression that consumption has materially increased. Producers have come to take advantage of the monthly allotment clause in their contracts in order to keep demand within bounds, but prices continue to advance and are now ranging $2.90@$3 f. o. b. New York harbor shipping points, while in some instances, spot coal in the East has sold at a considerable advance over this price. If car supply could be augmented, it would be a great help, but this is not immediately expected. In fact, we already hear of a shortage of motive power, which generally comes a little later from the continuous heavy use of engines.

Trade in the far East is calling for all the coal that can be supplied, and premiums are paid in some instances. Consumers are drawing heavily upon their contracts, and are likely to use up their contracted allowances completely before the season is over. The Sound is short of coal and is calling for more than can be shipped.

New York harbor promptly absorbs all the coal that comes that way. Any producer who has some to spare generally ships it East. All-rail trade is curtailed as much as possible and extra orders are generally refused.

Car supply is in varying proportions, according to territory. Transportation is up to schedule. Vessels in the coastwise market are in good supply. Current rates from Philadelphia are: To Boston, Salem and Portland, 80c.; to Lynn and Newburyport, $1.10; to the Sound, 65@70 cents.

COAL TRAFFIC NOTES.

The coal and coke originating on all lines of the Pennsylvania railroad east of Pittsburg and Erie were as follows for the year to Nov. 25, in short tons:

	1904.	1905.	Changes.
Anthracite.....	4,056,880	4,117,673	I. 60,793
Bituminous.. ...	24,538,762	27,064,042	I. 2,525,280
Coke	7,774,244	10,086,953	I. 2,312,709
Total.....	34,369,886	41,268,668	I. 4,898,782

The total increase this year was 13.5%; nearly half of the gain being in coke shipments.

Shipments of coal from Tennessee and Alabama mines over the lines of the Southern Railway Co. for the nine months ending Sept. 30 were as follows, in short tons: Tennessee, 1,165,509; Alabama, 1,321,814; Alabama coal to Greenville for river trade, 12,131; total, 2,499,454 tons.

Birmingham. Dec. 4.

The car shortage is easing up a little, as new coal cars are being received by the various railroads. The greatest shortage was felt along the Frisco road, but the complaint is not so loud now.

The coal production is heavier now than it has been in sixteen months. Efforts are being made by all the companies to get out as much coal as possible for this month, and all miners are going to be urged to lose as little time as possible, because of the holiday season.

The Gayoso Coal Co., in Walker county, has decided to double the capacity of its mines, and one new mine will be opened. The Star Cahaba Coal Co. has increased its capital stock from $18,000 to $50,000, and its property will be enlarged. The Tennessee Coal, Iron & Railroad Co. is pushing the work on the shaft near Pratt City, and by June expects to be using it, No. 3 and No. 2 mines to be concentrated so that all the coal will come through the new shaft. John Shugart has leased his little coal mine, west of Pratt City, to experienced miners, and the output is to be increased. Not less than 15 mines are now being opened in this State.

Coke shows but little improvement as to production, with the price strengthening. The importation of this product is still of some quantity.

Chicago. Dec. 4.

Both bituminous and anthracite coal have been in somewhat slack demand in the last week, due to the mild weather, the Thanksgiving holidays and the reluctance of consumers to lay in stocks in advance this year. The sharp cold at the end of the week, however, has resulted in a large increase of orders from all parts of Chicago territory, showing that supplies of both consumers and retailers are short.

There seems to be no prospect of speedy relief from the car famine that has prevailed for the last two months; on the contrary, it is apparently bound to grow worse with the growth of the winter. All grades of western coal are in great demand and short supply; it is hardly necessary to say that prices are firm. Domestic business is varying more than steam supplies, on acount of the contract requirements in the steam trade, but the car shortage has caused many users of steam coal to seek immediate supplies in the last two or three weeks With continuance of the shortage the market for free coal will be unusually good this winter. Eastern coals do not seem to be so badly off, as a whole, as western coals. Most eastern coals are somewhat freer as regards supplies and this feature, with the mild weather, has made the eastern coals not so strong relatively.

Quotations continue: Illinois and Indiana lump, $2.50@$2.85; run-of-mine, $2 @$2.45; screenings, $1.45@$1.75; Hocking, $3.40@$3.85; smokeless run-of-mine, $3.30@$3.50.

Nearly all bituminous coals in the local market are bound to advance at least slightly this week, owing to the cold weather, which has not only, increased demand largely, but also has increased the difficulties of transportation. Anthracite is in large supply at the docks, with no prospect of shortage in this or in the all-rail supply, though there is general complaint of delay by the railroads in handling shipments.

Cleveland. Dec. 5.

The coal situation has grown more tense, with no relief in sight. It is a question of cars purely. Some hope had been expressed that the shutting down of Lake shipments would supply this territory more abundantly with cars. On the contrary, the railroads have already shifted their cars into other quarters and are now trying to keep pace with the general demand. Prices have been boosted sharply during the past week, and run-of-mine No. 6 coal is now selling in this territory at $1.45 at mines, with nothing less accepted. There is a shortage of supply at that figure, due to the continued buying of the western cities. There is also an increased demand for slack, the mines now asking 90c.@$1 at mines for both Ohio and Pennsylvania.

It is announced that a meeting of the Massillon Association is to be held this week for the purpose of putting up the price of domestic coal. The old price was $2.10 at the mines for selected lump. An increase of 25c. a ton is expected.

The lake market is about closed for the year. Some cargoes, shipped in uninsured boats, will continue to run to the head of the lakes as long as the channels are open, but the supply at the lake docks is at present so small, there is little room for hope that much will be shipped hereafter. Wild rates on coal have been shaded during the week, indicating that the shipers appreciate the impossibility of moving much coal.

The coke situation is strong and steady. For the best grades of 72-hour foundry coke $4 is paid for prompt shipment and $3.90 on contracts. For furnace coke $3 @$3.25 is being paid.

Pittsburg. Dec. 5.

Coal.—The demand continues good and the new list of prices is now firmly established. It is as follows: Run-of-mine, $1.30 a ton; ¾-in., $1.40; 1¼-in., $1.50; slack, $1, all f. o. b. mine. These prices represent an advance of 10c. a ton, but slack has increased 15c. and may go higher. The rivers were navigable and during the past few days about 5,000,000 bush. were shipped to down-river markets, leaving but little loaded coal here, and it is expected that conditions will be favorable this week for sending the rest out. There are plenty of empty coal boats and barges in the pools and the river mines are in full operation. The shortage of railroad cars is still interfering with the operation of the railroad mines, and it is reported that but 60% of the requirements was furnished by

the railroads last week and the situation does not seem to have improved. Some wild reports have been sent out from Pittsburg, for unknown reasons, regarding the probable mining rate for next year. It was said that the Pittsburg district operators had met and offered to give the miners a voluntary advance of 5%. This has been positively denied by officers of Pittsburg Coal Co. and other large interests. Nothing will be done regarding rates for mining until the joint convention of miners and operators is held in Indianapolis in January.

Connellsville Coke.—There was a slight decline in both production and shipment, and the price for prompt delivery of furnace coke is a trifle lower. The car supply was fairly good, but the cold weather this week may interfere somewhat with shipments and have an effect on prices. Furnace coke sold at $2.90@$3 and foundry coke is firm at $3.50 a ton. The production for the week is given at 275,350 tons, and the shipments from the Connellsville region aggregated 11,985 cars distributed as follows: To Pittsburg and river points, 4,279 cars; to points west of Pittsburg, 6,318 cars; to points east of Everson, 1,298 cars. The combined shipments from the Connellsville and Masontown fields for the week amounted to 349,971 tons.

San Francisco. Nov. 30.

The trade continues quiet, but steady, with no change in prices. Supplies are sufficient, though stocks of Australian are light. Fuel oil is in regular demand.

For coast coals, in large lots to dealers, prices are as follows: Wellington, New Wellington and Richmond, $8; Roslyn, $7; Seattle and Bryant, $6.50; Beaver Hill and Coos Bay, $5.50; White Ash, $5.25. For Rocky Mountain coals, in car lots, quotations are: Colorado anthracite, $14; Castle Gate, Clear Creek, Rock Springs and Sunny Side, $8.50. Eastern coals are nominal at $14 for Pennsylvania anthracite, and $13 for Cumberland. For foreign coal quotations are, ex-ship: Welsh anthracite, $13; cannel, $8.50; Wallsend and Brymbo, $7.50 per ton.

Foreign Coal Trade.

Dec. 6.

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

	1904.	1905.	Changes.
Anthracite	1,963,215	1,928,768	D. 34,447
Bituminous	5,315,381	5,944,161	I. 628,780
Total coal	7,278,596	7,872,929	I. 594,333
Coke	430,232	507,599	I. 77,367
Total	7,708,828	8,380,528	I. 671,700

The coke went chiefly to Mexico. The coal exports were distributed as follows:

	1904.	1905.	Changes.
Canada	5,613,148	6,024,168	I. 411,020
Mexico	735 975	742,889	I. 6,914
Cuba	401,330	452,588	I. 51,258
Other West Indies	209,330	253,254	I. 43,924
France	10,177	4 322	D. 5,855
Italy	67 616	67,428	D. 188
Other Europe	53,916	26,090	D. 27,826
Other countries	187,104	302,190	I. 115,086
Total	7,278,596	7,872,929	I. 594,333

The total increase in coal exports was 8.2%. The coal reported to other countries goes chiefly to South America. The exports to Canada in detail were as follows:

	1904.	1905.	Changes.
Anthracite	1,936,215	1,897,484	D. 38,731
Bituminous	3,676 933	4 126,684	I. 449,751
Total	5,613,148	6 024,168	I. 411,020

Canada took this year 98.4% of all the anthracite, and 69.4% of the bituminous coal exported from this country.

Imports of coal and coke into the United States for the 10 months ending Oct. 31 are reported by the Bureau of Statistics as follows:

	1904.	1905.	Changes.
Canada	998,689	1,066,133	I. 67 444
Mexico	221	38	D. 183
Great Britain	101,008	53,016	D. 47,992
Other Europe	50	359	I. 309
Japan	41,378	41,716	I. 338
Australia	190,348	139,340	D. 51,008
Other countries	759	.....	D. 759
Total Coal	1,332,453	1,300,602	D. 31,851
Coke	.....	50,609	I. 50,609

Coke was not reported separately last year. With the exception of a little from Germany, it comes from British Columbia. The coal from Canada is also British Columbia coal received in California, with the exception of some Nova Scotia coal, which comes to New England. Of the total imports 22,976 tons were classed as anthracite.

The Boston & Maine Railroad Co. closed a contract with the Dominion Coal Co. at Sydney, Cape Breton, for 75,000 tons of coal, to be delivered at Boston and Portland.

Iron Trade Review.

New York, Dec. 6.

While the iron and steel trades are still active, there are signs of a lull in buying. This was to be expected, and business will probably be quieter until the close of the year. The lull is particularly noticeable in pig iron, and there has been less buying this week, and in smaller lots. Apparently most of it is to fill up unexpected gaps in stock. It is hard to do this, as there is little iron not covered by contract.

In finished material, matters are also quieter, except in structural material and plates. Both are still in strong demand, and it looks as if there was going to be much delay in filling bridge and building contract which have been let.

There is still a great deal of complaint about railroad delays. Furnaces are not getting ore and coke as fast as they are needed; while deliveries from mills are so slow as to cause congestion in the yards and frequent remonstrances from buyers who need the material.

The great storm on the Lakes last week wrecked a number of ore-carriers. The particulars are given in our Duluth letter on another page. This will cause a new demand for material, as Lake shipyards will be full of orders for new vessels and for repairs.

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

	1904.	1905.	Changes.
October	$12,799,081	$12,672,945	D. $126,134
Ten months	105,351,018	115,576,724	I. 10,225,706

For October there was a decrease of 1%; for the 10 months an increase of 9.7%. The leading items of the iron and steel exports for the 10 months were as follows, in long tons:

	1904.	1905.	Changes.
Pig iron	$43,354	$40,812	D. $2,542
Billets, blooms, etc.	275,615	179,780	D. 95,835
Bars	46,495	44,661	I. 1,834
Rails	342,726	249,941	D. 92,185
Sheets and plates	42,007	59,780	I. 17,773
Structural Steel	43.511	62,401	I. 18,890
Wire	94,237	110,271	I. 16,034
Wire-rods	14,517	4,836	D. 9,681
Nails and spikes	34,193	41,131	I. 6,938

Exports of pipe and pipe fittings, not reported separately in 1904, were 47,381 tons this year. There were decreases in several items, the more important being in billets and blooms, in rails and in wire-rods. The chief exports of rails were to Canada, Mexico and the West Indies; but European countries took 17,474 tons this year.

Exports of iron ore were 171,392 tons in 1904, and 179,919 tons in 1905; an increase of 8,527 tons. Most of these exports were Lake ore to Canada.

Imports of iron and steel, including machinery, into the United States were valued as follows for October and the 10 months ending Oct. 31:

	1904.	1905.	Changes.
October	$1,804,693	$2,255,217	I. $450,524
Ten months	18,403,198	21,820,972	I. 3,417,774

The increase in October was 20%; for the 10 months it was 15%. The chief items of imports for the 10 months were as follows, in long tons:

	1904.	1905.	Changes.
Pig iron	68,294	171,291	I. 102,997
Billets, blooms, etc.	9,580	11,501	I. 1,921
Bars	17,139	29,186	I. 12,047
Rails	37,444	16,560	I. 20,800
Iron rods	13,062	14,458	I. 1,396
Tin plates	61,068	58,778	D. 2,290

Imports of iron ore for the 10 months were 348,935 tons in 1904, and 709,766 tons in 1905; an increase of 306,831 tons. The greater part of this ore is from Cuba, but some ore comes from Canada and Newfoundland, and some from Spain.

Imports of manganese ore are reported at 69,224 tons in 1904, and 218,229 tons in 1905; an increase of 149,005 tons this year.

Birmingham. Dec. 4.

The pig-iron production in Alabama is steady, inquiry eliciting no information as to an improved condition. Iron quota-

tions in this territory remain firm, with a slight indication for an advance. The buying for the second quarter of the coming year has started, though not on an extensive scale. It is believed that the Alabama iron producers will be able to dispose of their probable make of the second quarter in the year without trouble.

The Tennessee Coal, Iron & Railroad Co. is delivering steadily on orders. There is no denial of the statement that this company will erect during the coming year two new furnaces in addition to rebuilding the furnaces at Ensley. Appointments have been made of representatives at Cincinnati, Chicago, Cleveland and New York. Willard Wilson, at present assistant to the vice-president, will go to Cincinnati; A. H. Carpenter, at present general sales agent in the coal and coke department, will go to Chicago; E. W. Bandy will be located in New York.

The following pig-iron quotations are noted: No. 1 foundry, $15; No. 2 foundry, $14.50; No. 3 foundry, $14; No. 4 foundry, $13.50; gray forge, $13; No. 1 soft, $15@$15.50; No. 2 soft, $14.50@$15.

The steel production during the month of November at Ensley was the largest for any one month since the plant has been erected. The total was 23,136 tons of steel, the greater portion of which went into rails.

Chicago. Dec. 4.

Sales of pig iron have somewhat fallen off in the last week, and indications are not promising for a boom revival before the beginning of the year. The trade, however, sees in the present condition a lull due to the extraordinary activity of the last two months, without any signs that the consumptive power of the trade has diminished. The business of the present resolves itself into supplying odds and ends, until the imaginary line of the new year is passed and buying begins freely for the last half of 1906.

Prices, in consequence of this condition of affairs, have remained stationary. Northern and southern are in about equal demand, both being scarce for the filling orders of consumers to stop gaps in the next six months supply. Northern is quoted at $19.50@$20 for No. 2, and Southern brings $14.50@$15 Birmingham, or $18.15@$18.65 Chicago. Lake Superior charcoal, still scarce, brings $19.50@$20, with the higher quotation the nearer one on most sales.

Finished materials continue in active demand, practically every line reporting large sales and excellent prospects. Railroad supplies are still selling largely, though there is a natural lull due to the coming of winter. Structural steel is active and large requirements will be made by the local trade soon, in view of the extraordinary amount of building projected.

Coke is in greatly increased supply, and consequently prices are somewhat lower. Connellsville brings $3.50 at the ovens on contracts, and $3.75@$4 for speedy deliveries.

Cleveland. Dec. 5.

Iron Ore.—Buying has started on a fairly liberal scale for 1906 delivery. The prices have been pretty well established at $4.25 for bessemer Old Range, $4 for bessemer Mesabi, $3.75 for non-bessemer Old Range, and $3.50 for non-bessemer Mesabi, all f. o. b. docks at Lake Erie ports. The last ore will be down the lakes by the end of this week or the first of next, indications being that total shipments will top 33,000,000 tons.

Pig Iron.—Buying has been limited, but the demand is exceedingly strong in the foundry grades. Consumers are asking for an increase of shipments on old orders. In the present stringency of material the Southern and Eastern furnaces are strong at $18 in the Valleys for Northern No. 2, and $14.50, Birmingham, for Southern No. 2. A few furnaces making bessemer, basic and malleable have resumed operations, but they do not market, being sold up ahead on contracts. The prices hold about as they have been, $18 in the Valleys being paid freely.

Finished Material.—The supply of bars is so short that some mills are getting a premium of $2 a ton. This is bringing out a fair supply from the smaller mills. Brokers who bought billets on speculation are now selling to the trade, getting $30@$31 at the mill for the bessemer 4 by 4s and $35 for forging. The letting of contracts for new ships has increased the demand for structural and plates. It is said that orders now pending will require 40,000 tons of steel. Big repair jobs is increasing the same demand. Sheets are strong and steady at the higher prices. Light rails for mine work are scarce, 15-lb. rails bringing $30 at the mill, Pittsburg.

New York. Dec. 6.

Pig Iron.—A large business is going, and there is special urgency about deliveries. It looks as if some foundries were very short of stock. Prices are not higher, but premiums are being paid in some cases for early deliveries.

For Northern iron, in large lots, we quote: No. 1X, $18.75@$19.25; No. 2X, $18.25@$18.75; No. 2 plain, $17.50@$18; gray forge, $16.50@$17; Virginia foundry is held at $18.60@$19.10 for No. 1, and $18.10@$18.60 for No. 2. Basic has been $18.25@$18.75 for Alabama, and 25c. less for Northern. For Southern iron, on dock, quotations are: No. 1 foundry, $18.75 ;No. 2, $18.25; No. 3, $17.50; No. 4, $17; No. 1 soft, $18.75; No. 2 soft, $18.25; gray forge, $16.50. Southern prices are firm.

Warrant business has been quiet, with few sales and slight changes.

Cast-Iron Pipe.—Prices have been again advanced to a basis of $28.75 per net ton for 6-in. pipe, carload lots at tidewater points. The business coming in is heavy for the season.

Bars.—Business is good and prices higher. Iron bars are 1.795c., tidewater, for plain, and 1.895c. for refined. Steel bars are 1.745c., tidewater. Store trade is good, with 2.25@2.50c. the current price, but premiums are asked on special deliveries.

Plates.—Steel plates are still in strong demand. Tank plates are 1.745@1.825c.; flange and boiler, 1.845@1.945c.; universal and sheared plates, 1.745c. up, according to width. For early delivery premiums are asked; in fact, nearly all business is on a premium basis.

Structural Material.—Orders continue to come in, and deliveries are uncertain. Prices are nominally unchanged. Beams under 15-in. are 1.845c. for large lots; over 15-in., 1.895c.; angles and channels, 1.845c., tidewater delivery. Premiums are asked on most business.

Steel Rails.—No change in standard sections. Light rails are in demand, prices ranging from $26 for 35-lb., up to $33 for 12-lb. rails.

Old Material.—Demand is strong, and prices are firm. No. 1 railroad wrought is $22@$23; No. 1 yard wrought, $21@$22; machinery cast, $14@$15; heavy steel melting scrap, $18@$18.50. These prices are on cars, Jersey City or other terminal delivery.

Philadelphia. Dec. 6.

The pig-iron market is developing surprising features of activity in basic and bessemer, and even in foundry and forge more business has been done within the past few days than was thought possible a week ago. Two or three large interests have made purchases of basic and bessemer on a basis of $17.50 per ton. Large orders have been secured for cast-iron pipe material, and it is understood that the orders recently placed are only a foretaste of others that are not far away. The tone of the pig-iron market is very strong and prices may be fairly quoted at $19@$19.50 for No. 1X; $18.50@$19 for No. 2; $18 for No. 2 plain; $16.50 for standard forge; $18 for basic; $19.50@$20 for bessemer.

Steel Billets.—Steel billets are quoted at $30 and considerable business has been quietly transacted; forging billets are quoted at $40.

Muck Bars.—Today's quotations for muck bars are $28.50, at which one lot was sold.

Bars.—Bars are selling very well at 1.83½ for best refined and 1.63½ for steel bars, but this is only a nominal price, and actual sales have been made this week for more money.

Sheets.—Sheets are very active and prices have advanced about $3 per ton on small business, which is about all that is being done at this time.

Pipes and Tubes.—There is no change in condition, and the moderate business that is being done is at figures heretofore prevailing. The mills are still able to accommodate the trade which they hold in Eastern territory without any delay.

Plates.—The plate market is extremely active. The strain just at this time is to make certain deliveries which were promised for December, but which were interfered by efforts of manufacturers to accommodate some urgent buyers which were crowded in.

Structural Material.—The pressure for structural material from unexpected buyers is still felt and most of them are being accommodated, but they are paying for the accommodation. The entire structural capacity of this week is taxed as it never was before.

Steel Rails.—The steel-rail situation is about as it was last week.

Scrap.—The buyers of scrap have supplied the most urgent requirements for the present, and desirable stock is pretty well cleaned up. Some low phosphorus scrap has been sold at $23.50; railroad scrap could sell at $23 if it could be had, and No. 1 yard scrap is very scarce at $20. No. 1 steel scrap is called for this week at $18. Old iron rails are nominally $25 per ton.

Pittsburg. Dec. 5.

New transactions in iron and steel are light, but the market is very strong. It is not likely there will be much buying before the opening of the year. The United States Steel Corporation, according to the latest report, has not concluded a deal for pig iron for the first quarter, but it is confidently expected that a satisfactory arrangement will be made in a short time. The feature of the steel market this week is the famine in ferro-manganese, and the situation is regarded as critical. There is none to be had and steel mills are beginning to suffer. It is reported today that some plants may be forced to close unless a supply can be received from some source. The Carnegie Steel Co., a producer of ferro, anticipated the shortage and several weeks ago contracted for from 3,000 to 5,000 tons of foreign ferro for delivery this month and during the first quarter of next year, which, with its own product, would cover all requirements. The delivery, however, is not satisfactory, and the company was forced last week to obtain a supply from another source. Manganese ore is coming in from Cuba and Brazil, and is being converted at one of the Carnegie blast-furnaces, but the supply is not sufficient to meet requirements. Spiegel is being used as far as possible. Three carloads of ferro-manganese are reported to have been sold during the week at $125 a ton, but this price is nominal, and it is not possible to buy any more even at that price. The pig-iron market is very quiet this week, and outside of a sale of 4,000 tons of basic iron a few days ago there have been no transactions of any importance. It was said today that all the available pig iron for delivery this month has been contracted for, and while there are a number of inquiries for next year, nothing has been done outside of the sales already reported. Production is very heavy, and it was estimated today that the record for the year likely will be about 23,000,000 tons. This will be about 5,000,000 tons in excess of the record of 18,000,000 tons made in 1902 and 1903. The Lake shipping season has closed, and in the absence of official data it is estimated that the shipments of ore from the Lake Superior regions will amount to about 33,000,000 tons for the season. The record was 27,500,000 tons, made in 1902. Prices for next year have been established and, as previously reported, will be 50c. above this season's rates and are as follows: Old Range bessemer, $4.25; Mesabi bessemer, $4; Old Range non-bessemer, $3.70; Mesabi bessemer, $3.50, lower lake docks.

The steel mills continue busy and have not yet caught upon specifications for plates and structural material. Steel bars are still in demand, but contrary to expectations no advance in price has been ordered and iron bars are held at from $7 to $10 a ton above steel bars. Sales of iron bars have been made lately at 1.85c. Pittsburg, but it is doubtful if a large tonnage could be secured at that rate and 2c. Youngstown, the price fixed by the Republic Iron & Steel Co. a week ago. may soon be the minimum. Steel bars remain at .50c. There is a notable improvement in sheets and tin-plate and the American Sheet & Tin Plate Co. yesterday started several more idle mills; it is believed all of its mills will be running before the end of the year. A number of independent sheet and tin-plate mills are idle for lack of steel, and the new prices ordered recently are being well maintained. Orders for steel rails continue to come in, fully 50,000 tons having been placed within the past week. Muck bar has advanced to $32 a ton, one sale at that figure being recorded which calls for 6,000 tons for delivery through the first half of next year. Recent sales were at $30.50 a ton.

Pig Iron.—Sales of all grades of pig iron for the week do not exceed 5,000 tons, including an order for 4,000 tons of basic iron. Prices are reported firm as follows: Bessemer, basic and foundry No. 2, $7.50, Valley furnaces and gray forge $16.85, Pittsburg. For the first quarter sales have been made at $17, Valley furnaces for bessemer and foundry No. 2. If the Steel Corporation closes the pending deal for first quarter iron it is not likely that this rate can be duplicated.

Steel.—No transactions in billets are recorded, and it is not posible to buy bessemer billets at less than $26.50; open-hearth billets continue to be quoted nominally at $27@$28. Sheet-bars remain at $27. Steel bars are 1.50c. and plates are firm at 1.50c.

Sheets.—The new prices for sheets are being maintained and the market seems to be improving. Black sheets are quoted at 2.30@2.35c. and galvanized at 3.35c. for No. 28 gauge.

Ferromanganese.—Three small lots of foreign ferro are reported to have been sold during the week at $125 a ton, but if it could be had a higher price would be willingly paid.

Heavy Chemicals and Minerals.

New York, Dec. 6.

In continuance of the general tone of the year, the demand for heavy chemicals is characterized by much strength, and with steady prices, though in some instances the market seems to be waiting for buyer and seller to get together.

Sulphur.—The market shows little change from our last report. There is but little business between buyer and seller, and though stocks are accumulating, yet it does not seem to affect the actual quotation. We note herewith the prices for the American product. Sicilian is quoted the same for Atlantic ports as the Louisiana product.

Pyrite.—This continues unchanged and in steady demand, the production being constantly absorbed (mostly for acid used by the fertilizer makers), and with some difficulty in making the supply equal to the active demand. Most of the foreign supply comes from Spain, with a very considerable fraction from Pilley's Island, Newfoundland.

Nitrate of Soda.—This shows the same prices, with a market which is reported as very strong. No stocks accumulate, the market absorption being ready and complete.

Salt Cake.—This is quoted at 65c. per 100 lb. on contract for car-load lots. The *heavy alkalies* (carbonates and caustic) show a sustained demand.

Sulphate of Copper.—This reported recently a slight advance (5c. per 100 lb.), probably in sympathy both with the noted advance of the metal, and with the general market demand. The price is given herewith.

Tin Crystals.—These are quoted at 21c. —1c. below last month. *Tin bichloride* is reported at 10¼c., a slight advance (¼c.) over last month.

Phosphates.—Phosphate companies report the same situation, as noted hitherto

and recently. Actual prices in some cases show a slight advance on those recently quoted; but the market is firm. Spot delivery is hard to fill. We discontinue, for the present, quotations on foreign supplies (Algerian, Tunis, Christmas Isle, Ocean Isle, Somme, etc.), as the firms handling these report no importations, the demand being met by the domestic supply.

PRICES.

Sulphur.		
Louisiana, New York, Boston or Portland	ton	$22.25
Philadelphia or Baltimore	"	22.75
Pyrite.		
Domestic, furnace size	Unit	11c
Fines	"	10c.
Imported, lump, At. ports	"	10@11c.
" fines " "	"	9½@10c.
" furnace size	"	11½@12c.

Pyrite prices are per unit of sulphur. On lump deliveries, a charge of 25c. per ton is made for breaking to furnace size.

Acids.		
Boric, crystals	per lb.	.10
powdered	"	.10½
Carbonic, liquid gas	"	.12½
Hydrofluoric, 30%	"	.03
48%	"	.05
60%	"	.11
Nitric acid, 36°, 100 lb		$4.75
38°, 100 lb		5.25
40°, 100 lb		5.50
42°, 100 lb		5.75
Oxalic acid, com'l, 100 lb		$5.00@ 5.25
Sulphuric acid, 50°, bulk, ton		13.50@14.50
60°, 100 lb. in carboys		1.05
60°, bulk, ton		18 00@20.00
66°, 100 lb. in carboys		1.20
66°, bulk, ton		21.00@23.00
Blue Stone (Copper Sulphate), car-load lots, per 100 lb		$5.55
Nitrate of Soda, 100 lb	96%	2.25
" " "	95%	2.22½
Sulphate of Ammonia, per 100 lb		3.10@ 3.15

Phosphates.	F. o. b.	C. I. F. Gt. Britain. or Europe
*Fla., hard rock	$7.75@8.00	$10.90@12.10
land pebble	4.00@4.25	7.95@ 8.65
†Tenn., 78@80%	4.60@4.65	10.52@10.92
78%	4.00@4.25	.....
75%	3.65@3.75	.....
68@72%	3.25@3.50	.....
‡So. Car. land rock	4.00@4.25	.....
river rock	3.75@4.00	.....

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

Foreign Chemical Trade.—The exports of phosphates and the more important chemicals from the United States for the 10 months ending Oct. 31, were as follows:

	1904.	1905.
Phosphates, tons	745,026	811,053
Acetate of lime, lbs	47,225,773	57,487,400
Copper sulphate, lbs	25,041,800	17,895,000

Other exports of chemicals were small. The chief exports of phosphates were: To Germany, 257,232; England, 125,009; Italy, 115,084; France, 88,208 tons.

Imports of fertilizing chemicals were as follows, in long tons:

	1904.	1905.	Changes.
Phosphates	84,810	53,838	D. 30,972
Nitrate of soda	233,912	269,934	I. 36,022

The imports of sulphur or brimstone, and of pyrites valued chiefly for sulphur contents, were as follows for the 10 months, in long tons:

	1904.	1905.	Changes.
Sulphur	114,838	71,027	D. 43,811
Pyrites	327,315	427,857	I. 100,542

The decrease in sulphur was due to the increasing competition of the domestic product. The pyrites imported this year carried the equivalent of about 183,000 tons of brimstone, making a total import of 254,027 tons of sulphur.

Imports of heavy chemicals for the 10 months were as follows, in pounds:

	1904.	1905.
Potash, muriate	101,768,659	143,436,127
Potash, chlorate	84,138	31,881
Potash, nitrate	11,010,364	8,922,438
Other potash salts	58,783,105	61,879,138
Bleeching powder	73,587,628	86,031,132
Caustic soda	1,954,803	1,909,557
Sal soda	4,061,228	1,086,238
Soda ash	16,407,015	12,221,447
Other soda salts	8,430,777	8,884,018

The more important potash salts and bleaching powder, or chloride of lime, show increases. The soda salts show decreases, due chiefly to the enlargement of the domestic manufacture.

Metal Market.

New York, Dec. 6.

Gold and Silver Exports and Imports.

At all United States Ports in Oct. and Year.

Metal.	October.		Year.	
	1904.	1905.	1904.	1905.
G'ld Exp	$3,855,649	$305,124	$86,895,557	$42,983,045
Imp	8,045,275	10,928,379	76,739,945	41,266,481
Exc	I. $4,189,626	I.$10,623,255	E.$10,166,612	E. $1,716,564
Silv. Exp	3,485,098	4,508,726	42,615,918	43,931,936
Imp	1,717,114	2,089,358	21,394,345	26,596,356
Exc	E. $1,767,984	E. $2,419,368	E.$21,220,673	$17,355,580

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

Gold and Silver Exports and Imports, N.Y.

For the week ending December 2, and for years from January 1.

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week	12,000	$49,902	$963,405	$49,695
1905	34,604,003	10,564,732	31,822,482	3,929,326
1904	100,900,489	6,599,623	33,727,810	1,132,615
1903	31,812,827	16,441,433	30,783,825	3,265,454

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

An unusual gold movement was found during the past week in the export of $1,750,000 gold to Mexico. The usual movement is the other way; while individual imports are not large, the total last year was $10,818,595. One good authority says that this movement has been entirely due to the sharp rise in silver, which touched 63¾ in New York and 30 5-16 at London. By importing gold from the United States and shipping its equivalent in silver to San Francisco and thence to China, Mexican bankers cleared a small profit on the operation. London figured in these negotiations, which were quite complicated. A small decline in silver would be sufficient to stop these gold exports.

The statement of the New York banks —including all the banks represented in the Clearing House—for the week ending Dec. 2 gives the following totals, comparison being made with the corresponding week of 1904.

	1904.	1905.
Loans and discounts	$1,090,602,900	$1,023,882,200
Deposits	1,127,878,100	1,007,172,500
Circulation	42,126,500	54,066,500
Specie	212,561,100	179,843,400
Legal tenders	77,947,500	74,515,100
Total reserve	$290,508,600	$254,358,500
Legal requirements	281,969,525	251,793,125
Balance surplus	$8,539,075	$2,565,375

Changes for the week this year were increases of $11,594 in loans, $30,200 in legal tenders and $7,994,900 in deposits; decreases of $4,623,200 in specie, $536,100 in circulation and $6,591,725 in surplus reserve.

The following table shows the specie holdings of the leading banks of the world. The amounts are reduced to dollars.

	Gold.	Silver.
New York Associated	$179,843,400	.....
England	167,797,900	.....
France	578,261,475	$219,141,210
Germany	164,110,000	54,705,000
Spain	74,980,000	113,845,000
Netherlands	33,010,000	30,213,500
Belgium	16,160,000	8,080,000
Italy	130,225,000	15,741,000
Russia	574,625,000	18,820,000
Austria	227,335,000	60,195,000

The returns of the Associated Banks of New York are of date Dec. 2, and the others Dec. 1. The foreign bank statements are from the *Commercial and Financial Chronicle*, of New York.

Indian exchange has been firm, and all the Council bills offered in London were taken at an average of 16.03d. per rupee. The demand for bills was good. A large amount of silver is going to India.

The coinage executed at the United States Mints in the month of November was as follows, in face value: Gold, $2,348,300; silver, $826,000; nickel and copper, $282,910; total value, $3,447,210. There were also executed 24,000 silver peso pieces for the Philippines. In addition, 700,000 pieces were coined for Costa Rica.

Prices of Foreign Coins

	Bid.	Asked.
Mexican dollars	$0.49½	$0.50½
Peruvian soles and Chilean pesos	.45¾	.47
Victoria sovereigns	4.85½	4.87½
Twenty francs	3.87	3.90
Spanish 25 pesetas	4.78	4.82

SILVER AND STERLING EXCHANGE.

Nov.-Dec.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.	Dec.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.
30	.....	....	30 1/16	4	4.85⅜	64	29⅝
1	4.85¾	65	30	5	4.85⅜	63½	29⅜
2	4.85¾	64¾	29¾	6	4.85⅜	64	29⅝

New York quotations are for fine silver per ounce Troy. London prices are for sterling silver, .925 fine.

Other Metals.

Daily Prices of Metals in New York.

Nov.-Dec.	Copper. Lake, Cts. per lb.	Copper. Electrolytic, Cts. per lb.	Copper. London, £ per ton.	Tin. Cts. per lb.	Lead. Cts. per lb.	Spelter. New York, Cts. per lb.	Spelter. St. Louis, Cts. per lb.
30	.....	.....	77⅛	....	....	.....	.....
1	17½ @17⅝	17¼ @17¾	77⅛	34¾	5.25	6.35 @6.40	6.20 @6.25
2	17½ @17⅝	17¼ @17¾	....	34¾	5.25	6.35 @6.40	6.20 @6.25
4	17½ @17⅝	17¼ @17¾	77¼	35	5.35	6.40 @6.45	6.25 @6.30
5	17½ @17⅝	17¼ @17¾	77	35	5.35	6.40 @6.45	6.25 @6.30
6	17¾ @17⅞	17¼ @17¾	77¾	35½	5.35	6.40 @6.45	6.25 @6.30

London quotations are per long ton (2,240 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. The price of cathodes is usually 0.125c. below that of electrolytic.

Copper.—The market has assumed a very much quieter aspect. The requirements of consumers are well covered for some little time ahead, and there is an inclination on their part not to engage themselves further at the current level of prices. The close, under the circumstances, is altogether nominal at 17½@17⅞ for Lake copper; 17¼@17¾ for electrolytic copper in ingots, cakes and wire bars; 16¾@17⅛ for casting copper.

The speculative market in London has also shown a tendency to drop, and some realizing caused a reaction, at one time bringing the quotations down to £77 for spot, £75 10s. for three months. However, the close is firmer at £77 15s. for spot, £77 for three months.

Statistics for the second half of November show a decrease in the visible supplies of 2,500 tons.

Refined and manufactured sorts, we quote: English tough, £78 15s.; best selected, £80; strong sheets, £88; India sheets, £83; yellow metal, 8d.

Exports of copper from New York for the week are reported at 3,514 long tons. Our special correspondent reports the exports from Baltimore for the week at 2,118 long tons of fine copper.

Copper Exports and Imports.—Exports of metallic copper from the United States for the 10 months ending Oct. 31 are reported by the Bureau of Statistics of the Department of Commerce and Industry as below; the figures given being in long tons, of 2,240 lb. each:

	1904.	1905.	Changes.
Great Britain	41,322	23,198	D. 18,124
Other Europe	159,120	140,222	D. 18,898
China	2,055	34,487	I. 32,332
Other countries	1,512	8,278	I. 6,766
Total	204,009	206,185	I. 2,076

To all countries outside of China there was a decrease of 30,256 tons; so that the gain this year was entirely in the Chinese business. In addition to the exports given above, there was exported this year 30,492 tons of ore and matte. The copper contents of these exports are not given; estimating them, chiefly on the basis of values, and adding to the quantity of metal, we find that the total exports for the nine months were equivalent to 210,382 tons of fine copper.

Imports of copper and copper material into the United States for the 10 months ending Oct. 31 are reported as follows, with re-exports of foreign material; the figures giving the equivalent of all material in long tons of fine copper:

	Metal.	Iron ore, etc.	Total.
Mexico	38,253	10,722	48,975
Canada	8,305	5,508	13,813
Great Britain	9,906	21	9,927
Other countries	2,565	1,899	4 464
Total	59,029	18.150	77,179
Re-exports	607	.....	607
Net imports,	58,422	18,150	76,572

The total net imports were 133,820 tons less than the exports given above. The imports of ores and matte from Canada and Newfoundland were 147,931 tons, with a copper content of 5,508 tons; those from Mexico were 81,266 tons, with a copper content of 10,722 tons. The imports from Mexico include a large proportion of matte. The imports from Great Britain were largely bars sent here to be refined. Imports from other countries were chiefly from South America.

Tin.—Our market has been more or less a reflection of the speculative movements in London, where, under large transactions, prices advanced from day to day, closing very strong at £161 10s. for spot, £157 10s. for three months.

Business here was not very active, as consumers have supplied themselves on a somewhat lower level and cannot make up their minds as yet to pay the extreme advance. The quotations at the close are 35⅛@35¼c.

Statistics for the month of November show an increase in the visible supplies of 500 tons.

Imports of tin into the United States for the 10 months ending Oct. 31 are reported as below, in long tons:

	1904.	1905.	Changes.
Straits	14,501	16,877	I. 2,376
Australia	251	484	I. 233
London	16,499	15,937	D. 562
Holland	519	404	D. 115
Other Europe	.....	662	I. 662
Other countries	341	32	D. 309
Total	32,111	34,396	I. 2,285

The total increase was 7.1%. The imports from Great Britain are chiefly Straits tin.

Lead.—The American Smelting & Refining Co. during the week again raised its price, putting its schedule up to 5.35 New York, 5.27½c. St. Louis.

The foreign market is exceedingly firm and advanced from day to day, closing at £16 16s. 3d. for Spanish lead, £16 18s. 9d. for English lead.

Imports of lead in all forms into the United States, with re-exports of foreign lead, for the 10 months ending Oct. 31 were as follows, in short tons of 2,000 lb. each:

	1904.	1905.	Changes.
Lead, metallic	7,991	3,503	D. 4,488
Lead in ores and base bullion	87,242	80,059	D. 7,183
Total imports	95,233	83,562	D. 11,671
Re-exports	74,194	52,112	D. 22,082
Net imports	21,039	31,450	I. 10,411

Of the imports this year 73,081 tons were from Mexico, and 9,477 tons from Canada. Exports of domestic lead for the 10 months were 215 tons in 1904, and 250 tons in 1905; an increase of 35 tons.

Spelter.—While the excitement has somewhat abated, a good business is doing from day to day and the market closes at an advance, the quotations being 6.40@6.45c. New York, 6.25@6.30c. St. Louis.

The London market has been firm throughout the week and closes at £28 15s. for good ordinaries, £29 for specials.

Exports of spelter from the United States for the 10 months ending Oct. 31 were 7,553 short tons in 1904, and 2,727 tons in 1905; a decrease of 4,826 tons. In addition there was 3,017 tons of zinc dross exported this year. Exports of zinc ore were 25,645 tons in 1904, and 21,847 tons in 1905; a decrease of 3,798 tons.

Zinc Sheets.—The price of sheet zinc was advanced 25c. on Dec. 1, and is now $7.75 per 100 lb. (less discount of 8%), f. o. b. cars Lasalle and Peru, in 600-lb. casks, for gauges No. 9 to 22, both inclusive, widths from 32 to 60 in., both inclusive, and lengths from 84 to 96 in., both inclusive. The freight rate to New York is 27.5c. per 100 lb. The fluctuations in the base price for sheet zinc since January 1, 1905, have been as follows: December 30, 1904, $7.25; January 7, 1905, $7.50; May 12, $7.25; June 1, $7; July 29, $7.25; August 10, $7.50; December 1, $7.75. The demand is reported active.

Antimony.—The market is quite active and prices have advanced to 12½@13½c., depending upon brands and deliveries.

Nickel.—Quotations for large lots, New York or other parallel delivery, are 40@47c. per lb., according to size and condition of order. For small quantities, prices range from 48 up to 60c., also according to size of order and deliveries.

Exports of nickel, nickel oxide and nickel matte from the United States for the 10 months ending Oct. 31 were 6,341,048 lb. in 1904, and 8,262,669 lb. in 1905; an increase of 1,921,621 lb. Imports of nickel ore and nickel matte for the 10 months were 6,890 tons in 1904, and 11,313 tons in 1905; an increase of 4,423 tons this year.

Quicksilver.—Prices in New York continue steady at $40 per flask for large orders—over 100 flasks—and $40.50 for jobbers' lots, down to 10 flasks. For re-

tail quantities, under 10 flasks, pound prices are charged, which work out to $41.75@$42.25 per flask. San Francisco prices are steady at $39 for domestic orders, and $37.50 for export. The London price is £7 5s., but second hands ask only £7 2s. 6d. per flask.

Exports of quicksilver from the United States for the 10 months ending Oct. 31 were 1,403,583 lb. in 1904, and 870,452 lb. in 1905; a decrease of 533,131 lb. this year.

Manganese Alloys.—Prices for these alloys in Germany are given by Paul Speier as below. The prices are for orders of not less than 500 kg. delivered in Bremen, and are as follows, per 100 kilograms:

	Marks.
Manganese copper, No. 1, 30% Mn	275
No. 2, 28% Mn	180
No. 3, 20 to 25%, with 2 to 4% iron	165
Manganese tin, No. 1, 55% Mn., no iron	480
No. 2, 56% Mn., some iron	280
Manganese nickel, No. 1, free from iron	450
No. 2, traces of iron	270

Manganese metal is quoted as 3.60 marks per kg.—38.8c. per lb.—delivered in Bremen.

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

Aluminum.	Per lb.
No. 1, 90% ingots	33@37c.
No. 2, 99% ingots	31@34c.
Rolled sheets	4c. up.
Aluminum-bronze	20@23c.
Nickel-alum	33@39c.
Bismuth	$2.10
Cadmium, f. o. b. Hamburg	77c.
Chromium, pure (N. Y.)	80c.
Copper, red oxide	50c.
Ferro-Molybdenum (50%)	95c.
Ferro-Titanium (20@25% N. Y.)	75c.
Ferro Chrom. (75%)	12¼c.
Ferro-Tungsten (37%)	29c.
Magnesium, pure (N. Y.)	$1.60
Manganese (98@98% N. Y.)	75c.
Manganese Cu. (30@70% N. Y.)	40c.
Molybdenum (98@99% N. Y.)	$1.75
Tantalic acid (N. Y.)	40c.
Thallium, f. o. b. Breslau, Germany	65@70c.
Phosphorus, foreign	45c.
Phosphorus, American	70c.
Tungsten (best), pound lots	90c.

Variations in prices depend chiefly upon the size and condition of orders.

Missouri Ore Market.

JOPLIN, Dec. 2.

The highest price paid for zinc ore was $54 per ton, and the assay basis price ranged from $48 to $51 per ton of 60% zinc. For the first time of the year the advent of the Caney Zinc Co. in the market for a largely increased purchase did not affect the market. Heretofore such advent meant an advance of $1 to $2 per ton on all grades of ore. Just now, however, the Lanyon Zinc Co. is entirely out of the market, in addition to the withdrawal of the Prime Western Spelter Co. and the United Zinc & Chemical Co. some weeks ago. This lessens the demand for these three concerns 1,200 tons per week, but a stronger demand from other sources has kept the demand equal until the Lanyon Co. dropped out. This made it possible for the Caney Co. to purchase a large tonnage with very slight advances. Thanksgiving and incipient labor troubles lessened the output of the week approximately 1,000 tons. All differences between mine owners and employees appears to have been settled individually, the agitators shipped in here securing only a few miners to join in a union.

Lead ore continues to soar, the highest price this week being $75 per ton, with 80% grades selling at $74 per ton. The demand fully equals the output and competition is sharp among buyers, even with this high price.

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

	Zinc, lb.	Lead, lb.	Value.
Joplin	2,384,410	272,690	68,410
Carterville-Webb City	1,925,470	509,920	62,160
Duenweg	926,350	133 880	26,255
Galena-Empire	762.260	93,030	20,970
Badger	719,720	.. ...	17,270
Aurora	7 4,540	.....	15,340
Granby	514,000	20,000	8,520
Alba	253,160	.....	6.455
Neck City	210,030	41.030	5,865
Carthage	218,360	.....	5,560
Prosperity	152,820	11,800	3,940
Oronogo	128,870	8,550	3,200
Spurgeon	266,870	.....	2,860
Central City	117,140	.....	2,690
Sherwood	69,720	6,750	1,615
Beef Branch	83,650	20,240	1,600
Totals	9,433,390	1,090,890	
48 weeks	267,363.240	57,944,420	$12,256,110
Zinc value, the week, $213 465; 48 weeks,			$10,495,515
Lead value, the week, 40,245; 48 weeks,			1,760,595

The following table shows the average monthly prices of zinc and lead ores in Joplin, by months:

ZINC ORE AT JOPLIN.			LEAD ORE AT JOPLIN.		
Month.	1904.	1905.	Month.	1904.	1905.
Jan.	33.33	52.00	Jan.	55.55	61.50
Feb.	33.63	52.77	Feb.	56.37	57.62
March	35.40	47.40	March	57.20	57.20
April.	35.75	42.88	April.	58.00	58.00
May	34.87	43.31	May	57.77	58.27
June.	32.93	40.75	June.	56.60	57.80
July.	33.37	43.00	July.	53.00	58.00
August	37.55	48.83	August	53.00	58.00
September.	40.18	46.75	September.	53.50	63.50
October	43.65	47.60	October	53.50	63.86
November.	43.95	49.55	November.	54.70	68.67

Wisconsin Ore Market.

PLATTEVILLE, Dec. 2.

Nearly all of the mills in the district shut down for Thanksgiving, and owing to continued scarcity of cars, little or no ore was loaded from the outlying camps. Assay basis, 60% zinc ore, brought $52 per ton; several small lots of higher grade brought $54.50.

Lead remains steady at $34@$35 per thousand for 75% ore.

The following is the only ore reported as being loaded:

	Zinc, lb.	Lead, lb.
Platteville	516,380	76,000
Shullsburg	84,000	30,000
Mineral Point	35,000	.....
Total	635,380	96,000

The Platteville camp was the only one where there were cars enough to load the ore left in the bins last week.

Mining Stocks.

New York. Dec. 6.

There is little change in the speculative conditions, but for the present the bulls seem to have the call. The industrials have been prominent on the Exchange, American Smelting, Amalgamated Copper, General Chemical and Virginia-Carolina all being heavily traded in.

On the outside market, the copper stocks were active and strong, nearly all making gains. Granby, which has declared a 3% dividend, and Utah Copper showed well; Nevada Copper and Utah Apex were also in request.

On the Consolidated Exchange there was the usual trading in the Comstocks. The Tonopahs and Cripple Creek shares were more in evidence, while several Utah stocks—notably Ontario—made their appearance.

Boston. Dec. 5.

The local stock market has been active and quite broad. It was a good market all around, and prices have been generally firm.

North Butte has been up to $76, closing $1 below the highest. On to-day's market there were a number of advances. Copper Range went up $4¼, to $79¼; Osceola $1, to $10; Quincy $3, to $111; Mohawk $2½, to $64. Utah reached $57½, and United States Mining $40¾; while Boston Consolidated sold at $22. Calumet & Hecla sold at $680, an advance of $12. On the curb, Nevada Consolidated sold up to $9⅞, and Utah Apex to $7¾. Isle Royale brought $24, losing a fraction later.

The strong position of copper, and the activity of the trade generally, are supporting the market. Copper stocks look as if high prices would be the rule for some time to come if no untoward occurrences come to interrupt the advance.

The United States Circuit Court has refused to grant the application of the Johnstown Mining Co.—a Heinze company—for an order to inspect the Boston & Montana books, to ascertain the quantity of ore removed from the Rarus claim. The court held that it was without jurisdiction and that the case is one for the Montana State courts.

Colorado Springs. Dec. 1.

There have been no striking features during the past week, and trading has been about normal in volume. Banner, which was the leader in the prospect list last week, still continues to be an active trader, but at reduced prices. This stock sold down to as low as 4¾, but closed today at 5⅛c.

The production for November for the Cripple Creek district exceeds the preceding month by nearly $100,000, but the tonnage was less. The total production was 63,755 tons, with a valuation of $2,050,525.

Portland sold on Wednesday for $2.15. El Paso has fluctuated little and sold today for 62c. Findley has sold down from 77¼ to 70c. Isabella is selling for 25c.; Vindicator for 70c. There was no Elkton traded in during the week, but the stock closed on today's market 45@49c. Independence has been selling for 14c. per share.

San Francisco. Nov. 30.

The Comstocks opened rather dull, but a better demand showed itself later. Prices were rather weak, however, and the chippers were in evidence. Ophir closes around $5.75, and Consolidated California & Virginia at $1.50 per share.

The Tonopahs were strong and prices better. Most of them are quite strongly held. Closing prices were $2.40 for Montana Tonopah, and $1.45 for Midway.

Oil shares continue dull, with few changes in prices.

Dividends.

Company.	Payable.	Rate.	Amt.
American Smelters B, pfd.	Dec. 1	$1.25	$375,000
American Smelters A, pfd.	Dec. 1	1.50	255,000
Calumet & Arizona	Dec. 18	2.80	500,000
Calumet & Hecla	Dec. 20	15.00	1,500,000
Copper Range Con	Dec. 23	1.00	383,781
Federal Mng. and Sm	Dec. 15	2.50	150,000
Federal Mng. and Sm., pfd.	Dec. 15	1.75	210,000
Gen. Chemical, pfd.	Jan. 2	1.50	150,000
Granby Con	Jan. 15	0.30	399,991
Greene Con. Copper	Dec. 30	0.40	345,600
National Lead, pfd	Dec. 15	1.75	260,820
Old Dominion	Dec. 15	0.50	144,008
Republic Iron and S., pfd.	Jan. 2	3.12½	638,020
Rocco Homestake	Dec. 26	0.02	6,000

*Monthly. §Bi-monthly. †Quarterly. ‡Semi-Annually.

Assessments.

Company.	Delinq.	Sale.	Amt.
Brunswick-Potosi	Dec. 13	Jan. 2	$0.03
Brunswick-Savage	Dec. 12	Jan. 2	0.03
Caledonia	Nov. 17	Dec. 8	0.10
Cedar Creek, Cal.	Dec. 24	.....	0.004
Challenge Con.	Nov. 22	Dec. 13	0.10
Champion	Dec. 11	.....	0.50
Chollar	Dec. 18	Jan. 8	0.10
Con. New York	Dec. 15	Jan. 2	0.03
Justice	Nov. 16	Dec. 9	0.05
Pearl Con., Wash.		.....	0.002
Purington, Cal.	Dec. 26	.....	0.01
Segregated Belcher	Dec. 8	Dec. 28	0.05
Spanish Ridge, Cal.	Dec. 18	.....	0.05

St. Louis. Nov. 25.

	High.	Low.
Adams	$ .40	$ .25
American Nettie	.17	.12
Center Creek	2.00	1.50
Central Coal & Coke	62.50	62.00
" " " pfd.	80.50	80.00
Central Oil	60.00	55.00
Columbia	1.00	.25
Con. Coal	31.00	30.00
Doe Run	170.00	166.00
Granite Bimetallic	.20	.15
St. Joe	18.50	18.00

LONDON. (*By Cable.**) Nov. 22.

	£	s.	d.
Camp Bird	1	13	3
Consolidated Gold Fields	5	19	4½
De Beers	17	12	6
Dolores	2	6	6
East Rand	6	7	6
El Oro	1	10	6
Esperanza	5	5	0
Modderfontein	7	5	0
Rand Mines	7	10	0
Rio Tinto	66	7	6
Simmer and Jack	1	10	3
Stratton's Independence	0	7	3
Tomboy	1	6	3

*Furnished by Wm. P. Bonbright & Co., New York.

STOCK QUOTATIONS.

NEW YORK. Week Dec. 6.

Name of Company.	High	Low	Clg.	Sales
*Amalgamated	91	85⅞	90⅜	402,575
Anaconda	159	151	157	35,200
British Col. Copper	8⅞	8¼	8⅜	10,800
Federal	132	132	132	100
Federal, Pf.	110¼	106¾	108⅛	13,350
Greene Copper	28	27⅜	27¾	15,930
Greene Gold	4¼	3⅞	4⅛	6,650
Mitchell	9⅞	8¾	9	9,900
Tennessee Copper	38	36	37	3,200
Union Copper	2	1¾	1½	7,000
United Copper,	36¼	33	36	22,700
United Copper, Pref.	79	76	78¼	550
Utah Apex	7⅝	6⅞	7⅛	25,000

NEW YORK INDUSTRIALS.

Am. Smelting & Ref.	157⅛	150½	152½	120,700
Am. Smelting & Ref., Pf.	132½	129	130½	10,900
Colorado Fuel & Iron	48½	44¾	47½	32,900
National Lead	85½	68	84¾	227,344
Pittsburg Coal	0	0	0	.....
Pittsburg Coal, pf.	59	57⅞	58	1,800
Republic I. & S.	34½	30	33⅞	122,850
Republic I. & S., Pf	105½	102	105	38,800
Tenn. C. & I.	126½	118	124½	87,750
U. S. Red. & Ref.	30	29	30	800
U. S. Red. & Ref., Pf.	70½	68½	70½	1,500
U. S. Steel	37¾	36	37	133,855
U. S. Steel, Pf.	104⅞	102⅞	104¾	85,353
Standard Oil	673	666	667	177
Bethlehem Steel	34⅞	30¾	34¾	9,850

BOSTON.

Allouez	42½	41	41½	1,955
*Amalgamated	91	88¾	90⅝	32,630
Atlantic	25	23	23½	1,770
Bingham	35¼	34	34¾	1,535
Boston Consolidated	22¾	21¼	22	18,182
Calumet & Hecla	680	670	680	23
§Centennial	29⅛	27⅜	28¼	2,282
Mercur	.60	.59	.60	1,850
Copper Range	79½	73¾	79	23,984
Daly-West	21	18⅝	19	23,984
Franklin	18½	17½	18¾	1,835
Granby	10½	9⅞	10	10,600
*Green Con. Copper	28	27¾	28⅞	1,295
Isle Royale	23⅞	23	23⅞	1,295
§Mass	10	9⅜	9⅝	520
Michigan	17⅜	16½	17	4,615
Mohawk	64	59⅞	64	6,491
North Butte	76¾	74½	76	13,455
Old Dominion	34⅜	32½	34	5,553
Osceola	110¼	108	110	942
Parrot	29⅞	29	29¼	4,567
Phoenix	1½	1⅜	1½	10
Rhode Island	6¼	6	6	490
Shannon	7¾	7⅝	7¾	2,590
Tamarack	128	126	127	305
Tecumseh	14	13	13¾	913
United Copper, com.	36½	35	36¼	10,335
Utah	58	55¾	57	15,853
Wolverine	129	128½	128⅞	176

PHILADELPHIA.

Cambria Steel	28¾	28	28	8,202
Philadelphia Co.	52	51⅝	51⅝	2,283
Tonopah	13¾	13½	13½	605

PITTSBURG.

Crucible Steel	13¾	13	13½	1,265
Crucible Steel, Pref.	68¾	67½	68½	2,198
Tonopah Ext.	5.75	5.35	5.50	2,285

COLORADO SPRINGS.

Name of Company.	First	High	Low	Clg.
Elkton	45¼	45¾	45	45
El Paso	60	61	60	61
Isabella	37½	37⅝	24	24½
Portland	210	210	200	210
Vindicator	70	70	69½	70

SAN FRANCISCO.

Best & Belcher	1.35	1.55	1.30	1.40
Bullion	.30	.31	.30	.30
Caledonia	.70	.73	.61	.61
Confidence	.94	.95	.90	.90
Con. Cal. & Va	1.50	1.55	1.45	1.45
Gould & Curry	.19	.23	.18	.18
Hale & Norcross	1.05	1.40	1.05	1.25
Mexican	1.35	1.40	1.35	1.35
Occidental Con	.86	.87	.86	.87
Ophir	5.75	6.00	5.75	5.75
Savage	.50	.59	.50	.56

*Ex-dividend. †1st Installment Paid.
‡Assessment Paid. §2d Installment Paid.

Monthly Average Prices of Metals.

SILVER.

Month.	New York.		London.	
	1904.	1905.	1904.	1905.
January	57.005	60.690	26.423	27.930
February	57.592	61.023	26.665	28.047
March	56.741	58.046	26.164	26.794
April	54.202	56.600	24.974	26.108
May	55.430	57.832	25.578	26.664
June	55.673	58.428	25.644	26.910
July	58.095	58.915	26.760	27.163
August	57.806	60.259	26.591	27.822
September	57.120	61.695	26.349	28.528
October	57.923	62.034	26.760	28.637
November	58.453	63.849	26.952	29.493
December	60.563	.....	27.930	.....
Year	57.221	.....	26.399	.....

The New York prices are in cents per fine ounce; the London quotation is in pence per standard ounce, .925 fine.

COPPER.

	NEW YORK.				LONDON.	
	Electrolytic.		Lake.			
	1904.	1905.	1904.	1905.	1904.	1905.
Jan.	12.410	15.008	12.553	15.128	57.500	68.262
Feb.	12.063	15.011	12.245	15.136	56.500	67.963
March	12.299	15.125	12.551	15.250	57.321	68.174
April	12.923	14.920	13.120	15.045	58.247	67.017
May	12.758	14.627	13.000	14.820	57.321	64.875
June	12.269	14.673	12.399	14.813	56.398	65.881
July	12.380	14.888	12.505	15.005	57.256	66.887
Aug.	12.343	15.664	12.468	15.725	56.952	69.830
Sept.	12.495	15.965	12.620	15.978	57.645	69.667
Oct.	12.993	16.279	13.118	16.332	60.012	71.406
Nov.	14.284	16.599	14.456	16.758	65.085	74.727
Dec.	14.661	.....	14.849	.....	66.384	.....
Year.	12.823	.....	12.990	.....	58.587	.....

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 2,240 lb., standard copper.

TIN IN NEW YORK.

Month.	1904.	1905.	Month.	1904.	1905.
Jan.	28.845	29.325	July	26.573	31 760
Feb.	28.087	29.262	August	27.012	32.866
Mar.	28.317	29.523	Sept.	27.780	32.095
April	28.132	30.525	Oct	28.596	32.481
May	27.718	30.049	Nov.	29.185	33.443
June	26.325	30.329	Dec.	29.286	.....
			Av., year.	27.986	.....

Prices are in cents per pound.

LEAD IN NEW YORK.

Month.	1904.	1905.	Month.	1904.	1905.
Jan.	4.347	4.552	July	4.192	4.524
Feb.	4.375	4.450	Aug.	4.111	4.665
Mar	4.475	4.470	Sept.	4.200	4.850
April	4.475	4.500	Oct	4.200	4.850
May	4.423	4.500	Nov.	4.200	5.200
June	4.496	4.500	Dec.	4.600	.....
			Av., year.	4.309	.....

Prices are in cents per pound.

SPELTER.

Month.	New York.		St. Louis.		L'nd'n
	1904.	1905.	1904.	1905.	1905.
January	4.863	6.190	4.673	6.032	25.068
February	4.916	6.139	4.717	5.989	24.594
March	5.057	6.067	4.841	5.917	23.825
April	5.219	5.817	5.038	5.667	23.813
May	5.031	5.434	4.853	5.284	23.594
June	4.760	5.190	4.596	5.040	23.875
July	4.873	5.396	4.723	5.247	23.938
August	4.866	5.706	4.716	5.556	24.675
September	5.046	5.887	4.896	5.737	26.375
October	5.181	6.087	5.033	5.934	28.225
November	5.513	6.145	5.363	5.984	28.500
December	5.872	.....	5.720	.....	.....
Year	5.100	.....	4.931	.....	.....

New York and St. Louis prices are in cents per pound. The London prices are in pounds sterling per long ton (2,240 lb.) good ordinary brands.