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Zinc Oxide and Zinc-Lead Pigment Manufacture

How the Process Requiring Pure Zinc Ores and Anthracite Fuel Was Made Suitable for Complex Ores and the Use of Soft Coal

WILLIAM F. GORDON*

The successful production of zinc oxide from ores dates back to the issue of the patent of Samuel Wetherill, for the furnace process (November, 1855) and the patent of Samuel Jones for the collection method. The furnace is an arched chamber of rectangular horizontal section, the hearth of which is composed of perforated grate bars of special construction.

The closed space under the grate is supplied with air under pressure which passes up through the perforations in the grate bars and through the charge resting on them. Upon the grate is placed a bed of coal, about 2 in. thick, covering the grates.

CRUSHING MILL AND ROASTING-FURNACE HOUSE

OXIDE-FURNACE HOUSE

Upon this bed of coal is placed about 5 to 6 in. of mixed coal and ore making a total depth of charge of 7 to 8 in. In a furnace whose grate area is 72 sq.ft. the total charge of ore and coal weighs 2200 lb. on the average. Such a charge is worked off in five to six hours. The residue, or slag, consists of the ash of the coal, the gangue of the ore and some zinc which has failed to be volatilized, the proportion of zinc being about 3 per cent.

After finishing the working of a charge, which is manifested by no more zinc flame appearing, the furnace is completely cleaned out and a new charge is introduced, the furnace remaining sufficiently hot to ignite the new charge.

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Oxidation and Collection of the Zinc

In blowing the air into the charge, through the perforated grates, a high degree of heat results. At about 1280 deg. C. (2350 deg. F.) in the presence of incandescent carbon, zinc oxide is reduced and the metallic vapor rises as a blue flame. The top of the furnace has an opening which connects with a main flue. Into this main flue all the furnaces open. The metallic flame, upon passing into the cooler portions of the flue, below 1290 deg. C., combines with oxygen. It is probable that the zinc secures its oxygen from carbonic dioxide gas, inasmuch as the nature of the furnaces would not admit of the presence of much atmospheric oxygen.

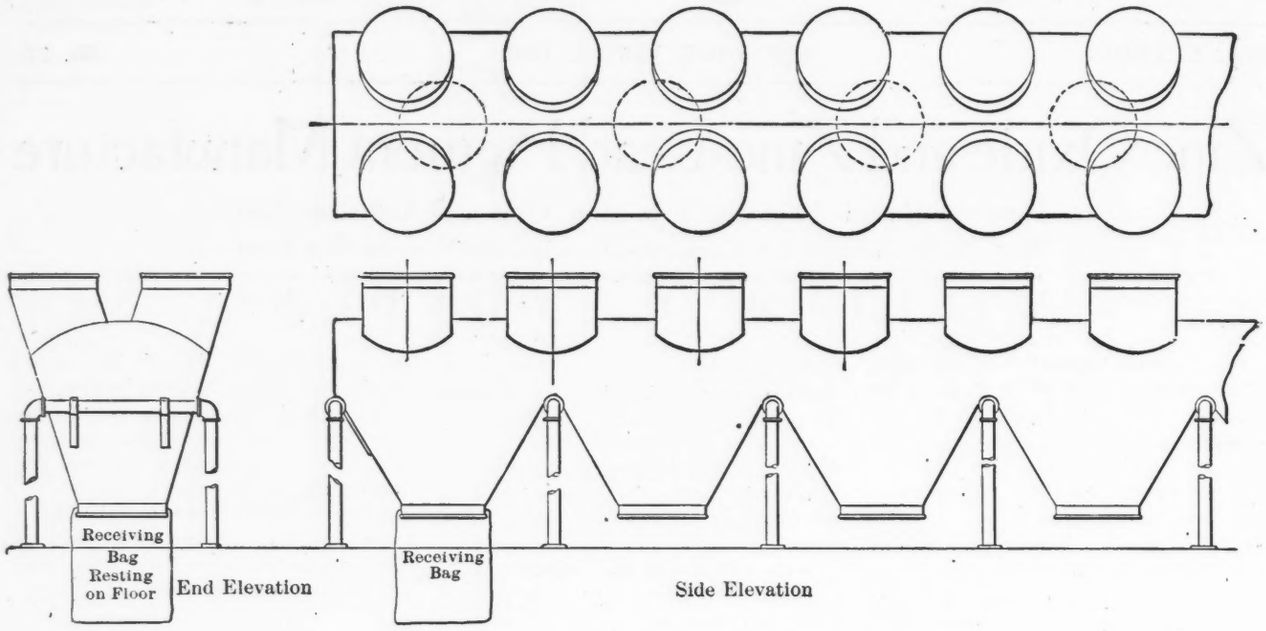
The zinc after combining with oxygen becomes a floating, amorphous powder, whose composition is 80 per cent. zinc, and 20 per cent. oxygen. This floating powder is drawn by exhaust fans through the various clarifying rooms where the heavier impurities are settled out, and then through long sheet-iron cooling pipes, after which it is finally drawn into the collecting or bag room.

The collecting process in the bag room consists of a large number of muslin bags (30 ft. long and 2 ft. in diameter) attached to sheet-iron conveying pipes. The oxide and gases are driven into these muslin bags, where a filtration takes place, the gases escaping through the muslin and the zinc oxide remaining behind. The bags are shaken at intervals, and the zinc oxide which has collected on the inner surface of the bag becomes detached and drops to the bottom. When a quantity has accumulated in the bottom of the bag it is removed and conveyed to the packing room, where it is barreled, using the same packing machinery as in flour mills.

Influence of Fuel

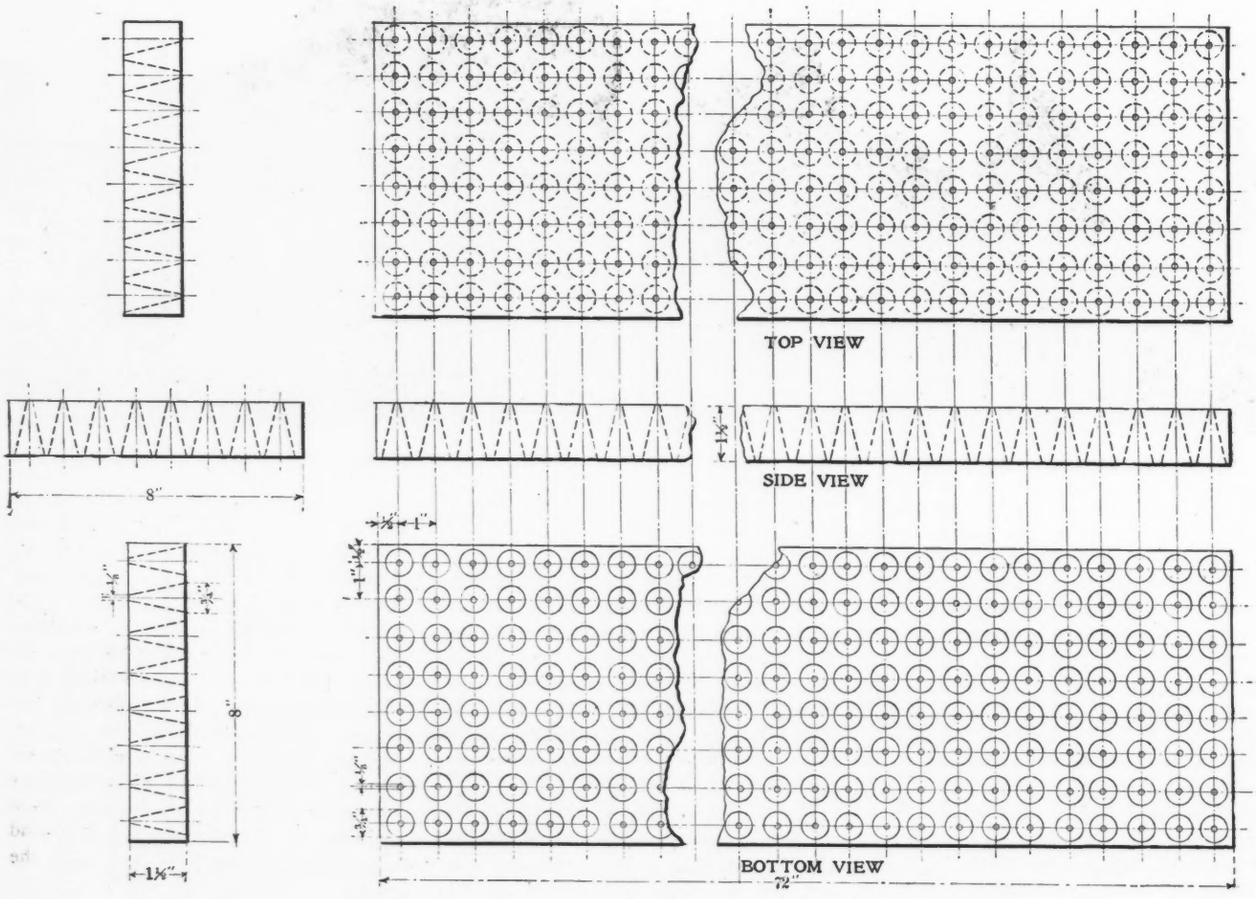
The above is an outline of the zinc oxide process, as usually practised. It requires a very pure ore and anthracite coal. The process appears very simple, but in fact is one of great difficulty. Much care must be exercised to have the oxide chemically pure, as very small portions of sulphur dioxide (SO_2) or of zinc sulphate ($ZnSO_4$) render it worthless. Also, the color is of vital importance, and this is subject to great deterioration from very slight causes. A very delicate balancing of all parts of the process is necessary, and careful relations between the various parts of the works when designing and constructing must be observed. Even a change in the direction of the wind frequently has a marked effect upon the process.

About 1900, after experimenting, I came to the conclusion that the softer



Plan, End Elevation and Side Elevation.

BAG-ROOM HOPPERS



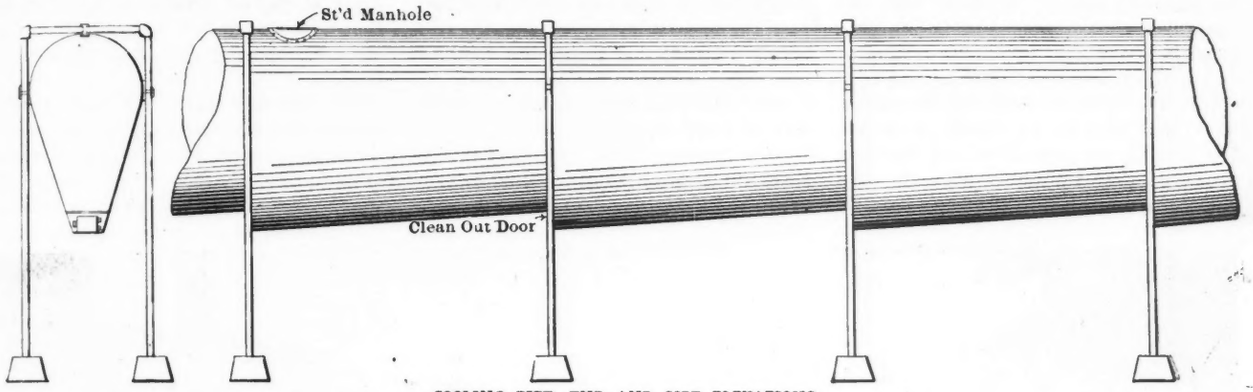
GRATES FOR OXIDE FURNACES

coals of the West might be used in the manufacture of zinc oxide. A small company was organized and a works with four furnaces was built at West Plains, Mo. A fair quality of oxide was produced, but the company was too weak financially to stand the necessary expense of corrections and experiments. However, enough was done to show the probable success of the process, the company was organized at St. Louis, and a works was built at Joplin, Mo. After many trials and changes, good results were finally attained. In using soft coal it was necessary to change much of the anthracite process, owing to the necessity of destroying the hydrocarbons which discolored the oxide.

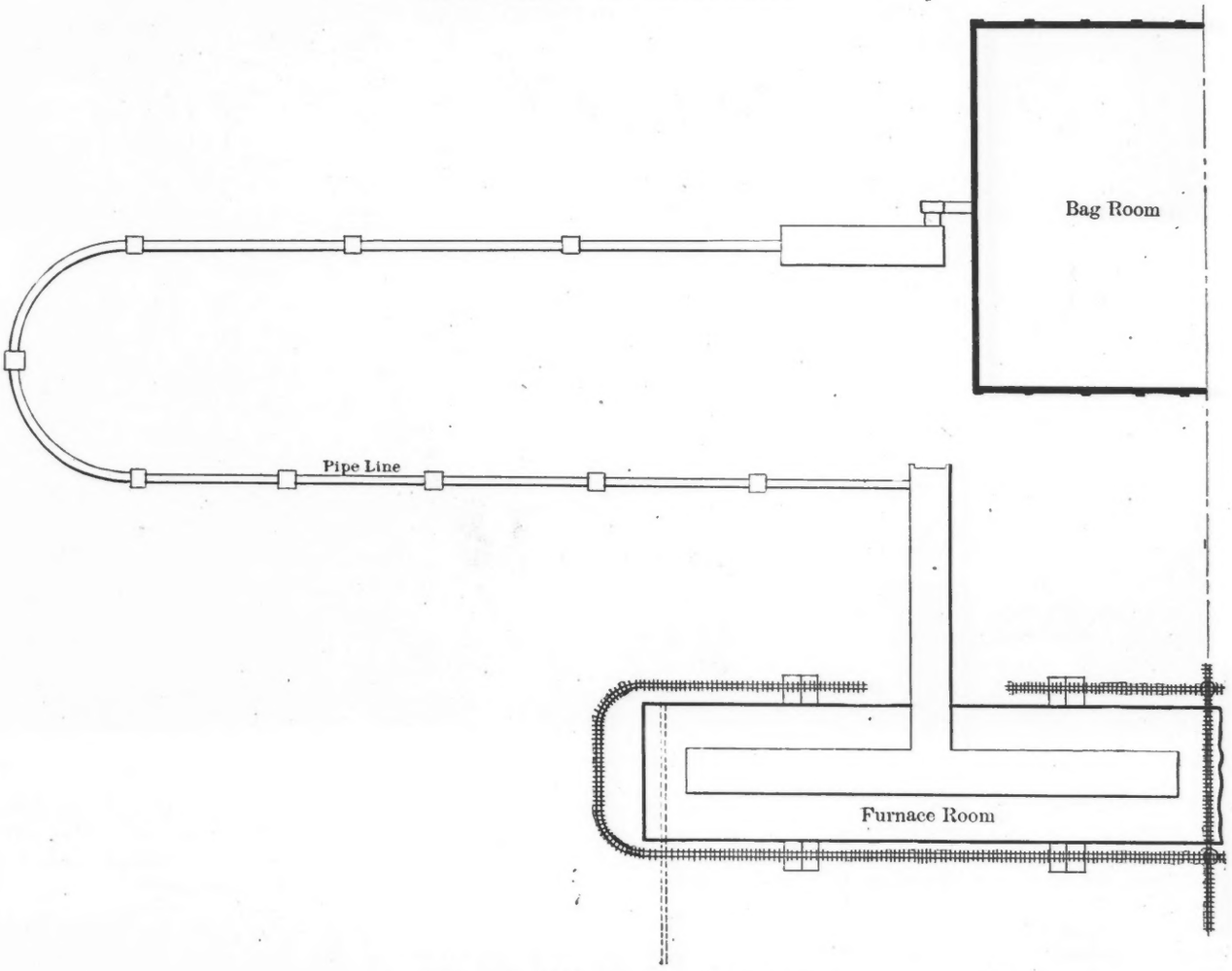
The Use of Zinc-lead Ores

The high price and scarcity of pure zinc ores forced a gradual use of an ore which contained some lead, and it became apparent that a smelter built along proper lines would treat very complex ores without the necessity of separating them. I was given the opportunity, and planned a smelter to use western ore, which was built at Coffeyville, Kan. This plant went into operation in April, 1906, and was a great success. It is now producing a high-grade pigment from the previously almost worthless ores of zinc and lead.

The ores used are the sulphide, carbonates and silicates of zinc and lead, and may be a combination of any of these, the only requirement being that the combined assay of zinc and lead be not under 30 per cent. (for example, an ore having 20 per cent. zinc and 10 per cent. lead). Below 30 per cent. of zinc-lead content, ore is too low in grade to be profitable. There



COOLING PIPE, END AND SIDE ELEVATIONS

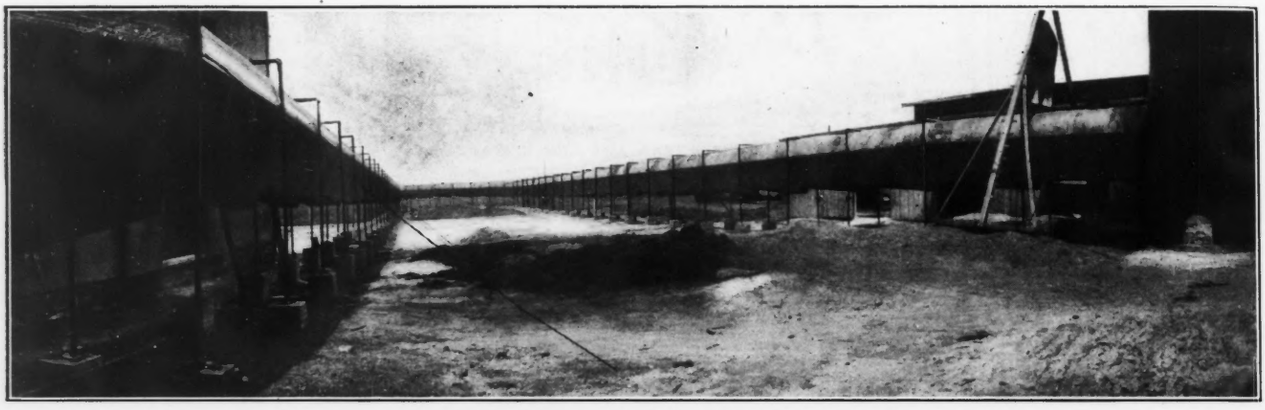


PARTIAL PLAN OF WORKS, COFFEYVILLE, KANSAS

is no requirement that any special relationship between the zinc and lead be observed. All grades of ore can be used, varying from those containing no lead up to those containing equal proportions of zinc and lead. It has been found by mixing ores from various districts that an average will contain one-third lead and two-thirds zinc. From such a charge a pigment is produced containing very nearly one-third basic lead sulphate and two-thirds zinc oxide. In preparing the charge, ores high in lead are mixed with ores low in lead, the amount of lead that may be used being calculated from the zinc content as a basis.

I have studied this phenomenon to a considerable extent, and am of the opinion that the lead is also volatilized and, having a greater affinity for sulphur than for oxygen, combines as the sulphate. The reason for so believing is that an ore charge of zinc and lead carbonate may be used and sufficient sulphur in form of iron pyrite be added. It is hardly probable that a chemical combination takes place between the lead as carbonate, and the sulphur in the pyrite before they are volatilized.

After passing from the pigment furnaces the floating zinc and lead is conducted as in the zinc oxide process to the bag room. In this process about 150 sq.ft. of muslin in the bag room is used for every square foot of grate surface in the pigment furnaces.



VIEW OF PIPE LINE COFFEYVILLE PLANT

FURNACES IN COURSE OF CONSTRUCTION

Principles of the Process

The ores are sized and carefully roasted to a proper sulphur content, the amount of sulphur left in the ore depending on the amount needed to combine with the lead to form basic lead sulphate. The roasting furnaces used are McDougalls, furnished by the Allis-Chalmers Company.

After roasting, the ore is taken to the pigment furnaces, and the zinc and lead are volatilized, the zinc going through the reaction as above described, and producing zinc oxide. The lead, which theoretically should also produce an oxide, does not do so, but unites with the sulphur left in the ore and forms basic lead sulphate.

Saving Copper, Gold and Silver

Another practical part of this process is the saving of copper, gold and silver in highly zinkiferous ores. Zinc has been a great detriment in many copper-gold-silver ores, and in some cases has rendered them valueless. The average zinc permitted in such ores without penalty is rarely over 10 per cent., and often as low as 5 per cent. In this pigment process the zinc is volatilized and the copper, gold and silver are retained in the slag. The slag is then smelted in an ordinary blast furnace.

Ores are purchased outright, a basis of 35 per cent. being used. A fixed value per unit is added above 35 per cent., and deducted below 35 per cent. The average assay of the ore treated is about 38 per cent. In case of ore containing gold, silver and copper a special arrangement is made.

The zinc-lead pigment is one of great beauty. Its covering capacity is equal to the same amounts of white lead (carbonate) and zinc oxide. Since neither the zinc oxide nor lead sulphate is affected by atmospheric conditions it is very durable. It does not darken by contact with sulphur gases, and therefore holds its color in coal burning cities.

When electric lights are used in lighting the main drifts underground, the globe placed at each chute should be placed at the end of a drop wire of sufficient length to allow the trammer to move the light where he desires. When boulders block the chute a few feet above its mouth, the trammer wishes to see how they are caught; at other times, while loading, the light is best at one side, out of the way.

Novel Equipment of Tywarnhaile Copper Mine

Dynamos Driven by Producer-gas Engines Furnish Power and the Vacuum Process Serves to Concentrate the Low-grade Ore

BY EDWARD WALKER

The greatest production of copper in Cornwall is at the Levant and other mines where tin is the chief product, and Tywarnhaile, situated four miles north of Redruth, is the only mine now in operation where nothing but copper is found. It also has the distinction of affording the most up to date practice in power production and concentration to be found in Cornwall. The power is all provided by suction gas producers and gas engines which are coupled directly to electric generators. The pumping, hauling and metallurgical plants are all driven electrically with excellent results in the way of economy. The concentration of the copper ore is effected by the Elmore vacuum flotation process. This process is in its infancy and has only within the last month or so been running continuously on these ores and should not be confused with the Elmore oil concentration process, which proved a failure in practice, owing to the cost of the plant and the large consumption of oil. The principles of the present process were described in a recent issue of the JOURNAL.

GAS ENGINE GENERATOR SETS

GAS PRODUCERS

APPLICATION OF THE ELMORE VACUUM PROCESS

The process is one of the family of flotation processes in which gaseous bubbles are used for carrying sulphides and native metals to the surface and so separating them from the gangue. Frank Elmore, in experimenting on these processes, discovered that the gases liberated when water is placed under a partial vacuum would act on the sulphides in this way, equally as well as gases generated by the action of acid on the gangue, as in the Potter and Delprat processes. In developing this idea he found that the vacuum could be adapted for circulating the material to be treated, and thus he developed a continuous and automatic process, in which the material is drawn up one arm of a siphon into the separator, and the tailings and concentrates discharged down the other arms of the siphon.

In order to get a siphoning action the plant is built on a series of floors, the separator at the top, and the supply and discharge tanks at the bottom, about 30 ft. below. The supply tank from which the material is drawn is a few feet above the discharge tanks. The pulp from the battery is delivered directly into a mixer on the first floor, consisting of a rotating barrel. Oil drops slowly into the pulp as it passes into the mixer. The rotation of the mixer brings the oil into contact with the surfaces of the particles, so that the particles shall offer more adhesion for the bubbles. After passing through the mixer, the pulp is discharged into a tank from which it is drawn up a pipe to the separator on the top floor. The separator is kept under a vacuum of 28 inches. By the arrangement of the siphon arms and the vacuum, the lifting and circulation of the pulp, concentrates and tailings is quite automatic. The diameters of the various pipes have to be calculated exactly. In order to maintain the proper level of the pulp, valves are placed at the bottoms of the discharge pipes, which can be regulated by the separator attendant. It is advisable in order to assist in this inspection and to help the agglomerated concentrates down the gallery, to have a supply of clean water entering at the top of the concentrator.

DATA OF PRACTICAL OPERATION

The question how much water is to be in the pulp depends on circumstances. In many cases it may be advantageous to send the pulp through a settler so that some of the water may be extracted. At Tywarnhaile this is not done, but the pulp passes directly from the battery to the mixer.

Another point is the amount of oil used. Originally 15 lb. of oil to the ton of ore was specified, but W. R. Thomas, the manager of Tywarnhaile, cut this down to 5 lb. The oil used is a medium petroleum product, which drops easily, and is much more fluid than the oil used in the old Elmore oil process.

In order to make the oil have its proper effect on the surface of the sulphide particles, it is necessary that the water should contain some acid. In his first experiments Mr. Elmore added a few pounds of acid per ton. Since the plant has been in operation at Tywarnhaile Mr. Thomas has found that the natural acidity of the mine water is sufficient to achieve this end.

The power required to operate the plant is small. The motor which operates the vacuum pump and rotates the mixer is rated at 5 h.p. The separator is a small vessel, measuring five feet in diameter and standing about five feet high. Rather over a ton of ore is passed through it in an hour, the actual figures being from 25 to 30 tons a day. The stamp battery contains ten heads of 1050 lb. each, and crushes this amount to a fineness of 25 holes to the linear inch.

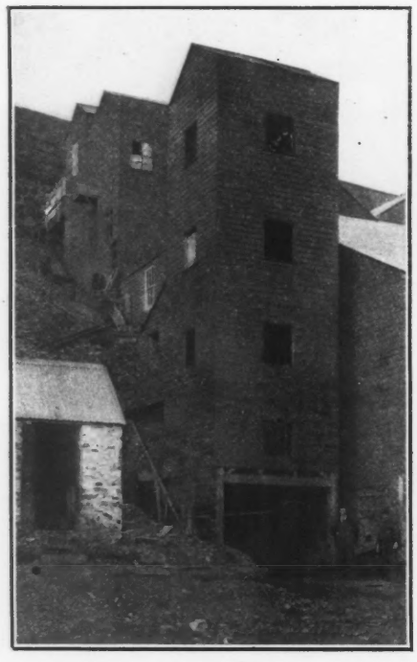
The process was first tried on slimes, but in practice it is found that coarser material will flow up the pipe in a perfectly satisfactory way. Mr. Thomas is

now engaged in experiments with a view of ascertaining how coarse a material can be effectively treated.

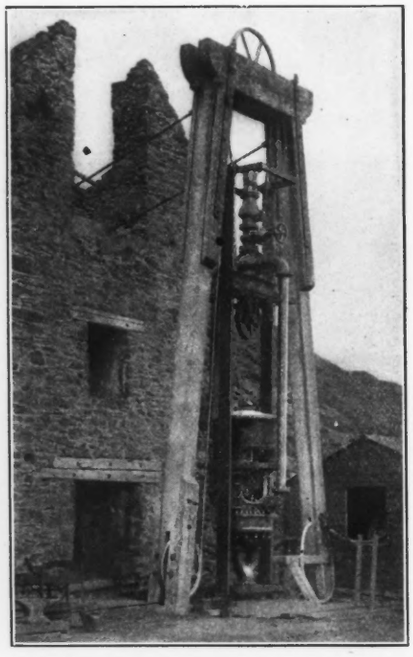
At Tywarnhaile the ore treated up to the present time comes from the dumps, and assays on an average 0.5 per cent. of copper. After passing through the vacuum plant a concentrate averaging 9 per cent. is obtained, and the tailings assay about 0.08 per cent. These figures have been obtained by averaging over a month's run. Before very long the ore in the mine will be available. This ore is of comparatively low grade, not averaging more than 2 per cent.

Power Plant

The Tywarnhaile mine has been in possession of the present owners for nearly ten years. A year ago, when the Elmore vacuum plant was erected, it was decided to open up the mine once more, and to adopt the latest methods of power generation. The steam engines were abandoned and gas-power plant was substituted.



VACUUM SEPARATOR HOUSE



ELECTRICALLY DRIVEN TURBINE PUMP READY FOR LOWERING

Three Dowson producers have been erected, each rated at 160 h.p. The coal used is South Wales anthracite, which is broken to size from ½ in. to 1¾ in. There are three sets of gas engines and dynamos combined, of the Westinghouse type, each set consisting of three single-acting cylinders. Each set has a normal capacity of 130 brake h.p. The dynamos are alternators of the three-phase type, and the current is 90 kw., 440 volts and 50 period. The illustrations given herewith show the gas producers and scrubbers, the power house, and the new centrifugal pump.

The electric current has so far been used for driving the pump, and for operating the stamps and concentrating plant. In the course of a few weeks the hauling gear and aërial transport will be completed, and then the power plant will be in full operation.

The pump which was bought when the gas plant was erected is a Worthington two-stage turbine pump, and is driven by a 100-h.p. motor. The first work it had to do was to unwater the mine. The operations were complicated by the continuity of some of the workings into adjacent mines, so that a great deal more water was raised than the Tywarnhaile mine was responsible for. It took three months to unwater the mine from the adit level to 200 ft. below. The inflow of the water against which the pump has now to work is 600 gal. per min., which is about two-thirds of its possible capacity.

It is impossible to give exact results as yet relating to the economy of the gas-power plant, for the full power has not yet been required. Judging by the results up to date, it would appear that the coal consumption is about one-third of what it was when steam engines were used, and that the consumption is just a fraction above 1 lb. per brake h.p. The actual results when the full plant is in operation will be looked forward to with great interest.

The Brazilian government has recently established a bureau of geological and mineralogical research as a branch of the department of ways and public works. Among other duties this bureau will prepare maps, diagrams and statistics, and issue them for the benefit of statistical bureaus.

The Phosphates of Northern Arkansas

By A. H. Purdue*

The phosphate deposits of northern Arkansas occur over the area between the towns of Hickory Valley, northeast of Batesville, Independence county, and St. Joe, Searcy county. The phosphate bed, which is practically flat, outcrops on the hillsides above the streams. As prospecting and careful geological field work have been confined to that part of the area lying within Independence county, it is not known whether or not workable deposits occur to the west of this area.

Only one company, the Arkansas Fertilizer Company, is operating in the region. The developed deposits are near the mouth of Lafferty creek, in the western part of Independence county. Operations were begun in 1900, when a phosphate plant was established at the mines. After a few months the plant was destroyed by fire, but later it was decided to erect a new plant at Little Rock, and to ship the crude phosphate there for manufacture into acid phosphate. The new plant, which has an annual capacity of 40,000 tons of acid phosphate, was not completed until the latter part of 1906.

Nature of the Deposits

The phosphates occur as bedded deposits and probably are of Ordovician age. The total thickness of phosphate rock usually is several feet, but the only bed sufficiently rich to work with profit is from 18 in. to 6 ft. thick. Within the vicinity of the developed deposits this bed is a compact, homogeneous, light-gray rock. The color is due to small white particles thoroughly mixed with dark-gray material. The white particles apparently are the ground-up fragments of shells and to them is probably due the phosphatic character of the rock. The dark-gray material consists of small, angular to subangular fragments and gives the rock, on close inspection, a conglomeratic appearance.

Only about 3000 tons of crude phosphate were mined in 1906, but with the completion of the new plant the output for 1907 should be considerable.

In the purchase of zinc ore the returning charges which have been made by European smelters on American, Australian and Canadian ores during the last two or three years have ranged from $11.40 to $13.16 per 2000 lb., these figures corresponding to 53@60 marks or 65@75 francs per 1000 kg.

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The Use of Coolers in Air Compression

By Frank Richards

The chief function of the cooler attached to an air compressor is the reduction of the volume of air to be compressed, the reduction of volume entailing a direct proportional saving in the power required. A reduction of 5 deg. F. means a reduction of 1 per cent. in the power required to compress any given quantity or weight of air. There are also important incidental advantages, which will appear later. The air may be cooled before compression by means of an "antecooler;" between two stages of compression, by an "intercooler; or after compression, in which case the apparatus is called an "aftercooler."

The antecooler is regarded by many as a mere refinement in air compression; yet it works quite as cheaply as the intercooler and there are many cases in which it could be employed with profit, especially in summer and in all cases where very cold water is available.

The Intercooler

The intercooler implies the compound or two-stage compressor, the two stages having the double purpose of avoiding high and dangerous temperatures and of saving power in the second compression on account of the considerable reduction of volume. The intercooler also, until very high pressures are reached, is apt to be regarded as an unprofitable refinement. The question of its utility is, however, not to be determined by opinion or prejudice. It should be approached in the same spirit as the question whether a given compressor should be a single-stage, a two-stage, a 20-in., or a 24-in. machine, the ultimate question in either case being as to which is the best machine for the purpose intended.

The precise pressures which should be reached in two stages is an open question; also the upper limit of single-stage compression. In the plants employed in the tunnel work, now going on about New York, we generally find two different systems, and two entirely separate and different sets of compressing apparatus, one for high and the other for low pressure, the former going up to 125 lb. gage, and the latter being expected to go no higher than 50 lb. In the service here referred to, the low-pressure compressors work most of the time at 20 to 30 lb., but there are many places where 50 lb. is the pressure to be constantly maintained, and then the value of two-stage compression may be worth looking into.

Comparative Cost

Suppose that we have to deliver compressed air constantly at 50 lb. gage, taking in air at 60 deg., and compressing in a single cylinder. Take a 30-in. diameter cylinder at 400 ft. piston speed. The free air capacity will be 1963 cu.ft. per min., the mean resistance for the compression stroke (adiabatic compression) will be 27.39 lb. sq.in., and the horse-power required will be 234.67.

Let us compare this with a system of two-stage compression, with an intercooler between the stages. The diameter of the first cylinder and the piston speed are the same as before, giving an equal free air capacity. We compress in the first cylinder to 25 lb., this pressure being fixed by the relative capacities of the first and the second cylinders and remaining constant regardless of the final or delivery pressure. The mean resistance, then, in the first cylinder (adiabatic compression) will be 17.01 lb., and the horse-power will be 145.74.

If the air thus compressed is then cooled to the original temperature, the pressure being maintained, the reduced volume will be inversely as the increased absolute pressure, 40:15, or 8:3, and for the second cylinder the piston area ratio should be the same, which would make it 18⅜ in. diameter. The mean effective resistance for the second compression, from 25 to 50 lb., would be 20.84 lb., and the h.p. would be 66.99, say 67, making the total h.p. 145.74 + 67 = 212.74, which is apparently a saving of 9 per cent. over the single-stage compression. As the intercooler would probably not cool the air quite to the original temperature, and as the friction of the mechanism as a whole would be slightly increased, the saving would probably be not more than 5 per cent. at the best, so that in compressing to 50 lb. it is doubtful whether two-stage compression with intercooling would be profitable.

When the Two-stage System Is Preferable

The great majority of compressors in use work at higher pressures than this, say from 75 to 90 lb. gage, this being the working pressure for rock drills, and for most of the air-operated tools of the shops. With the same cylinder data as before, 30 in. diameter and 400 ft. piston speed, the mean effective resistance in compressing adiabatically to 75 lb. single stage will be 35.23, and the h.p. 301.85. With two-stage compression compressing in the first cylinder to 30 lb., the mean effective resistance for this compression will be 19.4 lb., and the h.p. 166.3. For the second cylinder the diameter would be 17.32 in., the mean effective resistance 34.56, and the h.p. 98.7, making the total h.p. 265, or a little more than 12 per cent. less than for single-stage compression. Taken inversely, the power cost of single-stage over two-stage compression to 75 lb., with perfect intercooling, is nearly 14 per cent.

To compress to 90 lb., single stage, the mean effective resistance would be 39.18 lb. and the h.p. 335.71. Using the same two-stage cylinders as in the preceding case and compressing to 90 lb., the work of the low-pressure cylinder would be the same as before, and the h.p. the same, 166.3. For the high-pressure cylinder, compressing from 30 to 90 lb., the mean effective resistance would be 43.41 lb., and the h.p. 123.97, making the total h.p. 290.27, or nearly 14 per cent. below that for single compression, while in terms of the two-stage compression the excess of h.p. for the single stage would be more than 15½ per cent. The gain here would seem to be beyond question.

Dry Air and Lubrication

The intercooler does more than reduce the horse-power required for a given compression and to secure safe and comfortable working temperatures. It does much to remove what is in some cases the most serious objection to the employment of compressed air. Dry air cannot freeze up, and the intercooler helps to dry the air. This drying of the air is the special function of the aftercooler. The dryness of air is always comparative. The air is at its highest pressure, when it leaves the compressor. If it can then also be reduced to the lowest possible temperature its moisture-carrying capacity will be at a minimum. The air will then be so wet that it will deposit moisture. The water should at this stage be given every chance to drop out, so that, when the pressure falls and the temperature rises, the same air will remain dry air while in use.

If the air is not cooled, and thus dried before it starts on its course through the pipes, it will begin dropping water as it goes along. In freezing weather in outdoor work, as in quarries, and especially in switch and signal work, the moisture will freeze and gradually choke the pipe, or some of the ice will be carried along to an elbow or to some depression and form a solid obstruction. When the moisture is not in excess in the air there can be no freezing up. In weather which is not freezing the moisture *which is precipitated* is the cause of "water hammer" and leaky joints. Air which has not been dried by cooling also interferes with lubrication. Oil and water will not mix, and when moisture condenses upon surfaces requiring lubrication the oil cannot get at those surfaces.

Overpoled copper looks like slightly underpoled copper under the microscope. The mechanical properties are satisfactory, but there is a slight decrease in conductivity and castings are bad, due to the expulsion of gases as the metal sets. An overpoled bath is, however, in a very unstable condition, and it is usual in such a case to start at the beginning of the refining operation and oxidize the metal to set copper again. The chemical reasons for these facts are not fully understood. The fact that molten copper is so sensitive chemically to its surroundings, and that it chills so readily, due to its high thermal conductivity, makes it a difficult metal to handle.

The Russian Platinum Industry

E. De Haupick, of the Imperial Russian Engineers, in a paper in the *Mining Journal,* (London) May 4, 1907, gives the following valuable data as to the platinum industry in Russia.

The principal centers of platinum placers are Goroblagodatsk, on the Asiatic slope of the Ural, north of the basin of the River Iss (placers of Count Schouvalov) and Nigni-Tagilsk, on the European slope, the basin of the rivers Vissim and Martian (placers of Prince Demidof). Placers of the second rank are scattered about Verk-Issetsk, Cherno-Istchinsk, Ekaterinbourg, Kytim, Solva, Slatoust, and on some affluents of the river Toura.

The Urals have produced from the first days of the platinum industry until 1907, six million ounces troy of crude platinum, and to these official figures we must add about 1.5 million ounces of platinum stolen by the miners, which has secretly found its way to the market, and is not accounted for by the Government statistics. The production at the Nijni-Tagilsk district is twice as great as that of the Goroblagodatsk, and the quality of the gravel is better than that of the latter.

The development of the Ural platinum industry has been very uneven. From 1828 to 1846 the platinum output was pushed from 6500 oz. to 110,000 oz. per annum, but after the Russian Mint suppressed the coining of platinum, the output fell in 1852 to 6400 oz. It was revived again by the English in 1862, when they began to export Ural crude platinum to London.

The total output of the last few years is given in the accompanying table.

PLATINUM PRODUCTION OF RUSSIA.

Year.	Ounces
1894	203,250
1896	200,000
1898	203,100
1900	212,500
1903	226,000
1904	190,120
1905	200,450
1906	210,318

In 1906, 120 platinum placers were exploited, employing 6200 workmen, who washed 1,860,000 tons of alluvium, with an average of 0.09 oz. crude platinum per ton of gravel. In olden times the placers were richer in metal: from 1825 to 1829 the average extraction was 2.7 oz.; in 1829—1838, 0.5; in 1838—1850, 0.4; in 1850—1883, 0.33; in 1883—1894, 0.1; and in 1894—1907, 0.09 oz.

The Ural platinum market since 1862 has been in foreign hands. Johnson, Matthey & Co., of London, control the Nigni-Tagilsk placers; another English company (the Anglo-Russian Platinum Company, Limited) exploits the Cheridinski placers, the property of the Schaidourof Brothers; a German firm (Heraus & Co.), of Hanau, and a French one (Desmoutis, Lemaire, & Co.), of Paris, also control a great many placers. But the most important of the Ural firms is the Compagnie Industrielle du Platine, a French company, which has 40 different platinum placers on the rivers Iss, Peschanka, Toura, Schumakka, Gussevo, Melnitchoi, Taliza, Viy, Kissloi, Mokroy, and others. This company also has bought until 1915 the whole output of numerous placers of Count Schouvalov, in the Goroblagodatsk district.

The Compagnie Industrielle du Platine has a contract with another French company—the Compagnie des Metaux—to which it transfers the whole output of platinum for its disposal on European and American markets. The yearly production of this company amounts to 70,000—90,000 oz. Russia does not consume more than 6000 to 7000 oz., and this amount is used by two firms in St. Petersburg—the Kolbe & Lindfors and the Tentelef Chemical Manufacturing Company. Germans import Ural platinum only for their own consumption, without taking part in speculation. About 80 per cent. of the whole platinum output goes from the Ural to France and England.

The whole import of platinum into the United States is made from Paris, where the center of gravity of the world's platinum market is at present. As the whole yearly Ural platinum output is about 200,000 oz., the United States is the greatest consumer of Russian platinum.

The large profits from the prevailing high prices for platinum do not benefit the Ural mine owners, because the entire output for a varying term of years has been bought up under contracts at very low prices—about £2 6s. per oz. for 82 per cent. crude platinum—and they are excluded from participation in any gain in the rise of its value. Consequently the mine owners are not anxious to increase the platinum supply, awaiting the time when they can dispose of their product to better advantage. We can thus explain the fact that, in spite of the unprecedented ascent in prices, the output of platinum during the last 10 years has not increased. If we now study the figures relating to platinum ingot prices, we observe that before 1898 it was £2 2s. per oz., and since that time it has increased to £3 13s. 6d. in 1898, £4 4s. in 1902, £4 10s. 4d. in 1905, and £7 19s. 8d. in 1906. We can account for this when we bear in mind that the Compagnie Industrielle du Platine began its activity in 1898 with 65,500 shares representing a capital of £1,000,000, which pays a high dividend, as well as the shares of the Compagnie des Metaux, which sells the platinum of the Compagnie Industrielle du Platine.

The handling of over 65 per cent. of the Ural platinum output is controlled by a coterie—the so called Platinum Trust—which can manipulate the market almost at will. Yet, so far as can be ascertained by diligent inquiry, the recent break (early in 1907) originated in the United States, which accumulated during 1906 a considerable stock of platinum. At present American consumers are convinced that the prices will decline, and are placing as small orders as possible. To the impartial critic of the situation it would seem that the market actually is weakening, and we can expect for some time a decline in the price of platinum, but only for a time. It may be confidently predicted that the causes above mentioned—viz., the increase of the platinum price, the limited number of placers, the diminution in their yield, and the speculative tendency of the French company—do not give us cause to expect in future a decrease of the price of the metal to a reasonable figure, as its demand for almost all purposes increases every day with the development of the industry.

AVERAGE PRICE PER OUNCE TROY FOR PLATINUM INGOTS.

Year.	£	s.	d.
1874	1	5	2
1888	1	13	8
1890	1	15	8
1893	1	17	9
1895	2	2	0
1898	3	13	6
1900	3	19	9
1901	4	1	11
1902	4	4	0
1903	4	6	1
1904	4	8	1
1905	4	10	4
1906 (Jan.)	4	15	2
1906 (Oct.)	7	19	8
1907 (Jan.)	7	0	0
1907 (Feb.)	6	19	6
1907 (Mch.)	6	19	0
1907 (Apr.)	6	18	8

PRICE FOR CRUDE PLATINUM OF 82 PER CENT. IN URALS.

Year.	Rubles, per pood.	£	s.	d.
1874	4,800	0	19	0
1888	6,000	1	4	0
1890	6,200	1	4	8
1893	6,500	1	5	10
1895	6,600	1	6	7
1898	6,800	1	7	0
1899	7,000	1	7	8
1901	16,200	3	3	9
1902	17,300	3	9	4
1903	18,500	3	13	3
1904	21,000	4	3	8
1905	22,000	4	7	9
1906 (Jan.)	22,000	4	7	9
1906 (Oct.)	34,000	6	15	8
1907 (Jan.)	30,000	5	18	11
1907 (Feb.)	29,000	5	15	8
1907 (Mch.)	28,000	5	12	0
1907 (Apr.)	27,000	5	8	0

Electrolyte for Refining Copper

The ideal electrolyte for refining copper would be one chemically inert as a solvent but capable of electrochemically dissolving copper, and of zero specific resistance. These conditions are most nearly met by an acidulated sulphate solution, and this has the additional commercial advantage of employing one of the cheapest of chemicals, sulphuric acid. A sufficiently high percentage of sulphuric acid may be carried to make the specific resistance very low. There is a slight re-dissolving of the cathode copper, but not in serious amount. Gold is untouched and silver practically so. It is customary to carry a minute percentage of some soluble chloride as a constituent of the electrolyte which would throw down as chloride any silver which might be dissolved and also tend to slime antimony as oxychloride. Some claim that smoother cathodes result from the presence of chlorine.

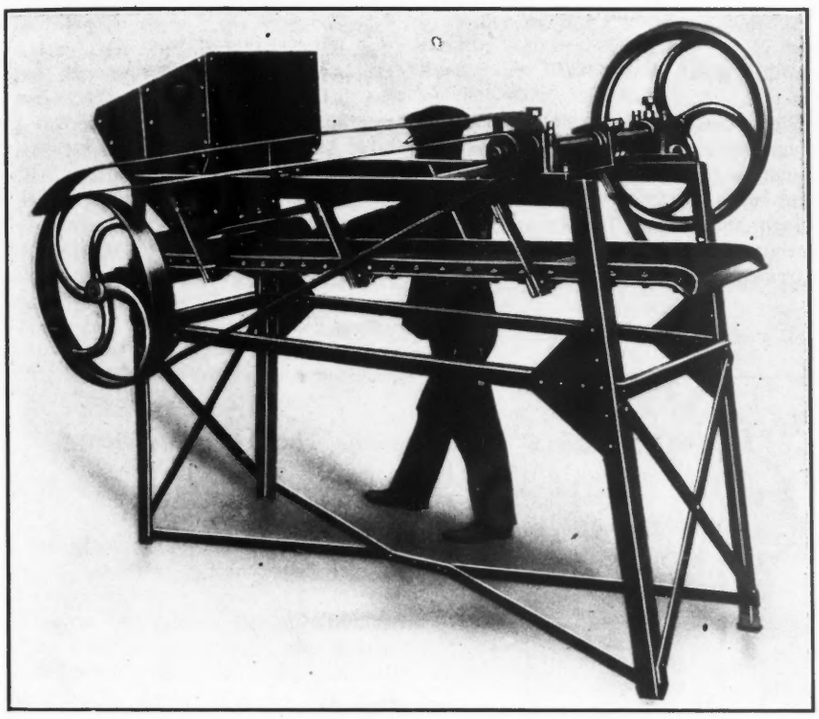
A Hand Screen Used at Monteponi, Sardinia

By Erminio Ferraris*

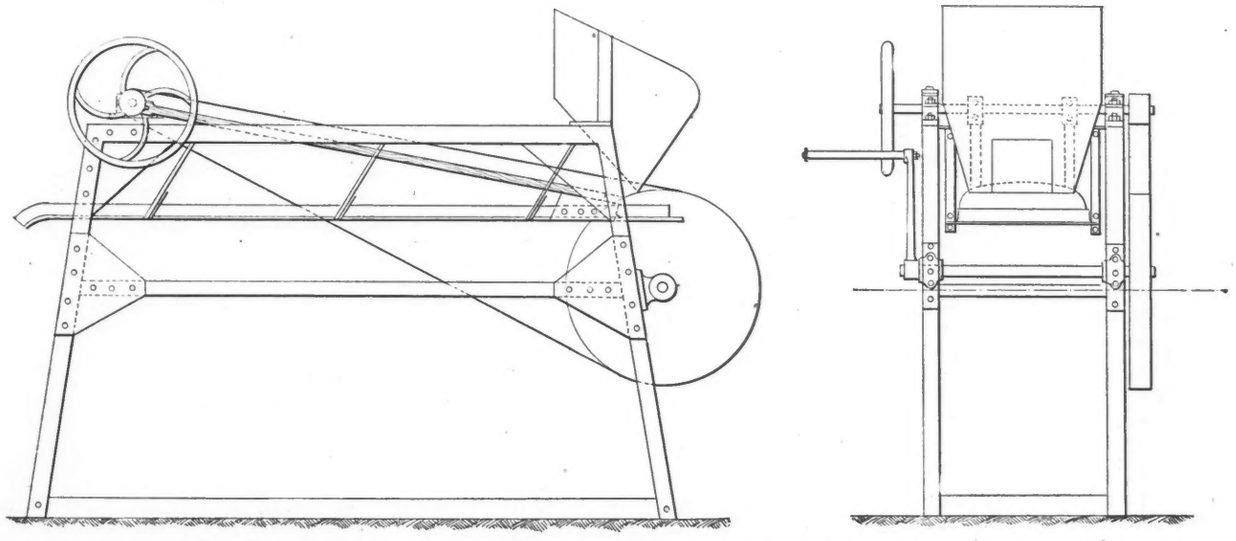
An efficient hand screen is often a great help in a mining camp where the ores are scattered at many points and no milling plant is at hand. The accompanying drawing and photograph show a hand screen used in Sardinia and other Mediterranean countries, which was first introduced at Monteponi about six years ago. It is designed on the principle of the Ferraris shaking screen, but is driven by hand and a belt. The eccentric gives by means of two wood connecting rods 300 oscillations per minute to the screen, which is supported by six wooden springs. The ore is delivered from a hopper to the screen, and is moved forward by the rapid diagonal oscillation of the screen.

If more than one size is required the screen is provided with two or more sizes of wire cloth, the space under the screen, between the four legs of angle iron, being divided correspondingly by wooden partitions. A wooden platform is placed in the framework near the bottom, on which heavy stones are loaded to keep the apparatus steady during operation.

Ores to be sifted by this apparatus must be dry. The work done by it is the same as by the machine-driven Ferraris screen, which has come extensively into use. The screen can easily be operated by a boy, and two men shoveling cannot overload it The weight of the machine, as shown in the photograph is 300 kilograms.



FERRARIS HAND SCREEN



FERRARIS HAND SCREEN, SIDE AND END ELEVATIONS

*Director-General, Societa di Monteponi, Monteponi, Sardinia.

Gold in China

With the object of stimulating gold production and coinage in China, the board of finance and the director of the Chinese Imperial Mint have passed the following order:

1. That more mines be prospected for, so as to insure a sufficient supply of gold.
2. That the provinces be ordered to make purchases of the metal and quickly transport same to Tien-Tsin for minting. Rewards will be granted to the provinces which make the largest purchases.
3. That experimental coinage be made first at Tien-Tsin and extended to other provinces, should it prove to be satisfactory.
4. That a uniform rate of exchange be fixed.
5. That one-tenth of the pay of officials of all grades above 100 taels be in gold.
6. That the gold coins be accepted for payment of customs and likin.
7. That gold, either in bullion or coin, is prohibited from being exported.
8. That the metal is prohibited from being used for the coating of idols.
9. That a law be passed to prevent the destruction of gold coins for any purpose.

The Muho and Kuanying Shan gold mines in Heilungkiang have been restored to China by Russia on the repayment of expenses incurred by the latter during the last several years.

Taotai Liu, director of mines, requests his Excellency Yuan to consult the Tartar generals of Fengtien, Kirin and Heilungkiang regarding the raising of funds for the reorganization of the mines.

Zinc and Lead in Upper Mississippi Valley

An old and famous mining region in the upper Mississippi valley is the area including Grant, Lafayette and Iowa counties in Wisconsin, Jo Daviess county in Illinois, and an irregular narrow belt of territory in Clayton and Dubuque counties paralleling the Mississippi river in Iowa. Dubuque, Galena, Platteville and Mineral Point are the leading cities. A recent publication (Bulletin No. 294) of the United States Geological Survey, entitled "Zinc and Lead Deposits of the Upper Mississippi Valley," by H. Foster Bain, State geologist of Illinois, is primarily an account of the present condition of the district and a statement of ideas relatng to the formation of the ores.

It is estimated that from 1821 to 1904 the total lead production of the district was 611,975 tons, which sold for approximately $50,000,000. The maximum production was between 1840 and 1845. In 1845 and again in 1847 more than 27,000 tons of lead were shipped. The total production of zinc up to 1905 is estimated at 450,000 tons, which probably did not bring much over $10,000,000. The early prices paid for the ore were very low—$3 to $8 for the carbonate and $4 to $12 for the blende. In recent years the product has been entirely blende, which has sold for much better prices. The zinc production of the district is now rapidly increasing, and for the year 1905 approximated 33,000 tons.

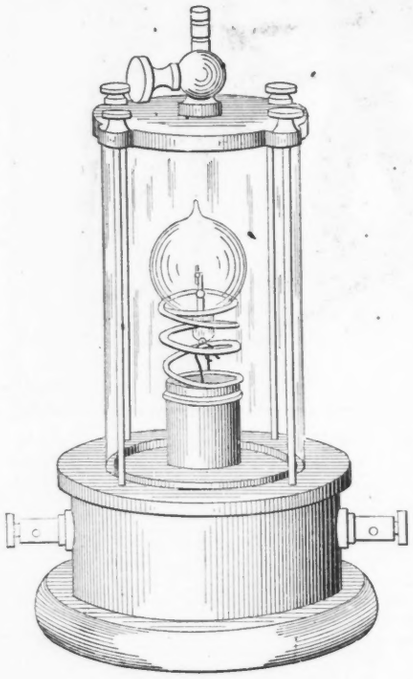
The scientific conclusion of Mr. Bain's consideration may be summarized as follows: "The ores of this region are believed to represent concentrations of material originally disseminated through the surrounding rocks, particularly the Galena and upper Platteville beds. It is believed that the zinc and lead originally present in the crystalline rocks of the Lake Superior district were delivered by rivers to an especially favorable portion of the Ordovician coast, where in warm, shallow waters they were partially concentrated by evaporation and were locally precipitated in quantity. The agents of precipitation were hydrocarbons or hydrogen sulphide, or both, derived from decaying masses of algae of a peculiar type irregularly accumulated within certain shallow basins on the sea floor. The rising hydrocarbons continued to be effective throughout the period of deposition of the Galena dolomite.

"As the algae matter became compressed the beds above broke and settled, leaving open spaces of peculiar form for the ultimate reception of the orebodies. The beds were slightly deformed, whereby the basins were accentuated, and deep joint cracks were developed. The area was subjected to peneplanation and later to gorge cutting, whereby the overlying shale was cut away and a vigorous underground circulation was brought about. This circulation resulted in a concentration of the disseminated material, and with the fall of ground-water level the ores were successively reconcentrated until the present type was produced."

The Tommasi Electric Safety Lamps

By D. Tommasi*

The ordinary incandescent lamp does not offer absolute safety in inflammable surroundings for if the globe breaks the filament burns in contact with the air. Even though this combustion is not instantaneous, it gives rise to the production of extremely small particles which in themselves are sufficient to start the distillation and explosion of certain mixtures of air and gas, and also of air and dust.



TOMASSI ELECTRIC SAFETY LAMP

To prevent absolutely all possibility of explosion, it is necessary to make it impossible for the filament to come in contact with the explosive gas. This end I have accomplished in the lamp shown in Fig. 1. The lamp proper is mounted within a glass cylinder which is closed at one end by the base of the apparatus and at the other end by a lid which is provided with a stop-cock. The whole arrangement is air-tight. The conducting wires are fastened to the binding posts on the base of the lamp as shown. Within the supporting pedestal there is a pair of little rubber bellows. When the bellows are not inflated they raise a little metallic tappet which is hinged at one end and in so raising the tappet, the current is broken.

In order to put the lamp in working order, it is necessary only to inflate the bellows and this is done by putting a piece of rubber tubing over the stop-cock and forcing in the requisite amount of air. The compression thus produced causes the bellows to dilate and close the circuit.

It follows, that if from any cause the glass cylinder breaks the pressure drops, the bellows contract, the tappets separate and the lamp goes out. On the other hand, if the globe itself breaks instead of the glass cylinder, the air within the cylinder expands by a volume equal to the volume of the globe or enough to cause the two tappets to separate and break. In any case, the filament remains inclosed either in the globe or in the protecting glass envelope.

For portable lamps the apparatus is provided with a light storage battery.

*Electrical engineer, Avenue d 'Italie, Paris.

The Thermit Patents

Special Correspondence

A patent suit has just been decided in London in connection with the thermit process. The company owning Dr. Goldschmidt's patents brought an action for infringement against a company called Weldite, Ltd. This latter company holds no patents but used silicide of aluminum, or a mixture of silicon and aluminum, for reducing iron oxides and so producing heat and metal suitable for welding steel rails. The only difference between this and the thermit process was the addition of silicon to the mixture. Weldite, Ltd., also contended that the thermit patents were not good in law, as the process was a matter of common knowledge, and relied on Claude Vautin's patent of 1894 for this statement. By the way it was Mr. Vautin and Messrs. Sulman and Picard who were at the back of Weldite. Mr. Vautin's patent of 1894 shows how iron and other oxides can be reduced by application of metallic aluminum, but it says nothing about any method, process or apparatus for utilizing the reaction for welding purposes. Also, the reaction was never used practically by Mr. Vautin, as he had devised no method of igniting the mixture which would not blow the whole charge away. Personally, I believe that the knowledge of the reaction dates from an earlier time than Mr. Vautin's patent. The judge before whom the action was tried upheld the thermit patents, declaring that the application to welding, the apparatus used, and the method of ignition were good inventions, and that the defendant's admixture of silicon with the aluminum was a colorable imitation. Consequently an injunction was granted against Weldite, Ltd.

Santa Cruz, a New Copper Camp in Sonora

By F. J. H. Merrill*

In the Magdalena district of Sonora, about 27 miles by wagon road southeast of Nogales, are the Santa Cruz mountains, which occupy a broad bend of the river of that name. On their western slope extensive discoveries of copper sulphide ores have brought in a swarm of prospectors and miners. Col. W. C. Green has just completed the denouncement of 4000 *pertinencias,* C. Sandoval & Co., bankers of Nogales, have taken up 100 pertinencias, Arnold & Co., of Cananea, have 50 pertinencias, and Geo. Derrick, of Cananea, 200 pertinencias—in all, claims numbering more than 5000 pertinencias have been filed by about 15 persons.

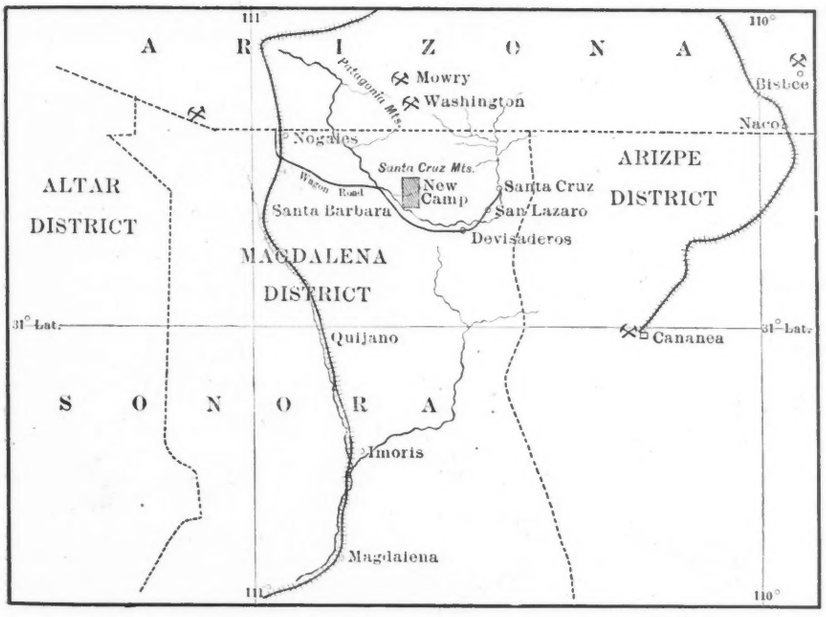
The claims are chiefly on the southwest slope of the mountain, which is furrowed by three large gulleys. The area in which the new claims have been filed is approximately five miles by two. I have not had an opportunity to visit the region, but the following general details are supplied by a graduate of the Freiberg mining school:

The country rocks are described as granite overlain by porphyry, ore being, it is said, found in both. The surface indications were faint parallel lines of malachite; on sinking a few feet, chalcopyrite ore was found. The first discovery was made by Edward Arnold, mayor of Cananea, a Mexican citizen of Swiss descent, shortly before Christmas of 1906. He has a shaft down 100 ft. The vein began with a width of 4 ft. at the surface. It is now said to be over 20 ft. wide. A tunnel has been started to meet the bottom of this shaft at a distance of 180 ft. from the side of the mounain.

In this tunnel sulphides of copper and iron were encountered at a distance of 7 ft. from the surface and, although it has been driven 120 ft., nearly all of it is in ore.

Samples taken from these workings are said to carry 20 to 40 per cent. copper and average 0.7 oz. gold.

Twenty or thirty prospect holes have recently been opened, many of which have struck ore. This new camp will be watched with much interest by all interested in the production of copper. The test of development must now be applied to determine the facts.



MAP SHOWING POSITION OF SANTA CRUZ CAMP

*Mining geologist, New York.

The Mountain Copper Company

The Mountain Copper Company, owning deposits and smelters at Keswick, Shasta county, Cal., and smelting and chemical plant at San Francisco, has issued its report for 1906. This company is controlled by Matheson & Company, of London, which also controls the Rio Tinto in Spain.

The profit for the year, subject to income tax, was £94,948, against £158,168 last year. The sales of copper for delivery during the year were 2854 tons, against 4564 tons last year.

It will be remembered that in accordance with the policy proposed by the board and adopted in 1904, the old smelting works at Keswick were closed in 1905 and a new establishment erected in the neighborhood of San Francisco, in which not only the copper contained in the ore could be recovered, but also the sulphur contents utilized. This policy, a good one in itself in respect to the rich ores, was rendered necessary by the Government injunction which was threatened and subsequently issued on account of alleged smoke nuisance, and also by the desirability of creating a market to be available in years to come, when the rich copper ores would in all probability be worked out and the company would have to depend upon its sulphur ores and products for its chief source of profit.

The closing of the Keswick smelting works has proved to have been not inopportune, as it has left for treatment in these times of high prices a quantity of rich copper ore which would otherwise have been smelted and marketed during a period of comparatively low prices.

The new smelting works and the acid and fertilizer factories were brought into operation in the spring and summer of last year, and have proved efficient.

Directly it was realized that the world's consumption was likely to keep the price of copper at or near the high price to which it has recently risen, the general manager intimated that he could at a moderate outlay start up and work, at any rate for a time, part of the old Keswick smelting plant, and as, by the company's successful appeal the Government injunction was lifted pending further action the board naturally decided to take advantage of the good prices to resume smelting at Keswick. One of the old furnaces has lately been blown in. The sale of acid has come up to the board's anticipation, and all the fertilizers made thus far have been sold.

The earthquake and fire at San Francisco greatly upset all business in California. The demand for refined copper has been limited, as all the factories were destroyed. The copper has had, therefore, to be chiefly marketed at the centers to which it was formerly sent from the old smelting works.

The share capital of the company stands at the nominal sum of £20, and the yearly profits are employed in paying interest on the debentures and in redeeming them. This somewhat unusual arrangement came about in 1902 when it was found that the copper deposits at Keswick were of limited extent, the shares then being converted into redeemable debentures amounting to one million pounds. Of these debentures £250,000 have been redeemed, leaving £750,000 outstanding. Owing to the difficulty at Keswick about the fumes, and the necessary removal of the works to San Francisco, much of the profit during the last years has gone to expenditure on capital account. Including the balance brought in from 1905 and the profit for 1906, the company has £150,000 in cash resources at the present time.

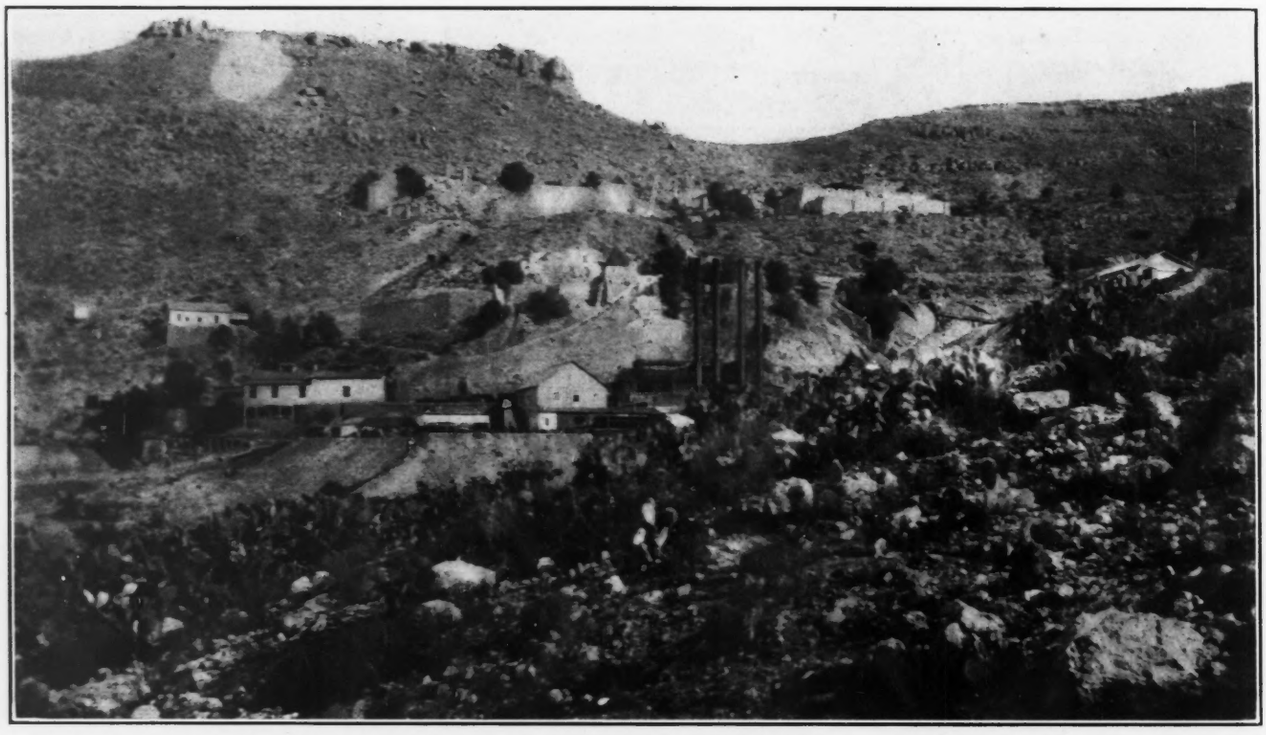
At Wardner, Idaho, miners are paid $3.50 per day; shovelers, $3; foreman, $6 @7; shift bosses, $4@6; timbermen, $3.75 @4; hoisting engineers, $4; head blacksmiths, $4.50; generally eight-hour shifts. The rate for board is $1 per day.

The Mining District of Asientos, Mexico

A District Situated Near Two Smelting Plants Which Includes Promising Copper, Lead and Silver Deposits in Rhyolite and Limestone

BY BRUNO NEWMAN*

The Asientos district is located about 40 miles northwest of the city of Aguascalientes. The mines are about 5 miles from the nearest railroad stations, San Gil, on the San Luis Potosi branch of the Mexican Central, and Cobre, a spur of the main line of the Mexican Central. The distance to the nearest smelting works is 40 miles from the American Smelting and Refining Company plant, at Aguascalientes, and about 75 miles from the works at San Luis Potosi. This insures low freight rates and makes it possible to ship low-grade ore.



SANTA FRANCISCA MINES, ASIENTOS; OLD WORKINGS OF SPANIARDS ABOVE PRESENT MINE

Character of Deposits

The main dike strikes across the district in a direction of about 30 deg. northwest-southeast, but at the most southeastern point of the camp it breaks up into three main vein systems, each of which again splits into numerous smaller veins. The three main splits strike about as follows: One, the most western, north about 45 deg. west. On this system are located the Guggenheim mines at Cobre and the Fortuna mines at Santa Clara. On the other two systems the mines at Asientos are located. The western and middle mines are the copper-ore producers, striking about 10 deg. northwest, with numerous smaller branch veins varying from north 10 deg. east to north 50 deg. west, and the most eastern system strikes about north 55 deg. west. This latter produces a silicious lead-silver ore of good silver grade and large, fairly uniform width. The general dip is from 60 to 75 deg. to the southwest.

The whole district outcrops plentifully with good surface indications, and has been prospected very little and for only about 4000 m. of its length.

The formation of the district is a gray-black limerock along the copper-producing veins, while the lead-silver split has a surface capping of rhyolite to a depth of about 200 m., varying from pinkish color at the surface to a more compact olive green in depth. Below this depth the limestone formation has been encountered once more, indicating the rhyolite to be a later local flow of limited extent. As the deepest workings in the district are only about 225 m. deep, and this only in one shaft at the lead-silver property of the American Smelting and Refining Company, the Santa Francisca mines, which shaft has passed through the surface rhyolite, and is now in the country limerock, comparatively little is known of the geology of the district. The deepest workings in the copper deposits are only about 125 m., and are still in the limerock exposed at the surface.

Santa Francisca Mines

The Santa Francisca mines on the most easterly split, are by far the largest and most developed mines in this district. It is an "Antigua," and records tell of work having been done 200 years ago by the Spanish priests. A considerable accumulation of water in the old workings was at first encountered, but the property is now thoroughly unwatered and work is being carried on vigorously. The mine is pumping about 600 gal. of water.

The upper three level workings are all in rhyolite, but at the fourth level, limerock was encountered. Through this a crosscut has been driven toward the vein. The rock encountered in this crosscut changed to a carbonaceous shale, much foliated and slickensided. The vein has, however, been reached and is producing ore, although the output is retarded because of the large amount of water encountered.

The vein matter is silicious, having a banded appearance, the bands alternating from quartz to lead-zinc streaks. The

*Mining engineer, Aguascalientes, Mexico.

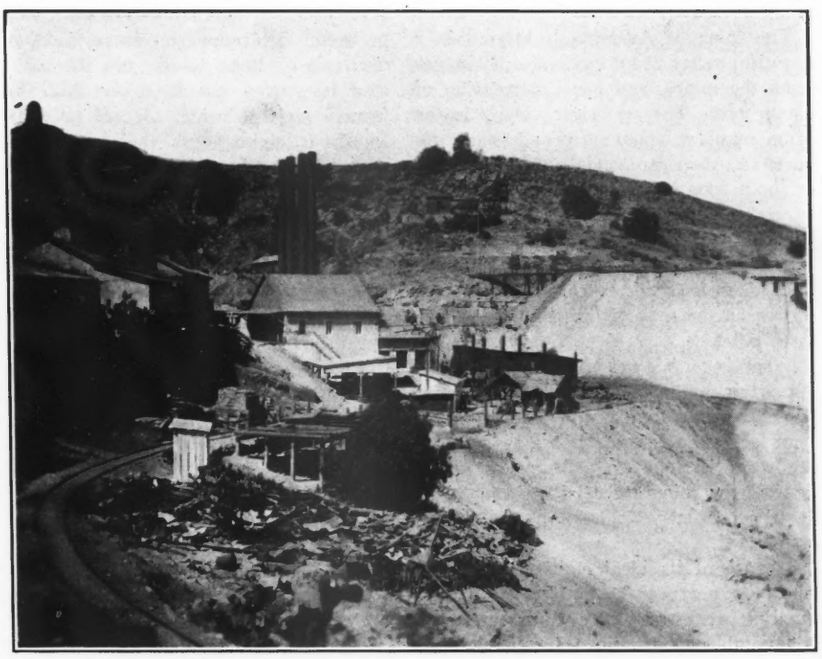
vein varies in width from 5 to 40 ft., with an average of about 20 ft. of ore. The lead, 2 to 3 per cent. being the average, carries most of the silver, about 1 kg. per ton, the zinc content being small, about 3 to 5 per cent., and silica about 58 per cent.

Mining has been carried on with square sets, owing to the loose ground in the old workings, but the country rock is sufficiently strong to omit timbering in virgin ground. All the ore is hand-sorted on the patio and shipped to the smelter at Aguascalientes by the Mexican Central Railroad, from San Gil, the mine's 10 kilometer railroad carrying the ore to the bins at San Gil station.

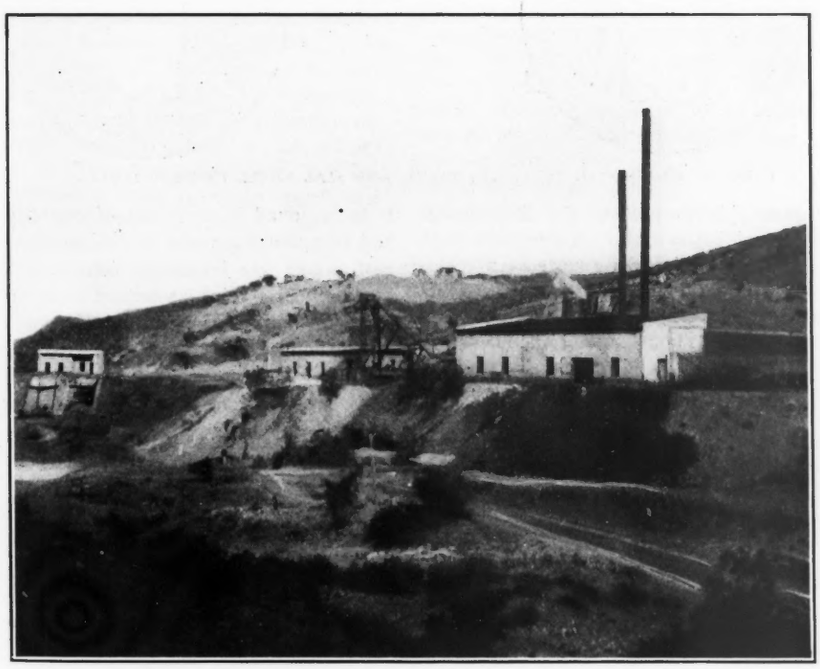
The output is steadily increasing, and will be very much augmented by the stoping ground to be opened in the fourth and fifth levels, in which latter crosscut is now being pushed from the main shaft toward the vein. The mine is owned by the American Smelting and Refining Company.

Merced y Anexas and El Orito

The largest copper-producing property is the property of the Aguascalientes Metal Company. It is located on the central vein system and consists of the Merced y Anexa and El Orito claims. Albert Doerr, the manager of the mine, who furnished the data given below, states that the present company has been exploiting the property for the past eight years. The



SANTA FRANCISCA MINE



PLANT AND MINE, AGUASCALIENTES METAL COMPANY

Merced property has two veins, averaging 3 and 5 m. in width, the ore occurring in lenticular shoots. The vein matter is silicious lime, the footwall consisting of a porphyritic dike and the hanging wall of slaty limestone. The silica content of the vein filling increases with depth, the average ore running 3.5 per cent. Cu, 250 gram Ag, and 5 gram gold per metric ton.

The ore is mined mostly by overhand stoping; being hoisted by electric power from one shaft and by horse whim from another, which is now being replaced by an electric hoist. Practically no timbering is required underground. The ore is shipped to the railroad by burros and carts, the property at present shipping 1500 to 1800 tons per month to the Aguascalientes smelter, its ore shipped by burro going to the Guggenheim branch railroad at Cobre, and the carts carrying the ore to San Gil over the main wagon road, a distance of about 5 miles.

The Asientos Mining Company also owns several properties on the same vein and some of its branches. Its principal claims are the Nopensada, Alta Palmira and Veta Grande. Its plant, furnishing electric power, located at the Nopensada mines, has been shut down, for several years, but is about to resume, with new owners, who are putting up a plant at Alta Palmira also. The Nopensada and Alta Palmira mines are "Antiguas," the latter, according to reports, having furnished very high-grade silicious silver ore below its surface copper ore. Its old square masonry shafts are filled with water, and no work has been done for several years. Several prospects on the Alta Palmira vein have recently encountered good ore and bid fair to become good properties if properly developed.

The Nopensada is a copper producer, and before its shutdown shipped considerable ore, although no great depth has yet been obtained. The new company is now unwatering the mine and expects soon to be operating again.

Other Mines

The Mitchell Mining Company, of New York, has recently obtained several mines, prospects, and a large amount of surrounding ground east of the Nopensada mines, and is now developing some of its prospects with good indications of success.

A few prospects in the district, the Los Angeles, Lulu, Mascota, Patricio and Tepozan, especially on the branch vein called "Alta Palmira vein," are opening good ground, and good ore has been encountered in some of these prospect shafts and

workings at comparatively shallow depth. With a reasonable outlay of money spent in systematic development work, the prospects in the camp should rapidly become producers. Some good ore has also been encountered on the extension of the Santa Francisca vein, by some new prospects working on this siliceous silver vein system.

The town of Asientos is located in a beautiful valley about one and a half miles from the mines, and has a population of about 3000. The American colony in the camp numbers about 30 people, and supports an American school. The elevation is about 7000 ft., and the climate is most agreeable throughout the year. The San Gil railroad station of the San Luis branch of the Mexican Central, is about four miles from the town, and the Cobre station on the spur of the main line about three miles.

Labor is of fair grade, the miners coming originally from the Zacatecas camps, and there is no difficulty in securing sufficient labor at a reasonable price. Most of the work is done on contract or meter system, the miners receiving from $1 to $1.50 per meter drilled on the latter system.

Because of its ideal climate, plenty of labor, its nearness to both railroad and smelting works, the camp offers unusually favorable opportunities for the mining of its low-grade ore. The present lack of development of the camp is due to lack of outside capital for vigorous working of the prospects in the district, but several companies have taken up considerable property lately, and before long activity on a larger scale than heretofore is confidently expected.

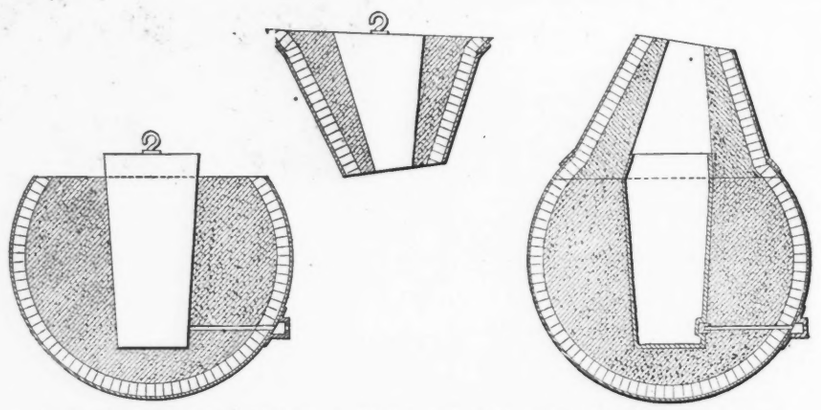
Lining and Drying Copper Converters

By H. L. Charles*

A new method of lining and drying copper converters, invented by H. L. Charles does away with the old method of drying the lining with fuel aided by blast pressure. The new method effects not only a saving in expense, but also in the time of drying and in the operation of the converter. The fuel-drying method consists in filling the newly lined converter with wood and when the fire has started, a light blast is introduced at the tuyeres. Then about 250 lb. of coke is put in and more blast applied until a high heat is attained. This method requires the use of at least two tons of coke for each lining, and then does not completely dry the wet lining in 24 hours. Moreover, the uneven drying prevents uniform corrosion and injures the life of the lining.

In the new method the converter is lined by tamping the lining material around cores inserted in the shells as shown in the accompanying drawing, after introducing one layer of fire-brick in the usual manner. The tuyeres are plugged on the inside with clay and the converter is filled with molten slag. Converter slag is preferable, but slag or low-grade matte from blast or reverberatory furnaces may be used. The converter is set away for one, two or three hours, and the molten slag is poured out to allow the shell, formed on the inside, to cool gradually. In about eight hours the converter is ready for service. Numerous vent holes in the shell permit the steam and water to escape.

The bottom should be tamped in about two inches deeper than when fuel is used, to allow for the proper depth below the tuyeres for the shell that will naturally freeze on the bottom. The core should also be three inches longer and two inches wider than when formerly used, to allow for the shell formed on all sides. The slag shell should be knocked off on the tuyere side to prevent the first charge from spilling out and also running cool.



CORES IN POSITION IN CONVERTER PARTS, AND SLAG SHELL IN DRIED LINING

The process insures a more even corrosion of the lining, as well as a longer life to each lining. No caving of the lining will occur. Four and sometimes five shells for each stand are usually required when fuel is used, while with the slag process only two and one-half or possibly two are necessary. The longer life of the lining enables me to make from one to three charges more than when fuel was used for drying.

The process is now in use at the Butte Reduction Works at Butte, Montana, the Boston and Montana smelter at Great Falls, Montana, at the Bingham Consolidated smelter in the Salt Lake valley, and many others are considering adopting the method.

*Superintendent, Bingham Consolidated Mining and Smelting Company, Salt Lake City, Utah.

Monazite sand exporters in Brazil have been having more or less trouble with tax matters with State governments of late. The exhaustion of the best deposits of the mineral is likely to lead to some important changes in the course of the business in Brazil in a short time.

Columbia River Gold

The occurrence of finely divided gold associated with magnetic iron in the river sands of northeastern Washington is described by A. J. Collier of the U. S. Geological Survey in "Contributions to Economic Geology, 1906" (bulletin 315).

Placer claims were worked at many points along the upper Columbia river 20 to 30 years ago, but since the exclusion of Chinese laborers these old mines have been abandoned.

The placer gold along the Columbia is confined to the lower benches and river bars. It is associated with black sand containing a large amount of magnetite and smaller amounts of ilmenite, zircon, garnet, and other heavy minerals. Platinum probably also occurs in small quantities, though its presence was not detected in the field. It is claimed that the ultimate source of the Columbia River gold is to be found in the areas of crystalline and metamorphic rocks to the north and east, which are known to contain gold-bearing quartz veins, as well as other orebodies of various kinds containing gold.

The outlook for mining along the Columbia river is not encouraging; the possible profits from mining these lands would undoubtedly be less than the value of these lands for agricultural purposes. It is believed that the total amount of gold contained in the river bed and adjacent benches never exceeded $28,000 per linear mile, and the total amount in the 90 miles between Kettle falls and Nespelem could not have been more than $2,500,000. This gold is not uniformly distributed, and even if the bench lands were known to justify mining, it would not be advisable as they are not adapted to any relatively inexpensive process of mining. Hydraulicking on a large scale is ruled out by the absence of bed rock and the scarcity of water pressure; dredging, by the hight of these deposits above the river and the impossibility of floating the machinery over them.

The Auriferous Black Sands of California *

By J. A. Edman

The periodically occurring outbreaks of popular excitement in reference to new discoveries or re-discoveries of auriferous material have, at various times, been directed toward the actual or imaginary value of the heavy sands derived from gold-bearing gravel deposits, and generally known as black sands, by reason of the preponderance of dark-colored iron minerals among them.

The first and most notable popular excitement of this kind occurred in April, 1851, about the beach deposits at Gold Bluff, Humboldt county, and led to a rush of San Franciscans to that locality. Seven years later 25,000 Californians rushed to the lower Fraser river, in British Columbia, to seek wealth in somewhat related deposits of recent river gravels—a search which resulted disastrously to many, and led to the return of most of the California prospectors during 1859. Since that time the black sands rested in obscurity, except in isolated cases, when feeble attempts were made to extract the metallic value from various beach deposits along the coast of California and southern Oregon, until 1893, when public attention was again directed to the gold-bearing beach sands, as capable of furnishing a supply of economically valuable iron ore, besides gold and platinum.

The fallacy of this expectation was clearly shown during the discussion that followed, but attention was thereby directed to the gold present in the tailings from the extensive placer, drift, and hydraulic mines operating in the ancient and recent auriferous gravels of California, and which in their concentrated form carried values in association with the black sands. Lacking the element of novelty and speculation, public attention was not again directed to the subject until 1899, when Dr. David T. Day, of the United States Geological Survey, visited California and southern Oregon to investigate the occurrence of platinum and its related metals, chiefly on the beaches and in the stream gravels of northern California[1]. This again called attention to the black sands, although no attempt was then made to ascertain their gold value.

Dr. Day's Experiments

Meanwhile the constantly increasing scarcity of platinum led to efforts to exploit the known occurrences of that metal on the Pacific coast, and Dr. David T. Day was again placed in charge of a laboratory established by the Geological Survey, at the Lewis and Clark Exposition, in Portland, under a liberal appropriation made for the purpose, the object of which was to examine and report exhaustively upon the black sands of the Pacific coast. Numerous samples of the heavy sands from the mines of the Western States were collected and tested in the laboratory mentioned, and some of the results have reached the public through press reports, apparently emanating from the chief of the laboratory. Some results obtained from California sands were also published in Bulletin No. 38, "Structural and Industrial Materials of California," of the California State Mining Bureau.

The official report of these investigations made by Dr. David T. Day and R. H. Richards, was finally made public about March 1 last, and contains in tabulated form the mineral composition and metallic values of the 931 samples of sands examined by the commission.

While containing much of value in relation to the mineralogical composition of these sands, the report gives but few practical suggestions for their mechanical or metallurgical treatment in the field or at the mine. It gives, however, the record of several interesting laboratory experiments in the production of crude iron and steel from the iron sands by the use of the electric furnace.

Since the close of the Portland Exposition in October, 1905, there has appeared a host of actual or pretended inventors of machinery to manipulate the black sands, and also a number of patent or secret process men or corporations, among which many have put forth the most extravagant claims of their ability to extract metallic as well as other values from these golden sands, and manufacture high-grade steel from the waste; all to be done cheaply and effectively.

In view of the erroneous and misleading impressions already created a brief statement of the origin, distribution, and probable value of the heavy black sands, from the standpoint of the miner and metallurgist, has been prepared.

Origin and Physical Characters

The popularly so-called black sands comprise the minute particles of the heavy, hard, and resistant minerals originally existing in the rocks that form the various gravel deposits of California, as well as of any other country where metamorphic and igneous rocks exist or predominate, and are found in small quantities in all water-borne sands and gravels, in beach, river, creek, gulch, and hill deposits, both ancient and recent. In their original condition they form but a small percentage of the gravels, varying from 0.25 per cent. up to, but seldom exceeding, 2 per cent.; are frequently distributed all through the mass of deep gravel beds, but by virtue of their generally high specific gravity occur somewhat concentrated in the lower strata and on the underlying bedrock. They seldom, if ever, become visible except through the operations of the gravel miner, when they undergo a partial mechanical concentration in the resultant tailings. The tailings deposits in their turn become further concentrated in contact with free-flowing streams, when a concentration may be effected up to 5 per cent. and occasionally but rarely up to 10 per cent.

The black sand of the beaches represents nature's work of concentration on the slightly auriferous gravel beds of fluviatile origin, as at Gold Bluff, in Humboldt county, and at other points on the coast, and more rarely from direct erosion by wave action on the auriferous rocks of a coast line. The concentration here, as depending upon the surf, is fitful and changing, but frequently results in the formation of a thin layer of almost pure black iron sands, occasionally rich in gold and to less extent in platinum.

Any deep and extensive deposits of iron sands have not yet been discovered on this coast, and so far exist only in the vivid imaginations of unscrupulous promoters of mining schemes or patent processes. If, however, they did exist, such sands are of little commercial value for the manufacture of iron in any country where pure iron ores in mass are relatively abundant, as is the case even in California. They could not, even under the most favorable conditions, compete with the iron ores of Lake Superior.

The black sand of the beaches, as well as of the interior, consists largely of tifaniferous iron as well as chromite, which minerals can not be successfully eliminated for commercial uses, even by the best magnetic separation. After concentration and separation, a briquetting of the sand would be imperative.

The black sand derived from the gravel deposits of the interior carries, in addition to the gold and platinum, other elements of value, such as gold amalgams, nickel, iron, various auriferous sulphides and selenides, and occasionally metallic copper. Various heavy silicates and oxides are found mingled with the iron sand, of which, however, only a few occur in quantity enough to be commercially valuable, such as zircon, tantalite, and cassiterite. Diamonds in microscopic sizes are occasionally met with in the black sand, and larger sizes will probably be found by working over many tailings deposits.

The chief value in stream black sand will always be found in gold, platinum metals, and amalgams. In some localities, however, certain iron minerals carry gold included within their mass, in which case the gold value rises far above the average.

In general, the valuable black sand may be described as consisting of hard minerals ranging in specific gravity from 3 to 7, mingled with small percentages of metals and metallic minerals reaching from 7 to 20 in specific gravity. Most of the value will be found in the sand below one eighth inch diameter.

*From a bulletin issued by the California State Mining Bureau.

[1] *Transactions*, American Institute of Mining Engineers; Vol. XXX, p. 702.

Methods of Treatment

The black sands should be considered as the concentrates of the gravel deposits, and may be compared with the concentrates obtained in milling the metalliferous ores to which they are related and from which they are partly derived. Their treatment should in essentials follow the rules that experience has dictated in the manipulation of gold ores.

Treatment will naturally fall into two divisions; concentration, and reduction. It will not in general be practicable to concentrate direct from the gravel deposits, except in the case of dredge mining, wherein the first stage of concentration, by grading to a determined size, is already performed. The vast tailings deposits occurring in California, as well as in other gold-mining states, already partially concentrated, offer the best and most inviting field for the recovery of black sand.

The first step should be grading to a definite size, by means of grizzlies, riddles, and screens; the next concentration in water by gravity to a definite range of specific gravity.

In reduction, the first step should be a separation of the magnetic from the non-magnetic minerals of the sands, after previous drying. For this purpose we now possess several efficient magnetic separators.

Part of the metallic values may be recovered during the process of concentration. The final recovery of gold, platinum, and amalgam can not be effected by mechanical means alone, although grinding of the coarser sand may be required. In many instances a moderate roasting will be required, and a subsequent treatment by chlorination or by cyanide solution. As in all other mining and metallurgical operations, the points to be determined are: First, the percentage of heavy minerals present in a certain body of sands or gravels; next, the average values of these when concentrated; and, finally, the cost of their extraction.

Approximate Value

The value contained in the heavy sands after suitable concentration can scarcely be stated, even approximately, as it will vary within indefinite limits, depending upon the character of the gravel deposit from which the black sand is artificially or naturally concentrated, the range of its concentration, and its contained minerals. In general, the highest value is found in the heavy sands derived from the ancient Tertiary deep-gravel channels, where great chemical changes by leaching and re-precipitation have originated various secondary auriferous compounds as yet scarcely known.

In most cases it must be taken for granted that the black sands will be concentrates from the tailings of gold-bearing gravels, already stripped of the value obtainable by ordinary methods of gravel mining, such as practiced in hydraulic, drift, and shallow placer operations, among which the first is always most wasteful of gold. In contradistinction, the gold-saving system of washing the gravel, applied in dredge mining, may be said to be the most rational as well as most perfect metal-saving method in present use, and as a result the concentrates from dredge tailings may be expected to carry but little gold and platinum. The black sand obtained from the shallow ravines and gulches is generally the poorest, and when chiefly composed of magnetite and chromite, often practically worthless.

Subject to the above limitations as to composition, the properly concentrated heavy sands of California's gravel deposits may be said to carry from $5 to $200 per ton, and probably average near $40 per ton. Well-authenticated but rare cases occur, however, where concentrates from drift mines on deep-gravel channels have exceeded $1000 per ton.

No definite information is available relative to the average value of the concentrated black sand of the ocean beaches, which, differing so much in physical features, would require a method of treatment radically different from that of the stream sands.

When fully understood and intelligently developed, the above described heavy sands of the gravel and beach deposits should add much to the mineral wealth of California. It should, however, be borne in mind that these auriferous sands exist not as a natural product, ready for the miner, the investor, or the speculator, but must be brought forth by the intelligent efforts of man, assisted by the forces of nature.

Iron and Steel in Wales

According to a U. S. consular report from Cardiff, the iron and steel industry of Wales, which ranks third in importance, gives employment to 12,000 men, who were on April 1 given an increase of 6 per cent. in wages. There are 49 iron furnaces in Wales. Those of north Wales average 21,234 tons a year, but those of south Wales are more modern and average 40,166 tons. The total pig-iron production for 1906 was 980,243 tons, an increase over 1905 of 8709. Of the output, 99,343 tons were forge and foundry, 793,321 tons hematite, and 86,157 tons basic. Practically no Welsh iron ore is mined, the furnaces being dependent upon foreign ores. The imports into Cardiff in 1906 were 926,994 tons; Newport, 591,393 tons, and Swansea, 131,907 tons, making a total of 1,650,294 tons, being an increase of 29,750 tons over 1905. Practically all the imports come from Spain, but France, Greece, and Sweden furnish small lots. The Spanish ore is delivered at $4.86 to $5.23 a ton at Cardiff.

Notes on Mining in Humboldt County, Nev.

Special Correspondence

Humboldt county, in which for many years the mining industry has been dormant, is now showing the activity in evidence in other parts of the State. In the sixties there were several properties which produced large amounts of silver, some of the ore being rich enough to haul by wagon to Sacramento. The county has also produced several million dollars in placer gold.

Bonanza gold ore has been found by prospectors north of Lovelock at the camp called Seven Troughs. The ore and conditions are similar to those found in several of the southern camps. There are silicified zones in andesite which show low values over considerable widths, and in places small veins which carry thousands of dollars to the ton. Many properties have been floated here, and considerable development work is in progress. A dozen or more automobiles run between Lovelock and the three townsites comprising this camp. Salt Lake City parties are up to the present the most heavily interested. Several other localities in the same neighborhood are being prospected thoroughly.

At Rosebud, which is about 30 miles east of Seven Troughs, there is also considerable excitement. Both gold and silver ores have been discovered and some prominent southern operators have paid large sums for undeveloped claims. The orebodies occur with brecciated dikes, the cementing material being silica.

Further north prospecting work is being prosecuted on several copper properties, and some of the old silver properties are being reopened. East of Lovelock, in the Humboldt range, there is also great activity. Some important strikes of both gold and cinnabar ores have been made in American cañon. This cañon is famous for the production of about $9,000,000 in placer gold. All of this was taken out by Chinamen. The paystreaks in the gravel in places carry enough cinnabar to pay for working, but until recently the source of neither this nor the gold had been discovered. An important body of cinnabar ore is also being developed in Eldorado cañon, which lies on the west slope of the Humboldt range, near Rye Patch.

Brazil in 1906 exported gold to the amount of 4,547,940 grams (gram = 15.43 grains), as compared with 3,879,000 grams in 1905. There is still continued complaint both as to taxation upon the gold-mining industry and the unsatisfactory state of Brazilian mining legislation.

The Franklin Air Compressor

The new Franklin air compressor manufactured by the Chicago Pneumatic Tool Company, shown in the accompanying illustrations is of the duplex pattern, with simple or cross-compound steam cylinders and simple or two-stage air compressing cylinders according to working conditions. A variety of combinations is obtainable for varying pressure conditions, and machines are also built for motor or water-wheel drive, either direct or by belt, gear or chain. The machine is built in sizes ranging in capacity from 30 to 200 cu.ft. of free air per minute, for 10 to 125 lb. working air pressure.

The frames are heavy box-shaped castings, strongly ribbed to withstand the strain when working at maximum load. The bottom surface bears upon the foundations throughout its entire length. The cross-head guides are bored, and provision is made for catching and draining the drip from the bearings and stuffing boxes. The steam cylinders have interior walls covered with asbestos or mineral wool, and are lagged with planished iron.

Cylinders and Pistons

The air cylinders and cylinder heads are completely water-jacketed, and the pistons are of the solid type with cast-iron spring rings. The shaft is of the center crank type, with exceptionally heavy crank arms.

The box cross-head is provided with taper shoes, turned to fit the cylinder guides. These shoes have screw adjustments affording a means of taking up the wear. Oil guards at each end of the lower slide on the bed give continuous lubrication to the lower shoe, while a sight-feed oil cup on top of the bed provides the necessary oil for the upper shoe. The piston rod is screwed into the cross head and secured by a lock nut. The connecting rod has on the solid cross-head end wedge and adjustment screws. The crank end is of the marine type, with heavy bolts and brass liners.

The single compressor has two balance wheels, one on each side. The duplex and cross-compound compressors have heavy fly wheels made in two sections, bolted together at the hub and at the rim.

The steam-driven compressors are provided with a pressure-regulating governor to control automatically the operation of the compressor in accordance with the demand for air, working in connection with a speed governor which regulates the speed of the compressor. The single- and belt-driven compressors also have an unloading device to relieve the compressor of all load when the desired air pressure is obtained, and to cause it automatically to resume delivery when the receiver pressure becomes reduced. The smaller steam-driven machines have plain "D" slide-valves accurately scraped to the seat and fastened to the rod with adjustment for wear. Steam cylinders 12 in. in diameter or larger are provided with the Meyer adjustable cut-off valves, the main valve being balanced.

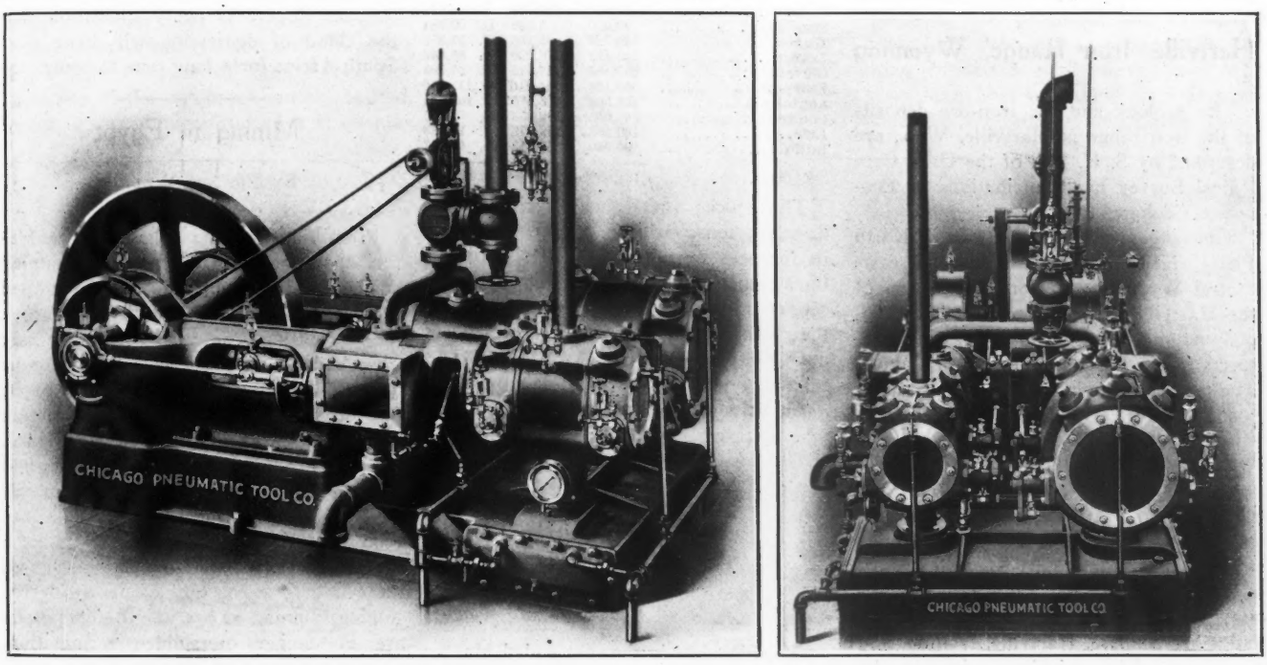
Cut-off and Valves

The balance plate and steam chest cover are both designed to provide the necessary rigidity to prevent their deflection under steam pressure. A graduated scale indicates the point of cut-off, which may be adjusted from ¼ to ⅞ of the stroke, while the compressor is running. All valve rods, eccentric rods and links are made of steel, with steel heads bushed with bronze and provided with take-up.

The air-inlet valves of the poppet type are made from steel and have removable seats and guides. They are placed radially in the cylinder.

The valve stems and heads are forged in one piece, thus avoiding the use of flange nuts, jam nuts, split pins or other contrivances intended to serve as a head for the stem.

The valve seat is entirely separate from the cylinder proper and may be removed, replaced or renewed whenever occasion requires. The valves and seats are placed in position after the heads are attached to the cylinder, and are held securely by large screw plugs. The valve springs are of steel, and the proportion of the valve area enables the cylinder to fill freely at each stroke without volumetric loss or impaired efficiency due to the wire-drawing effect of insufficient area.



FRANKLIN AIR COMPRESSOR

Air Discharge and Intercooler

The compressors of larger size are also built with mechanically moved intake valves of the semi-rotary Corliss type, placed in the cylinder heads and driven by gears from eccentrics on the main shaft. These positively moved valves combine large area with short ports and minimum clearances. They open and close without impact. These valves are driven by separate eccentrics, which on duplex, steam-driven machines have the advantage of allowing adjustment of the air-valve gear without disturbing the setting of the steam valves. All bearings through-

out the gear are provided with phosphor bronze bushings adjustable for wear. Inlet as well as discharge valves can be removed and inspected without disturbing the valve gear.

All air discharge valves are of the poppet type, cup-shaped, pressed from high-grade steel and fitted with light tension springs. These valves have removable seats and guides.

The intercooler provided with two-stage compressors, forms a part of the compressor base, being located directly under the air cylinders, minimizing the piping and floor space required and rendering the compressor self-contained. The intercooler tubes are of brass or charcoal iron expanded into steel tube sheets. Ribs are provided in the water heads and baffle plates are inserted between the tubes to aid in the circulation of both water and air.

Hartville Iron Range, Wyoming

The geology and the iron-ore deposits of the iron range at Hartville, Wyo., are described by S. H. Ball of the U. S. Geological Survey in "Contributions to Economic Geology, 1906."

The range lies north and east of North Platte river, in Laramie county, in east-central Wyoming. It forms a portion of the Hartville uplift, a broad and low domal mountain mass similar in many respects to the Black hills in South Dakota. The maximum hight of the uplift is about 6000 ft. above sea level, and the region is one of comparatively small relief.

The iron range extends from Guernsey to Frederick, a distance of 8 miles, and the iron-bearing rocks reach a maximum exposed width of 3 miles. The productive area extends from Sunrise northeastward 2 miles and from the same point southeastward 1 mile. The towns of the iron range are Sunrise, Hartville, Ironton, and Guernsey. The principal mine of the range and the local offices of the Colorado Fuel and Iron Company are at Sunrise, a village of 1500 people. The Colorado & Wyoming and the Chicago, Burlington & Quincy railroads pass through the district.

Most of the valuable claims are controlled by the Colorado Fuel and Iron Company, which is rapidly developing the Sunrise and Chicago mines. These now furnish the greater portion of the ore used at this company's smelters at Pueblo, Colo. In 1905 the Sunrise mine ranked twentieth in production in the United States, only two mines outside of the Lake Superior region exceeding it. The ore of this range is a high-grade hematite frequently analyzing 68 per cent. iron but probably averaging not more than 60 per cent. The iron content in the Sunrise mine increases perceptibly with depth, indicating, perhaps, a considerable redeposition of iron at depths through secondary processes. The ores of this range examined by early writers were low in phosphorus, many samples showing only a trace, whereas much of the ore shipped at present is of a non-bessemer grade. Some of the ore is high in silica, its only other detrimental constituent. Sulphur, so far as known, is absent, while the copper minerals occupy such restricted areas that their presence is not troublesome in sorting ores.

Lake Iron Ore

The usual yearly statistics gathered by the *Marine Review*, of Cleveland, from the various dock managers at Lake Erie ports show that the amount of ore on Lake Erie docks, May 1, was, in long tons:

	1906.	1907.	Changes.
Toledo	52,550	147,397	I. 94,847
Sandusky	29,320	5,439	D. 23,881
Huron	80,728	98,106	I. 17,378
Lorain	140,452	176,300	I. 35,848
Cleveland	350,382	447,573	I. 97,181
Fairport	266,162	154,246	D. 111,916
Ashtabula	462,564	568,485	I. 105,921
Conneaut	148,528	139,853	D. 8,675
Erie	169,488	189,276	I. 19 788
Buffalo	90,960	50,313	D. 40,647
Total	1,791,090	1,976,988	I. 184,898

The stocks on docks, Dec. 1, were 6,252,455 tons, so that winter shipments to furnaces were 4,275,467 tons. Adding the summer shipments, gives a total of 30,099,769 tons of Lake ore which reached the furnaces through Lake Erie ports during the year ended May 1, 1907. The following table shows the total ore shipments from Lake Erie ports to furnaces for eight years, with the stocks on docks at the close, May 1, of each year:

	Shipments.	Stocks.
1900	15,882,881	1,720,656
1901	14,468,260	3,050,183
1902	17,216,065	2,848,194
1903	21,905,251	3,592,367
1904	18,739,995	4,534,103
1905	20,057,070	2,271,631
1906	28,984,358	1,791,090
1907	30,099,769	1,976,988

The shipments in the year ended May 1, 1907, were the largest on record.

Conditions in the Transvaal

SPECIAL CORRESPONDENCE

Depression still hangs as a heavy cloud over the country, and the money market is so tight that it is almost impossible to raise cash for new enterprises. Those development propositions which expected to float off some of their shares to raise capital to carry on operations, find it impossible to dispose of these shares for a reasonable figure, and in consequence some of them will be compelled to close down. There are several mines on the Rand now idle, which could be made to pay well were it possible to raise capital to get them to the producing stage, and provide sufficient labor to keep the mill going. Unless things improve, very few of the mines now in the development stage will be able to stand the strain.

The distress in Johannesburg is most apparent, reminding one more of an old city like London or New York, than a young community like this. Men are seen begging in the streets who never begged before. The charitable institutions are all taxed to the uttermost, and the unemployed camp is well filled. Beside the indigency commission now sitting, the Government has appointed another commission to investigate the labor question, and to report how far white labor can be used in the mines. The depression will not be driven away by the appointing of commissions. The keynote of the trouble is the feeling of insecurity and uncertainty that exists throughout the country. European investors are beginning to look askance at a country where they never know from one year to the other what is going to happen. There is every indication that the cloud of depression will hang over South Africa for a long time to come.

Mining in Egypt

BY EDWARD WALKER

From time to time I have referred to the operations of the few gold-mining companies in Egypt, and have recorded the progress of the Nile Valley Company, the consulting engineers of which are Messrs. Lake and Currie. A short time ago the company came to the end of its resources and by means of reconstruction £36,000 new working capital was provided, for the purpose chiefly of exploration and development. Unfortunately this money has all been spent and further supplies are required. In fact, the company is in a very precarious position, and although there is over 20,000 tons of ore ready for stoping, running $8 per ton, the operations are in danger of sudden termination. There is no hope of a further assessment, and as the £1 shares are now quoted at 1s. it is impossible to issue new shares at par. As a last resource, the directors are proposing to create 250,000 new shares of nominal value of 1s., and to offer them to shareholders at 18d. The new shares will rank equally with the old shares of £1 each. If all shareholders subscribe, the further capital thus obtained will amount to £18,750, but the directors are not sanguine of raising more than £5000. The mine is now down to 400 ft. and the veins are as patchy as ever. In the past some remarkably rich pockets have been struck, and there is still the hope that others may be found. The fear is, however, that the mine will not live much longer.

The decrease in the Chilean production of copper in 1906 is ascribed to scarcity of manual labor, which is absorbed by the nitrate industry, now very flourishing.

Colliery Explosions and Their Causes

Disasters Are Due to Many Combined Causes of Which Seismic Forces Are Believed to Be More Important Than Barometric Changes

BY JAMES T. BEARD*

As well might one attempt to define natural law and prescribe limits to its action as to presume to explain all the influences that combine to produce a mine explosion. One may point out contributory causes and enumerate conditions that unquestionably lend their influence to produce the dread result; but too often it happens that one or another of these influences is emphasized to the almost utter exclusion of other conditions of equal or even greater importance.

The subject of mine explosions is a broad one and must be approached from many sides before one can hope to arrive at a true estimate of the relative importance of the numerous causes. Indeed, what is sometimes adjudged a cause may prove on closer investigation to be but the contemporaneous result of some hidden phenomenon that is at once the direct cause of both the explosion and its supposed agency. I use the word explosion here not as meaning the actual occurrence, but the conditions that make the occurrence possible.

Because two occurrences or phenomena are of record almost invariably contemporaneous proves no more than the fact of their association. It still remains to be shown whether the association is one of cause and effect, or whether they are both alike the effect of a hidden cause as yet unknown, perhaps even unsuspected.

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Need of Investigation

I have prefaced what I am about to say as to the causes of mine explosions by the above remarks because of the frequent proneness of mining men to accept almost any theory that seems to afford a solution, or throw any light on the difficult problems met in mining. Much confusion is often caused by the careless statements or wrong reasoning of writers in the treatment of this subject, in respect to which we are all but learners.

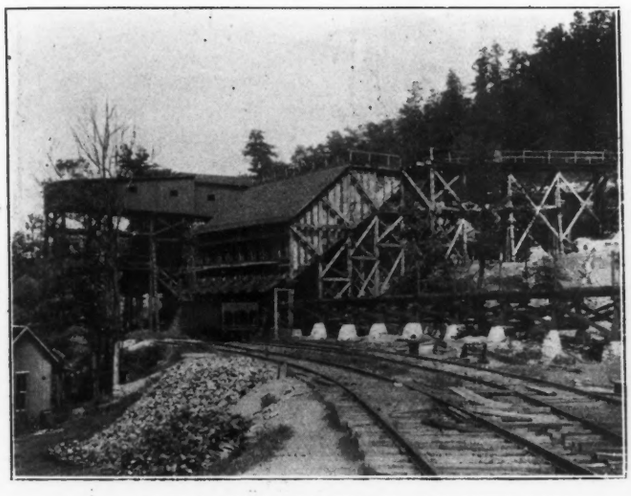
The inquiries lately revived in reference to the influence and bearing of atmospheric changes on the outflow of gas in mine workings, and other causes contributing to mine explosions, are of increasing importance year by year. Not in the brief history of American mining has there been a time when knowledge on this subject has been more eagerly sought than it is at the present. In Pennsylvania, be it said to the credit of a broad-minded management, conditions that have been growing worse each year have been met by an ample and efficient ventilation that has in the majority of the mines defied serious accident arising from the ignition of gas. It is true there have been numerous minor accidents from this cause, but an ample ventilation has arrested and localized the trouble in each case and prevented what would in many instances have proved a mine explosion.

Dangerous Mistakes

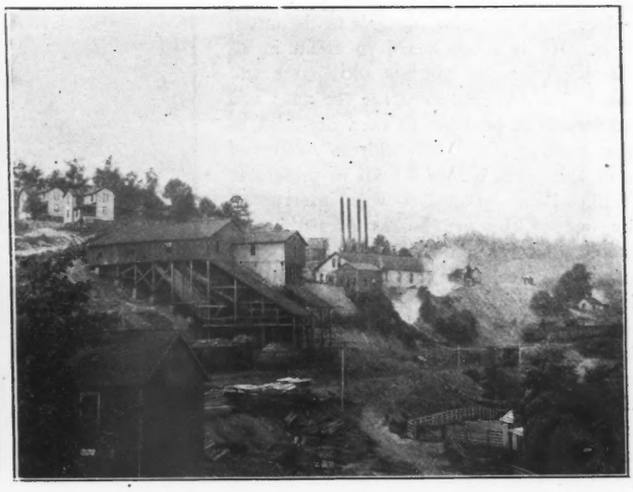
Before considering further this part of the subject, I desire to call attention briefly to some important mistakes that have been, and are still being made, and which form a part of the accepted daily practice of miners, mine managers and engineers generally. These mistakes, whether due to lack of knowledge, or of judgment, or a reckless disregard of safety, are directly responsible for many fatal accidents with gas.

One of the prevailing customs that has grown to greater proportions in the development of American mining than elsewhere is the permitted use of mixed lights, and yet there is probably no one thing connected with the mining of a gassy seam that is fraught with as much danger. It is almost inexplicable that a mine management, careful to a fault, it may be, about less important matters, should in this regard commit the safe keeping of the mine to the miner, who is left to exercise his own judgment as to whether or not it is safe to use a naked light in his chamber. It is true that in some cases he is instructed by the fire-boss to use his safety lamp at the face, but the records of the courts show that such instructions are constantly disobeyed. In many instances it is a fact that the mine foreman as well as others of the mine officials are willing to allow the miner to run his own chances, trusting that he alone will suffer if he accidentally fires the gas above him.

I believe this attitude of many mine officials is the result of misapprehension on their part.



New River and Pocahontas Consolidated Company's Plant, at Minden, West Virginia.



Red Star Coal Company's Tipple, on Loup Creek, West Virginia.

TYPICAL MINES IN A REGION WHERE DUST EXPLOSIONS ARE MOST FREQUENT

The confidence placed by the management in the efficacy of an ample circulation may be betrayed at any time by the oversight or lack of faithfulness of fire bosses, lack of judgment or foolhardiness of miners, or by one or another of the many unavoidable occurrences common to mining. The margin of safety in the operation of a mine generating explosive gas is very small—so small, indeed, that a very slight occurrence may in an instant develop a highly explosive condition of the mine air. The custom that is common in a large number of mines generating gas of permitting the use of mixed lights cannot be regarded in any other sense than hazardous. Anyone familiar with the movement and behavior of gas in mines must admit that the risks are so great they should not be assumed.

Working in Gas

The entire question of working in gas resolves itself into something like the following: The average miner does not understand, nor can he comprehend, the true nature and behavior of mine gas. It is to him as a mysterious presence; and yet he firmly believes his experience as a miner has made him superior to the situation. He is often heard to claim in all sincerity that he can not only taste and smell, but *feel* and even *see* the gas; and seldom is it possible to convince him to the contrary. In an address delivered only this week before a body of miners at Wilkes-Barre, Penn., I was interrupted by one of the fire bosses present, who stated that he could detect the presence of gas by feeling it on the backs of his hands. The man who cannot taste, smell, feel and see gas has simply no standing below ground. On the other hand, however, the fire boss who essays to find anything less than 3 per cent. of gas when examining a mine is scorned and derided; he is told he does not know what gas is; he is, in fact, the butt of ridicule.

In view of these facts, coupled with the urgency of the demand for coal, is it strange that the operation of a gassy mine is a hit-and-miss proposition—a cross somewhere between the responsibility of the management and the liability of the men underground? I believe the present system of examining a mine for gas to be wrong. In the daily examination of the workings the fire boss ordinarily is compelled to cover more territory than it is possible to inspect properly. His examination is necessarily very far from complete or thorough, owing to lack of time. In the examination of a chamber only occasional tests are made where the fire boss supposes gas may have accumulated, and these are made hurriedly. Only accumulated gas receives the special attention of the fire boss.

Carrying a Naked Light When Inspecting

In many mines the fire boss carries a Davy lamp in one hand, and a torch in the other, when examining the mine. He is supposed to leave his torch on the floor at the mouth of a chamber, but more than once has it happened that fatal results have come from his failing to do this. The accident in the Central Shaft mine of the Delaware, Lackawanna & Western Company, Nov. 21, 1906, in which Mine Foreman Benjamin Evans and Fireboss Evan J. Williams lost their lives, was of this nature. The explosion was apparently caused by the gas being ignited by the naked torch carried by Evans. Williams carried a Davy lamp. Both men were burned almost beyond recognition.

The fire-boss reports invariably "no gas" when he does not observe a cap on his Davy about ¾ in. in hight, which would mean 3 per cent. of gas. If the cap is from 1.5 to 1.75 in., indicating for ordinary mine gas about 4 per cent. of gas in the air, he perhaps cautions the men and tells them to use their safeties. As the Clanny lamps used by the men, however, are poor testing lamps, the miner sees no gas on his lamp and concludes his naked lamp, which gives him better light, is safe. He therefore substitutes the latter for the safety lamp shortly after the fire boss has departed, if, indeed, the fire boss has gone up into the chamber at all with the men.

The Effect of Dust

Another factor that does not enter the reckoning of the fire boss is the effect of the dust thrown into the air by the ordinary operations of the mine, and which increases the explosive condition of the mine air so that it is possible for an atmosphere that appeared safe when examined by the fire-boss in the early morning to become dangerous when laden with fine dust a few hours later. Such was the probable cause of the fatal disaster in the Harwick mine, at Cheswick, Penn., Jan. 25, 1904, when 178 men were lost. The mine had been examined by the regular fire bosses only 3 hours previous and reported safe.

A Bad Practice

In some mining districts the practice is advocated of reducing the circulation in the mine by slowing down the fan or short-circuiting a portion of the air-current passing into the mine on the main airways, about 15 min. previous to the time of firing. Only a short time ago this practice was openly recommended by a State mining board. Nothing could be more foolhardy than to tamper with the circulation in a mine at the very time when an efficient ventilation is needed at the working face to prevent the backward expansion of the products of blasting. The weakened air-current, staggered by each successive blast is no longer able to oppose the large volumes of combustible gases, generated by the burning of the powder, which crowd back into chambers where shots are yet to be fired. Such a condition is a menace to safety.

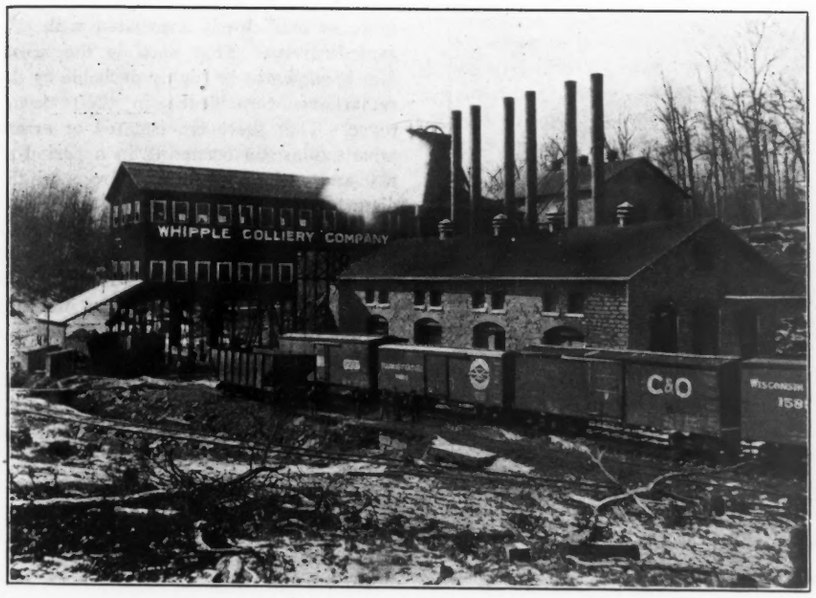
THE WOODWARD MINE, NEAR KINGSTON, PENNSYLVANIA. SCENE OF A RECENT EXPLOSION

I have mentioned a few only of the many practices which have become so common in our mines that mine officials have seemingly come to disregard their danger. Many others equally hazardous could be named, but let us turn now to consider briefly some of the natural agencies that affect, or are supposed to affect the explosive condition of mine air and are therefore an indirect cause of mine explosions.

Barometric Pressure as a Cause of Explosions

Much has been written on the supposed relation of changes in barometric pres-

sure to the occurrence of mine explosions. Evidently this would be difficult to prove, being much like the proverbial Irishman's flea. Reason will not confirm any invariable or even general relationship of such changes in atmospheric pressure to recorded mine explosions, because of the simple fact that many explosions are caused by accidental occurrences that are in no way associated with atmospheric changes, such as derangement of the ventilation in the mine due to an open door, a fall of roof, a breakdown of the fan or engine, etc. On the other hand, explosions do not necessarily follow an increase in the gaseous condition of the mine air, which might accompany a fall of barometric pressure. When overzealous advocates of the barometric theory think they have found new and convincing proof that cannot fail to establish the truth of their argument, there is sure to occur a considerable number of explosions on a rising barometer, which offers a sharp challenge to the theory and presents an insurmountable obstacle.



SEAT OF THE MOST RECENT WEST VIRGINIA DISASTER

Before deciding the question of whether a true relationship may reasonably be expected to exist between barometric changes and mine explosions, facts must be shown to form the basis on which to build such a theory, or else the logical results of the theory must be shown to be facts themselves.

The barometer is an index of the pressure of the atmosphere; a fall of barometer indicates a decrease of atmospheric pressure. In accordance with the laws of fluid pressure, a decrease of atmospheric pressure is accompanied by an expansion of all free air and gases at or near the surface of the earth, the expansion being directly proportional to the decrease of pressure. Expressed simply, "the volume ratio is equal to the inverse pressure ratios." This is the acknowledged relation between barometric pressure and the volume of free air and gases.

The amount of expansion produced by a given fall of barometer is important as showing the practical effect in the mine to change the gaseous condition of the mine air. For example, free air supporting simply an atmospheric pressure corresponding to, say, 30 in. of mercury will expand in the ratio $\frac{30}{29}$ for a fall of 1 in., $\frac{30}{28}$ for a fall of 2 in., or $\frac{30}{29.9}$ for a fall of 0.1 in., etc.

In blower ventilation the mine air, under a 2¾-in. water gage, is supporting a pressure of 0.2 in. of mercury above the atmosphere, and a fall of 0.1 in. barometer produces an expansion of the mine air and gases in the ratio $\frac{30.2}{30.1}$. Likewise for the same conditions in exhaust ventilation the corresponding expansion ratio is $\frac{29.8}{29.7}$. These ratios show clearly that for each 0.1 in. of fall in barometric pressure at sea level there is an increase in volume in all mine air and gases of $\frac{1}{301}$ of the original volume in blower ventilation, and $\frac{1}{297}$ of the original volume in exhaust ventilation, for a 2¾-in. water gage.

At various elevations above the sea level these ratios would change accordingly: thus, at an elevation of 10,750 ft., the barometer corresponding to 30 in. at sea level is 20 in. The increase in volume corresponding to the above conditions is then $\frac{1}{201}$ of the original volume in blower practice and $\frac{1}{197}$ of the same in exhaust practice. The ratios show the increasing effect, for the same fall of barometer, as the absolute pressure supported by the air or gas is decreased.

The effect of barometric change thus far shown applies to all free air and gases filling the abandoned parts of mines. Abandoned mine workings should be ventilated as thoroughly as the conditions will permit, but it is not possible to maintain a safe condition of the air in these workings, and as a consequence a large area of abandoned workings is always more or less of a menace to the safety of the mine. The principal danger lies in the volume of accumulated gases that is liable to be forced out of these old workings into the airways and roadways of the mine, which may thus be rendered unsafe in a short space of time.

It is in respect to these dangerous reservoirs of gas that barometric changes produce their chief and in fact their only appreciable effect to cause an explosive condition of the mine air.

A Practical Assumption

It is therefore important to consider to what extent or in what degree is this effect operative? In other words, what is the practical significance of a stated fall of barometer with reference to producing an explosive condition of the mine air, waiving the actual occurrence of an explosion? In answering this question it is necessary to state that barometric changes are gradual; a fall of 0.1 in. in from 3 to 5 hours is a rapid fall of barometric pressure and does not occur except at infrequent intervals.

I will assume for the sake of illustration an extremely bad case such as could not occur in any justifiable mining practice. Say there are 10 acres of abandoned workings standing, and full of pure marsh gas, in a 6-ft. seam, at an elevation of 10,000 ft. above sea level; and the barometer falls from 20 in. to 19.9 in. in 3 hours. Approximately the gas set free in this case is

$$\frac{10\,(43{,}560 \times 6)}{200\,(3 \times 60)} = 72.6 \text{ cu. ft. per min.}$$

during the time in which the barometer is falling. This quantity of gas is the amount in excess of what is given off regularly. To show the proportion of this increase of gas due to a sudden fall of barometer, I will assume the velocity of the air-current passing in the airway skirting the old workings is, say 600 ft. per min. and the airway has a sectional area of 50 sq.ft., giving a circulation of $600 \times 50 = 30{,}000$ cu.ft. of air per min. If this air-current carries ordinarily 2 per cent. of gas, the mine is producing 600 cu.ft. regularly, which is increased to 672 cu.ft. during the fall of barometer. The increase in the percentage of gas in the air-current is, in this extreme case, only from 2 to 2¼ per cent., which increase could not be detected on the flame of a Davy lamp.

In usual mining practice today any dangerous goaves are so far ventilated as to prevent large accumulations of gas in them, and as a consequence what gas is thrown out from such places owing to a fall of barometer or other cause is not pure marsh gas or even feeder gas, but

air containing perhaps a high percentage of gas. Under such normal working conditions, assuming an acre of abandoned workings in a 6-ft. seam and a fall of barometer from 29.1 to 29 inches, the volume of air and gas thrown off is

$$\frac{43{,}560 \times 6}{290\,(3 \times 60)} = 5 \text{ cu. ft. per min.}$$

Assuming this contains as high as 20 per cent. of gas, which is not likely, the increase of percentage of gas in the air-current of 30,000 cu.ft. per min., assumed previously, is only from 2 to 2.003 per cent., an inappreciable increase. The actual gas given off in this case is increased only 1 cu.ft. for 600 cu.ft. regularly produced.

There are so many other causes that are liable to happen at any time, and which in their effect are a hundred fold more dangerous than any results that can reasonably be attributed to any possible fall of barometer that it is idle to consider the latter. For example, roof falls, which are of frequent occurrence in old workings, may set free a large volume of gas, sufficient to render the mine air in the workings immediately adjoining highly explosive. The regular daily extraction of coal, accompanied as it is by the continuous movement in the overlying cover, opens fresh feeders which not infrequently become a menace to the safety of the workings. The outpouring of the gas is at times so abundant that it becomes necessary to abandon those portions of the mine for a few days to give the gas an opportunity to drain off before resuming work.

A TYPICAL SOUTHERN WEST VIRGINIA PLANT

Volcanic Activity and Mine Explosions

But I have yet to mention an agency that is probably responsible for explosive conditions in mines to a greater extent than any yet named. I referred a year ago, in an article on mine explosions, to the lack of attention given by mining men to the variation of pressure of gas that may occur within the strata, from whence mine gases emanate. I believe as the result of several years' close observation that internal pressure is the cause of larger, spasmodic emissions of gas. The ground for this belief, which is at least reasonable, is as follows: It is a matter of general observation that the flow of gas in all mines located in regions or districts where gas may be expected is spasmodic. Even in districts producing large quantities of gas and which therefore appear to furnish a constant emission, there is a very perceptible ebb and flow, causing periods or fluctuations in the gaseous condition of the mines. In other districts and mines there are corresponding periods in which much gas is given off, followed by intervals where there is almost an entire absence of gas in quantities to cause alarm. Often these periods of the ebb and flow of gas from the strata are quite local, that is, restricted to a limited area or district, and at times appearing in a single mine or portion of a mine only. Several instances have recently occurred where the flow of gas increased in a portion of the mine so rapidly that the men were withdrawn from that district and not permitted to return for nearly a month when the flow ceased almost entirely.

Observations such as the foregoing prove quite conclusively the existence of conditions or agencies that affect the emission of gas locally and from within. No atmospheric changes could produce local phenomena such as these. We possess very little exact knowledge of the condition of the interior of the earth, but the evidence of volcanoes in action and our knowledge of the agency of heat and pressure make it certain that tremendous activities are in constant operation within the earth's sphere. It is both natural and reasonable to suppose that the pressures in subterranean channels that will discharge molten material under the great head due to the hight of a volcano, can make themselves felt in other quarters, and incidentally augment the outflow of gas from strata already pregnant. No one familiar with underground conditions and who has listened with awe to the mysterious "poundings" in the overburden of a mine, caused, as is well known, by the working of gas in the foliations of the strata, can study the phenomena of earthquake waves and shocks without being convinced of the close relationship of the different phenomena. The conclusion is fairly certain that gas generated by the chemical and physical activities within the earth plays an important part in all these phenomena.

I have previously drawn attention to the close association of volcanic activity and mine explosions, and will only briefly refer to these here. The theory of spasmodic or irregular earth breathings, as just explained, if true, would give rise to periods of frequency of mine explosions, more or less closely associated with volcanic activity. That such is the actual fact is shown to be highly probable by the remarkable coincidence in their occurrence. That there are isolated or errant mine explosions occurring in a period of rest and entirely dissociated from seismic disturbance, does not argue against the theory, since it is not claimed that all mine explosions are the result of such disturbance. The causes producing explosive conditions in mines are too numerous to invite such an expectation. But when periods of marked seismic troubles are almost invariably accompanied by the appearance of gas in increased quantities in mine workings, and the occurrence of one or more mine explosions, the fact is significant of something more than mere chance.

Recent Mine Disasters

The terrible eruption of Mt. Pelée that devastated the island of Martinique, West Indies, May 20, 1902, was accompanied by four prominent mine explosions in a period of less than three months, causing the loss of 550 lives. Two of these explosions occurred at practically the same time as the principal eruption of the volcano. The record is as follows: May 19, 1902, Frayterville, Tenn., explosion, 184 lives; May 20, 1902, Mt. Pelée, eruption, 28,000; May 23, 1902, Fernie, B. C., explosion, 127; July 10, 1902, Johnstown, Penn., explosion, 112; Aug. 1, 1902, Wallangong, N. S. W., explosion, 127.

This was followed by two or three years of comparative rest, only to be succeeded by a still more terrible and prolonged season of disquiet. From early in the year 1905 to the present time there has been an unbroken succession of seismic disturbances marked by some of the most terrible mine disasters ever recorded. The record of the principal occurrences is as follows: Jan. 4 to 24, 1906, three mine explosions,

United States, 54 lives; Feb. 8, 1906, Parral, W. Va., explosion, 27; Feb. 19, 1906, Maitland, Colo., explosion, 16; Feb. 21, 1906, Colombia, S. A., earthquake, 2000; Feb. 27, 1906, Piper, Ala., explosion, 9; Mar. 10, 1906, Pas-de-Calais, France, Courrières explosion, 1200; Mar. 17, 1906, Formosa, Japan, earthquake, 3000; Mar. 22, 1906, Century, W. Va., explosion, 21; Mar. 28, 1906, Takashima, Japan, explosion, 307; April 3 to 17, 1906, Vesuvius, Sicily, 500; April 7, 1906, Formosa, Japan, earthquake, 109; April 18, 1906, San Francisco, Cal., earthquake, 2000; April 20, 1906, Calumet, Mich., fatal; April 20, 1906, Honolulu, fatal; April 21, 1906, Trinidad, Colo., 23.

Other mine explosions occurred June 6, Red Lodge, Mont.; July 19, Huger, W. Va.; and the memorable earthquakes at Valparaiso, Chile, Aug. 16; Porto Rico, W. I., September 27, and in the bed of the Indian Ocean, Oct. 1, followed by mine explosions at Pocahontas, W. Va., Oct. 3, Blosburg, N. Mex., Oct. 5; Wingate, Eng., Oct. 15; Johnstown, Penn., Oct. 24. Mt. Pelée was again in action from Oct. 6 to 11, when a violent eruption took place. In January, 1907, occurred two violent earthquakes at Kingston, Jamaica, W. I., on the 14th and the 28th, respectively, and a mine explosion on Jan. 23 at Primero, Colo. On Jan. 28, the day of the second shock at Kingston, there were two mine explosions in Europe, one of these occurring at Essen, Germany, with a loss of 275 lives, the other at Lille, France, with a loss of 20 lives. The day following, Jan. 29, the Stuart mine exploded, at Fayetteville, W. Va., with a loss of 75 lives, and Feb. 4, the Thomas mine, at Elkins, W. Va., loss 38 lives. March 1, Costa Rica experienced a severe earthquake shock, and the following day two explosions of gas occurred within an hour of each other, in the Holden colliery, Taylor, Penn., and the Woodward mine, Kingston, Penn., the two mines being but a few miles apart.

These terrible records tell significantly of the danger that exists in mine workings during periods of seismic unrest. Undoubtedly much trouble has been avoided by the increased vigilance and care exercised of late in mines by reason of the attention that has been drawn to the subject, and it is to be hoped mine officials will not relax precautions for the present at least.

Besides paying machine miners, shotfirers and loaders according to the number of tons of coal mined, some Nova Scotia collieries also pay the drivers, bratticemen, road-makers and other shiftmen by tally, according to the tonnage produced in the section in which they work. When this scheme is adopted, it is found that the interest of these latter men is more concerned in maintaining good ventilation, keeping the roads in good shape, and getting out as many cars of coal as is possible, so as to increase their earnings.

Barometric Pressure and Simultaneous Explosions of Gas in European Collieries *

By M. Mascart

The recent explosions of gas at Reden in Germany, and Liévin in France, were evidently due to a single and similar determining cause, which this time is shown with such evidence that those most opposed to the theory of the influence of seismic and meteorological phenomena upon explosions of gas must be almost convinced of their error.

Since 1877, I have, in successive communications to the Academie des Sciences, claimed that earthquakes and falls of the barometer have an influence on the freeing of gas in mines, and also on the liberation of gas in hot springs; I have also shown that all barometric falls are not necessarily followed by the escape of gas. In order for such an explosion to occur, it is necessary to have a period of compression, that is, a period of high barometric pressure, for some time before the depression occurs.

In short, I have succeeded in formulating the law, and pointing out that the depression must be rapid. The dangerous conditions that lead to a liberation of accumulated gases formulate themselves as follows:

1. Establishment of a period of high barometric pressures over a continent; or earthquakes in any part of the globe.

2. Sudden and continuous atmospheric depression.

I have proved that the gas-dust explosion of Courrières was preceded by a period of high pressure, followed by a sharp fall. Here is a new observation; I give a table of barometric pressures from Jan. 10 to Jan. 27, the eve of the accidents at Reden and Liévin, which were simultaneous. One will recall this period of fine days, calm and sunny, during the month of January.

TABLE I.

Date.	Mm.	Inches.
Jan. 10, 1907, noon	774	30.500
Jan. 11, 1907, noon	776	30.578
Jan. 12, 1907, noon	780	30.734
Jan. 13, 1907, noon	777	30.617
Jan. 14, 1907, noon	777	30.617
Jan. 15, 1907, noon	777	30.617
Jan. 19, 1907, noon	777	30.617
Jan. 16, 1907, noon	778	30.656
Jan. 17, 1907, noon	779	30.695
Jan. 18, 1907, noon	778	30.656
Jan. 20, 1907, noon	778	30.656
Jan. 21, 1907, noon	778	30.656
Jan. 22, 1907, noon	772	30.422
Jan. 23, 1907, noon	776	30.578
Jan. 24, 1907, noon	774	30.500
Jan. 25, 1907, noon	772	30.422
Jan. 26, 1907, noon	771	30.383
Jan. 27, 1907, noon	774	30.500

It will be observed that in the last seven days there were numerous fluctuations of 2 or 3 mm., but the general tendency was to a lower level. It is these little fluctuations which are the preliminary signs, while the equilibrium continues. It is at this moment, however, that we must look for the fall of the barometer, and take all precautions. The mine observatories should act, and all mine directors order the necessary precautions. I have proved by repeated observations that, at the moment of low pressure, it is too late to act, since the effects of the depression of the barometer do not make themselves felt until five or six hours after the fall in atmospheric pressure has already begun. In short, the barometers are always a little late.

It is interesting to note the suddenness there was in the phenomena of fall on Sunday, Jan. 27, and again on Monday, Jan. 28, the day of the accidents. Saturday, all day, the pressure was 774 mm.; Sunday at noon it was still 774 mm.; then the fall began. The accidents occurred, and the fall continued.

TABLE 11.

Time.	Mm.	Inches.
Sunday Noon	774	30.500
Suuday 2 p. m	773	30.461
Sunday 6 p. m	772	30.422
Sunday 8 p. m	771	30.383
Sunday 10 p. m	771	30.383
Sunday Midnight	770	30.344
Monday 2 a. m	769	30.305
Monday 4 a. m	769	30.305
Monday 6 a. m	768	30.266
Monday 8 a. m	767	30.227
Monday 10 a. m	766	30.188
Monday Noon	765	30.149
Monday 2 p. m	764	30.110
Monday 4 p. m	763	30.071
Monday 6 p. m	763	30.071
Monday 10 p. m	761	29.993
Monday Midnight	760	29.954
Tuesday 2 a. m	759	29.915
Tuesday 4 a. m	758	29.876
Tuesday 6 a. m	757	29 837
Tuesday Midnight	754	29.720

From this time, midnight on Jan. 29, the pressure increased. From Sunday to Monday the record was so typical, and showed so clearly the imminence of danger, that all the chiefs of mines in Belgium, and M. Reumaux, director of the mines of Lens, in France, ordered the dangerous chambers to be evacuated. "The observatory of Uccle," says *L'Etoile Belge*, "telegraphed to all the collieries of the basin of Charleroi and the Center, warning them of a quick fall of barometer. Measures were immediately taken; these consisted in doubling the watchfulness in the mines, and in speeding up the fans to expel the bad air and gas. Besides, miners were forbidden to go into places where it was believed that there was danger. These measures were enforced until new orders were given."

Unfortunately in Germany, the same precautions were not taken, and the colliery of Reden was the scene of a terrible explosion of gas, almost at the same hour as that at Liévin in France. The natural conclusion from this disastrous lesson is that we ought to observe in France, as is done in Belgium, the periods of high atmospheric pressure, and the beginning of the depression which inevitably follows.

In driving a tunnel or sinking a shaft, satisfactory ventilation may be easily obtained by using a steam jet.

*Notes submitted to the French Academy of Sciences; translated from *Echo des Mines*.

Colliery Notes, Observations and Comments

Practical Hints Gathered from Experience and from the Study of Problems Peculiar to Bituminous and Anthracite Coal Mining

DEVELOPMENT AND MANAGEMENT

Two electric winding engines which are being installed at a Belgian colliery, will be capable of raising 600 tons of coal per day of 10 hours from a depth of 3940 ft.

Past records show that in the United States there have been more explosions of fire damp in the months of May and October than in any other months in the year, while the most serious colliery disasters in Great Britain from 1778 to 1886 were in June and December.

At the Whipple mine of the New River Coal Company in southern West Virginia, where an explosion recently occurred, the barometer fell from 30.20 on April 29 to 29.98 on May 1, the date of the disaster. The atmospheric pressure again increased on May 2, the barometer reading 30.22.

At a dry and dusty colliery during the winter months, it is often advisable to use steam jets at the top of the down-cast shaft, the principal object being to raise the temperature of the air so as to make it capable of taking up more moisture. This practice also causes the saturation of any particles of dust which may go down from the pit top.

Rubber belts are cheaper than leather belts and should be used in wet places; in dry parts of a mine, leather belts are more suitable as they last longer than rubber belts. The latter should be kept free from grease or animal oils. When a rubber belt slips, apply boiled linseed oil to the inside of the belt and sprinkle powdered chalk on the oil.

The arrangement of mine-car tracks at the head of a shaft should be much the same as in the mine. The empty track for easy running by gravity should have grades toward the shaft varying from 2 to 0.25 per cent., while the loaded track should have a grade of from 1.25 to 0.75 per cent. away from the shaft. The minimum radius for curves should be 25 feet.

It has been found that coking coals lose that property when exposed to the atmosphere for an extended period, or by heating to about 570 deg. F. The slack of a non-coking coal can be made into a coherent cake by exposing it suddenly to a high temperature. Some coals which cannot be made into coke in beehive ovens are easily coked in modern gas-heated ovens.

The Thomas Dun breaker, near Larksville, Penn., has installed a 75-h.p. electrical motor. The process of hauling coal at this breaker is a new one in the anthracite region. A large continuous conveyer, operated by electricity, runs into the slope and from there to the working faces. The present output is about 300 tons per day, but it is expected to increase the output to double that figure in a few months.

The chief advantage in using steel rope as compared with iron rope is that the former has greater tensile strength than iron rope of the same diameter. For equal strength, steel rope can be made lighter, consequently it can turn around sheaves, pulleys and drums with less wear and tear. For all hoisting ropes in and about mines, the safe working load should be about one-sixth of the ultimate tensile strength of the rope.

The hoisting engine of a shaft should be located at a sufficient distance from the shaft to allow the rope to wind evenly on the drum, so that the coils on the latter will not loosen when the cage rests on the landing. Too great a distance from the shaft to the engine should be avoided, or the cage will be raised a few inches by the tension of the rope when the loaded car is removed. In general, the location of a hoisting engine should be one to one and one-half times the difference in the elevation of the center of the drum and the center of the sheave wheel.

In ventilating rise and dip workings with one fan, the air regulators should be carefully adjusted when the water gage varies. When the pressure is increased, experience has shown that the rise workings take more air than their share, and the dip workings less. The reverse is the case when the pressure is decreased. This is due to several causes, among which may be mentioned the fact that in dip workings the motive column is greater than in rise workings, and the difference in temperature of the intake and return is also greater in dip workings than in rise workings.

One of the large anthracite coal companies in building underground barns composed of a row of stalls, single or double, specifies that the dimensions of all single stalls shall be 5x10 ft., while the double stables are built 10x10 ft. The floors of the stalls have a grade of not more than 2 in. to insure drainage when cleaning; sometimes it is necessary that the stalls have a side slope, but that should not exceed 1 in. for a double stall, so that the difference in elevation between the highest and the lowest corners of the floor will not injure the feet, and cause lameness among the animals used underground.

A new system for preventing coal-dust explosions was recently tried at an English colliery. The plan was to saturate the main air current passing down the down-cast shaft with exhaust steam. This latter was mixed with the air by an arrangement of small jets, so as to mix the whole air current with the steam. This practice could only be followed when the pit was idle, because of the fog caused by the steam. The moisture from the steam was deposited upon the roof, sides and floor, and was satisfactory for a limited distance upon the roadways; but had the usual effect in rotting the timbers and injuring the strata which composed the roof and sides, thereby causing an increased number of roof-falls.

A 6-in. wrought-iron pipe is generally used in flushing anthracite culm into old workings. The life of a pipe depends largely upon the size of the culm and the speed with which the culm flows in the pipe. Sulphuric acid is nearly always present in flushing water, and it readily attacks the pipe. In general, the life of a pipe is from six to 18 months for culm, but if the culm is mixed with ashes, it lasts only from two to six months. The amount of water used in flushing depends on circumstances; 400 gal. of water is required to flush 1 cu.yd. of culm to level and down-hill places; 800 to 2400 gal. of water to 1 cu.yd. of culm to flush up-hill for any hight varying from 25 to 100 ft. above the "shaft level." Figures from four collieries show that on an average, 4680 gal. of water were used per cubic yard of culm flushed, while the average cost of labor per cubic yard of culm flushed is $0.052.

In all coal mines, the most dangerous dust is to be found upon the roofs, timbers, and sides of the roadways, rather than on the floors. For this reason, the practice of gathering the dust that lies on the floor into trams or cars does not remedy the trouble. In several instances mine managers have tried brushing the dust from the roof and sides before loading it into cars. This system did not prove satisfactory, owing to the fact that there are many inaccessible places above the roof timbers where dust accumulates; moreover this work could be done only when the mine was idle, since no men could be allowed to work in the air current of the roadways undergoing the periodical brushing. Furthermore, this practice of brushing causes a large quantity of the finest dust to be carried forward with the air current and deposited upon the interior portions of the roadway, causing an increased danger.

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Contents

The Situation in Copper

We have now reached the end of May, and the stagnation in the copper market resulting from a deadlock between the producers and the consumers continues. It is useful to summarize what is precisely the situation. It must be recognized immediately that the position of copper is by no means so strong as it was 10 weeks ago. At that time most of the producers had sold the bulk of their output for three and even four months ahead at the highest prices. Since then there have been no large sales, except for a brief period, about a month ago, when there was a reawakening of the foreign demand, which it was hoped would prove the forerunner of a new domestic demand, but those hopes were doomed to disappointment.

We have now reached the point where the output has been contracted for only a little way ahead. To make a broad generalization, it may be said that on the average about one-half of the June output is under contract. Some producers have sold further ahead, while others have sold less far. In fact, some producers have already reached the point where they have unsold copper on hand; in other words, a stock of unsold metal is now beginning to accumulate.

As to the statistical position of the metal, nothing very definite can be said. It has been heralded that there has been a decrease in the production since Jan. 1, and it is true that there have been difficulties in Montana and Arizona, which probably have resulted in a diminished production in those quarters; but, on the other hand, there has probably been an increased production in Michigan, and also in many miscellaneous quarters, unimportant individually, but of considerable importance in the aggregate, which are completely ignored in casual and irresponsible estimates. On the other hand, we know definitely that the exports to Europe have fallen off materially, and while we have no statistical information as to consumption, it is significant that the consumers who a few months ago thought it necessary to make their purchases for three months ahead, are distinctly of a different opinion now. It is possible that in their previous excitement the consumers overestimated their requirements and can remain out of the market for a considerable time after existing contracts have expired. The fact that certain consumers have requested postponement of shipments of copper already purchased, while a few have actually offered copper for re-sale, is indicative that they are in no immediate need to replenish their supply.

Nevertheless, some of the largest producing interests hold a different view, although it is uncertain whether they are now so strong in their opinion as they were a little while ago, and are acting consistently upon the theory that if they make no concessions in their offerings the consumers will have to meet their terms in the market. It is still a question whether they are correct, in which event there will be an upward turn in the price of copper, or whether they are wrong, proof of which would be followed by a sharp break. However, as time proceeds, and consumers refrain from appearing in the market, the prospect increases that we must make up our minds to a continuance of the downward tendency, which has already been manifested for a month or more.

Colliery Explosions and Their Causes

At the time of the explosions at Reden, in Germany, and Liévin, in France, which occurred nearly simultaneously a few months ago, we remarked that it would be interesting to have knowledge as to the atmospheric conditions existing when the explosions happened. This has been supplied by M. Mascart in a paper printed elsewhere in this issue. It appears that the two explosions occurred under conditions which make them strikingly confirmatory of the hypothesis that there is a particular liability to developments of gas when a period of high barometer is followed by a rapid drop in the pressure. However, Mr. Beard in a carefully prepared contribution, which is also printed in this issue, is decidedly skeptical of the barometric hypothesis, and believes rather in the connection between gassy conditions and earth-strains which are manifested by earthquakes. In so far as contemporaneous occurrences of earthquakes (and volcanic manifestations) and colliery explosions are concerned, Mr. Beard makes out a strong case. It is rational to believe that there may be a connection

with a common cause. However, there is nothing in such a hypothesis to argue against barometric conditions being a strongly contributory factor, perhaps the most directly governing factor, and we are disposed to think that Mr. Beard unduly belittles that side of the question. Certainly the conditions of air pressure do not affect merely the accumulations of gas in old workings, but may in quite similar manner affect the many "feeders," which are constantly discharging gas into the mine.

Everyone will agree with Mr. Beard that an explosion may occur on a rising barometer, especially an explosion due to a blown-out shot or other accidental cause. Nevertheless, it is true that more than 95 per cent. of the explosions in our coal mines during the last two years occurred immediately after a fall in barometric pressure. From the latter part of Mr. Beard's list of recent explosions we find 12 to which we have called attention as having occurred after a fall in barometric pressure.

One point in M. Mascart's paper is open to discussion, viz., whether a fan should always be speeded up during the danger periods. Many managers contend that the fan should be slowed down if an exhaust, and its speed increased if a blower.

With reference to the attitude of European countries as to the question of the influence of barometric pressure on outflows of mine gases, it is worth while to mention that the British meteorological service has at times notified the operators of approaching barometric changes. In a summary of the work of this department it is shown that 32 warnings were issued during one year, 19 of which were justified by subsequent events; 12 were followed within less than three days by 15 explosions, causing 139 deaths; two explosions, causing 43 deaths, occurred on the fifth day, and 23 lives were lost on the sixth day, a total loss of 205 lives in six days from the time of the issue of warnings. Colliery warnings based upon approaching atmospheric conditions have now become a regular practice in certain countries of the Continent. We are gratified to observe that our esteemed contemporary, the *Echo des Mines,* of Paris, has recently inaugurated a special service of its own in this direction.

We do not argue that the connection between gas outflows and atmospheric conditions is definitely proved. We have been interested in collecting and presenting facts which seem to bear out the idea that there is such a connection, and we hope soon to be able to offer some new and highly important evidence. The most essential thing at present is to direct the attention of colliery engineers to the question, which will lead to the accumulation of a mass of data from which some useful conclusion can be deduced. If there be a connection between gas outflows and atmospheric pressure, and the laws can be determined, it will be of immense practical importance, because atmospheric changes can be accurately forecasted, while earthquakes can not be. This is the reason why it is more important to study the former phase of the question than it is the latter.

Labor and Prosperity

The Reclamation Service, a department recently divorced from the United States Geological Survey, has issued a circular complaining of the hardships attending the present industrial boom in the far West. The demand for labor and materials of all kinds is so urgent that the service cannot secure reasonable bids for constructing its big irrigation works. The service hesitates to undertake the work itself, for the Government is as helpless as are its citizens confronted with the same difficulty. The circular sets forth that "Wages are from 40 to 60 per cent. higher than two years ago, while efficiency has decreased rather than improved by the unlimited demand for laborers. Owing to the remoteness of much of the work from centers of population, labor is not attracted and as a rule the Government gets only the leavings of the most undesirable class of laborers. The steady and skilful workers are all busy."

This sounds like the plaint of a forlorn mine manager explaining matters to the home office. The effect of extreme prosperity upon the labor situation is a serious question among mine owners. In Montana, in Arizona, in the Lake Superior district, in Missouri, and elsewhere the men are demanding more pay. An increase of 20 per cent. in the West recently brought out the complaint that the cost of living had risen in even greater proportion. Still the regular cost of board in the western camps remains the same, $1 per day, as it was in 1869, and has been continuously ever since. The wants of the laborer have increased, if not his needs, and the ability to enforce his demands has reduced his efficiency.

We have, thus, a case in which unusual demand retards production, an unhealthy state of affairs. Impaired productivity of labor is a loss to the country, for inefficient workmen, like inefficient machinery or undeveloped natural resources, represent factors of wealth production imperfectly employed.

A GOOD DEAL OF TALK is made by some of the financial and daily newspapers as to increase or decrease in the production of copper in the United States month by month. These estimates deserve no attention. There are no reliable statistics of copper production collected monthly for any of the districts, and even after the end of the year it is a matter of several months before the final figures can be reliably presented, although we are able at the end of the year, upon the basis of reports received from the producers by mail and telegraph, to present approximate statistics, which last year were inside of 1 per cent. of the total finally reported. Few of the producers make monthly reports, and as to the majority the estimates of their output which are published are often grossly inaccurate. It would be possible to arrive approximately at the production month by month, if all of the producers were willing to communicate their figures, as formerly used to be done, but at present such is not the case.

THE COSTLY EXPERIENCE of the mine operators in the foothill counties of California during the recent storms, when the power lines went down, and the mines rapidly filled with water, has served to teach them a lesson. On every hand the mine-owners are now preparing to meet any future emergency. They will not trust to electric power, steam or any other power alone, but will be prepared to operate their pumps and hoists in a variety of ways. In the Grass Valley district particularly, a number of mines are arranging improvements in their pumping systems. It is to be hoped that the new (and commendable) plans will progress sufficiently far to insure their consummation. Similar troubles have been experienced in previous years, good resolutions have been made, and then have been forgotten.

Views, Suggestions and Experiences of Readers

Comments on Questions Arising in Technical Practice or Suggested by Articles in the Journal, and Inquiries for Information

CORRESPONDENCE AND DISCUSSION

The Great Boulder Perseverance Mine

In the JOURNAL, May 18, in the London letter dated May 4, I note the following remarks about the Great Boulder Perseverance Gold Mining Company, Ltd., viz.: "It will be remembered that this company nearly came to grief two years ago through the carelessness, or worse, of the old controllers." The first part of the letter referred to explains the situation fully, as follows: "The most interesting point in the report (referring to the report on the Great Fingall Gold Mining Company, Ltd.) is the confession by the managers, Bewick, Moreing & Co., that they cannot give a dependable estimate of the contents of the ore reserves, owing to the irregularity of the deposit and its contents."

As I was in charge of the Great Boulder Perseverance property at the particular time mentioned, I wish to take exception to the above remarks of your correspondent. I am responsible for the report made to the shareholders upon the property in the year 1904, although the sampling and measurements were not made by myself, personally. The tonnage of ore included in the measurement made at that time has been shown to be within the tonnage claimed, but the values were over-estimated. This matter was carefully gone into by a royal commission appointed by the government of Western Australia at the time, to investigate the situation, the results of which commission were published and given to the public. The Great Boulder Perseverance was selected as the one mine for investigation, and the results of this did not turn out as anticipated by those who demanded the investigation. The above company was supposed to be the only one carrying a bullion reserve to even the monthly output, but the royal commission found that nearly every company in Western Australia carried the same bullion reserve and for the same purpose. The above facts, if not familiar to the writer of the letter in question, may be verified if he will refer to the said report of the commission.

Another noticeable fact is that all the annual reports of the principal mines of Western Australia showed a falling off in values similar to that of the Perseverance mine in 1905. This is shown in the publication of reports by the secretary of the Mine Owners' Association of Western Australia. From this report it is clearly shown that the Great Boulder Perseverance Gold Mining Company, Ltd., from the time it started paying dividends until the end of my management, paid a greater percentage of the gross value of gold won in dividends than any other mine in the whole of Western Australia. The mine was taken over after my management by my assistant, whom I recommended for the position, and who carried out the changes in the mill inaugurated by me before leaving. I will state here that after the royal commission had made its report I met the directors and shareholders at an extraordinary general meeting held in London, and was asked by them to return as their general manager at the mine. They held the position (which I agreed to accept) open for me for three months, but, unfortunately, I had personal business in London at the time which I could not neglect, and which interfered with my return and, as before mentioned, my assistant became manager. When a change in management was made about a year ago I was again asked by cable if I would be willing to take charge of the property, so that the insinuation in the letter of your correspondent is entirely without foundation. Now Messrs. Bewick, Moreing & Co., according to the letter referred to, make use of the same remarks as I made in my annual report to the Great Boulder Perseverance shareholders in 1898, as follows: "Owing to the nature and occurrence of the ore, rich lenses of telluride occurring through the vein, it makes it most difficult to accurately determine the value of the reserves."

The cheapening of costs all along the line has been going on since the inception of operations in Western Australia, but it is unfortunate that in getting out costs per ton they are not always reliable, as, in most instances, estimated tonnages are used, as I pointed out to the readers of your JOURNAL in a recent letter on the subject; and, until accurate weighing of ore going to the mills is resorted to, the published results of costs must be more or less unreliable.

The fact should not be lost sight of that the mines of Western Australia are generally well equipped for economic results in mining and treatment of ores, and as those ores become lower in grade, further economies are sure to be put in force that will still further reduce costs; but the method of treatment inaugurated at the Great Boulder, Great Boulder Perseverance, Kalgurli and other mines, of roasting, amalgamation, cyanidation, fine grinding and filter-pressing (or some better method of filtering introduced to replace filter-presses), is the method which will prevail, and any further reduction in costs will probably be along the lines of mechanical handling of the materials, and not in their metallurgical treatment.

What happened to Great Boulder Perseverance also happened to nearly every mine on the Westralian fields, and the grade of ore going to the mills had to be lowered on account of falling off in values generally, and the consequent earnings have fallen off, except where tonnages treated have been materially increased.

RALPH NICHOLS.

Gabriel, Durango, Mexico, May 23, 1907.

[It was far from the intention of our London correspondent to reflect in any way upon Mr. Nichols, whose professional record is too highly esteemed to allow him to be the subject of any insinuation. The reference was simply to the former "control" of the company, as to which there was no imputation that Mr. Nichols was responsible. We are glad to print his interesting letter.—EDITOR.]

Italians as Coal Miners

Recent articles have dealt with the employment of Italians as metal miners, but little has been said concerning their ability as coal miners. In the coal mines of Colorado and New Mexico, the labor is mostly foreign and comprises principally Italians, Hungarians, Slavonians and Japanese. The majority of the miners, however, are Italians. Men of this latter race as a rule make good coal diggers, but are inclined to be reckless in many cases such as not properly supporting the roof in the working places, and not guarding against the fall of coal while mining; they are tractable, however, and easy to manage.

Italian miners seldom get above the position of diggers, for they cannot be depended upon to hold positions requiring a cool head, because of their excitable nature. Their many holidays, or "big Sundays," as they call them, are a constant source of annoyance to the operators, for the simple reason that after one of their holidays they are apt to be unfit for work for several days. After pay-day the production drops off for several days, as the men commonly take that length of time to sober up.

They are not particularly cleanly, as can be readily imagined from the fact that as many as ten persons often live in three

or four rooms. Somehow they seem to prefer living in a tumble-down shack to a modern cottoge. Equip their houses with bath tubs, and they would keep coal in them.

The majority of the Italians marry, and apparently do not believe in race suicide. As soon as their children are of sufficient age to enable them to work in the mines, they are withdrawn from school, and put to work, beginning as trapper boys until they can help their fathers dig coal.

The Italians have no established boarding houses, but hire women to cook for them, they themselves buying the supplies and paying the women to do the cooking. As few try to learn to speak the English language, some system must be devised to handle them on the pay roll; most coal companies use an identification check stamped with the miner's pay-roll number. I have seen them bring a pay or time check on one company to another to be cashed, thinking as long as it calls for money, it is good anywhere.

Notwithstanding all their faults, they make good workmen, and the West, in most cases, is thankful for the Italians.

W. F. MURRAY.

Denver, Colo., May 10, 1907.

Adiabatic Volume Change of Gases

In my "Note on the adiabatic volume-change on mixing two gases," in the JOURNAL of May 18, 1907, I regret to find an error in one of the formulas, which, however, can hardly obscure the meaning to the intelligent reader.

The second expression should be

$$\frac{P}{760} \cdot \frac{273\, d_2}{t_2},$$

not

$$\frac{P}{760} \cdot \frac{273\, d^2}{t^2}.$$

ALFRED J. LOTKA.

Laurel Hill, New York, May 27, 1907.

Furnaces for Roasting Wisconsin Zinc Ores

I have read the article by Frank H. Trego in the JOURNAL of March 30. Evidently he must be in error when he states that an all-steel building of sufficient size to operate a roaster can be built for $1000. In regard to the relative merits of the furnaces which he describes, it is enough to say that none of the roasters built by Mr. Trego at the Mills mine, Square Deal mine, Roosevelt mine and the Platt mine is now in operation.

In contrast note that all of the roasters built by the Galena Iron Works Company are now in successful operation, viz.: Joplin Separator Company, Kennedy Mining Company, Hazel Green Mining Company, Tripoli Mining Company, the Dall Lead and Zinc Company, and several others, while three are under contract and in course of construction at the present time. The Dall Lead and Zinc Company produced a carload of ore on the first run that assayed as follows: 61.8 per cent. zinc, finished product containing 1.2 per cent. iron. The iron tailings from this product assayed only 0.8 per cent. zinc.

C. C. MATHEY.

Galena, Ill., May 3, 1907.

Concentration of Manganese Ore

In the correspondence columns of the JOURNAL of Feb. 9, under the heading, "Manganese Ore in Newfoundland," J. J. Whittle in alluding to the large proportion of silica (17.56 per cent.) contained in the ore, adds: "This I am told can be got rid of and the ore brought up to bessemer standard." This is a most important consideration with many holders of manganese-bearing properties in India who cannot either work or dispose of them on account of high percentage of silica, and owing to the fact of not knowing how to reduce it, and bring the ore to the standard.

INTERESTED.

Calcutta, March 29, 1907.

The following is Mr. Whittle's reply:

I have been informed that silica in manganese ores can be reduced, in the first place by washing thoroughly the ore as soon as it is mined to rid it of all clay and some of the silica, and that a great part of the balance of the silica can afterward be separated by concentration after pulverizing the ore.

J. J. WHITTLE.

New York, May 5, 1907.

Antimony Ore

Being interested in an antimony mine, I beg to inquire if you can give me information as to the market for antimony ore, the names and addresses of concerns which buy it, and the value of the ore.

C. A. H.

Lincoln, Tooele county, Utah, May 14, 1907.

The smelters of antimony in the United States are: Mathison & Co., New York; Chapman Smelting Company, San Francisco, Cal.; C. Solomon, Jr., Oakland, Cal. There are other concerns which buy ore for export, whose names and addresses may be found in the advertising pages of the JOURNAL.

The antimony ore produced in Idaho, Utah, Washington and Nevada in 1906 averaged 60 per cent. antimony, and fetched from $2.25 to $2.50 per unit, f.o.b. cars at the mines. Ore of lower grade is marketable, but much depends upon the cost of transportation. The antimony smelting industry, and the conditions governing it, were fully described in the JOURNAL of Dec. 1, 1906.

The Price of Spelter

The difference between settlement on the London and New York markets is a very important consideration to the American, Mexican or Canadian exporter of zinc ore. Although the London price has been at certain times in excess of the New York price, the average over a long series of years has been lower than the average at either New York or St. Louis. Whenever the London price has been higher, the United States has exported spelter, and the new supply of metal from this source has reduced the London price below the American level. There is no shortage of ore supply available to European smelters. On the contrary not only the ore supply, but also the smelting capacity, are going to be immensely increased by the operations of strong companies owning enormous reserves of ore at Broken Hill, New South Wales, which are already developing their plans. So long therefore as the United States maintains a duty on the importation of spelter, it is to be anticipated that the London price for spelter will continue to average a little lower, in the long run, than the American price. Joplin is still the most important source of supply for American zinc smelters, although since 1901 its relative importance has been diminishing, and probably will continue to do so. However, the Joplin district will doubtless continue to have a dominating influence on the general ore market for a long while to come, and its prices will to a large extent be used as a basis.

Platinum on the Fraser River

SPECIAL CORRESPONDENCE

The provincial mineralogist of British Columbia lately received from Lillooet, on the Fraser river, two ounces of black-sand concentrate containing platinum, which he forwarded to Philadelphia, Penn., where it was sold for $49.50. No information was received as to the source of the sand from which the concentrate was obtained, but it was probably the Fraser river. Heretofore no platinum has been reported as having been found in any other tributary of the Fraser than the Quesnel, which joins the Fraser near Barkerville, Cariboo, about 200 miles north of Lillooet. It is not known to occur about Barkerville, either in the Fraser or its tributaries north of Quesnel; neither has it been reported as having been discovered in streams in the Lillooet district emptying into the Fraser. Failing any other explanation, it would appear that if found in the Fraser, near Lillooet, the platinum was carried down that river from the Quesnel.

New Publications

MAP OF GOLDFIELD, NEVADA, WITH A LIST OF MINING COMPANIES, 1907. 20x25 in.; mounted on cloth. Price for wall map, $1, or folded, 50 cents. Denver, Colo., 1907: Clason Map Company.

THE ENGINEERING INDEX ANNUAL, 1906. Pp. 396; 6½x9½ in.; cloth, $2. New York and London: *The Engineering Magazine.*

The index to engineering literature of all kinds, compiled by the *Enginering Magazine,* has heretofore been published at intervals of five years, Volume IV, the latest, making a bulky book of 1236 pages. With the present volume the plan has been adopted of a yearly issue. This seems to us a much better plan. It makes a much more convenient book to handle, and it brings the information much more directly to the engineer who desires to use it. Five years is a long period in engineering history in these days and covers the publication of a great number of papers, articles and periodicals. Each year adds largely to the list, and to wait for five years until they can be conveniently found is too long. In other words, the five-year volume savors too much of ancient history, and we believe that the profession will appreciate the yearly arangement much more. The index is based upon that published weekly in the *Enginering Magazine* and is classified according to the chief branches of engineering work —civil, marine, mechanical, mining, railroad, etc. The book will find a place on the shelves of many engineers, who want to keep track of current literature on their many-sided profession.

EXAMINATION QUESTIONS FOR CERTIFICATES OF COMPETENCY. By the editors of *Mines and Minerals.* Pp. 568; illustrated. 6x9 in.; cloth, $3.50. Scranton, Penn., 1907: International Textbook Company.

Contents: Surveying. Geology and prospecting. Mine gases. Safety lamps. Inspection and regulation of gaseous mines. Explosives and blasting. Elementary principles and calculations of mine ventilation. Comparison of airways. Splitting air currents. Establishing a circulation of air in mine ventilation. Mine fans. Practical points in mine ventilation. Opening a mine. Method of working coal beds. Coal pillars. Timbering. Steam and steam boilers. Steam engines. Hoisting. Haulage. Hydraulics and pumping. Compressed air. Electricity. Duties of mine officials. Miscellaneous. State regulations governing certificated positions.

The book is not intended to replace textboks on mining, but to be used as a supplement to such textbooks. For this reason only those principles and theories are given that have been asked for by specific questions. The compilation represents the range of subjects and character of questions given in examinations for certificated mine positions in the United States and Canada during the last two years. The position for which the examination was held and the locality are denoted at the end of each question.

The essential purpose of the book is to be of assistance to candidates for the position of mine inspector, mine foreman, mine manager, fire boss, or hoisting engineer, and with this end in view a section called "Suggestions to Candidates" is designed to give practical advice to those who expect to appear before any State examining board. Another chapter in the book gives the regulations of the various States governing certificated mine positions, while in addition to a complete table of contents an elaborate cross index is included. The field covered is broad in scope, and the arrangement and treatment of the subjects are of such character that the book must prove of benefit to those engaged in coal mining.

Nipissing Mines Company

This company has just issued its report covering a period of 11 months, from May 1, 1906, to March 31, 1907. The corporation is a holding company, owning all the stock of the Nipissing Mining Company, Ltd., an Ontario Corporation. The Nipissing Mines Company was originally capitalized at $12,000,000, but only $6,000,000 stock was issued, and the other half is to be canceled. The property consists of large holdings in the Cobalt district in Ontario, which have frequently been described.

The income account of the Nipissing Mines Company for the 11 months is as follows:

Divid'ds on Nipis'ng M'ng Co. stock	$1,000,000
Interest	636
Total receipts	$1,000,636
Administration expenses	$25,059
Dividends paid, 16 per cent	960,000
Total payments	$985,059
Surplus, May 1	$15,577

The report states that the stock of the company is widely distributed, there being over 8000 stockholders on the books.

The account of the Nipissing Mining Company shows that in the 11 months there was mined 1103 tons first-class ore, 1296 tons second-class and 33 tons cobalt ore; a total of 2432 tons. The income account was as follows:

	Amount.	Per Ton.
Ore production	$1,053,299	$433
Interest	8,232	4
Total	$1,061,531	$437
Min'g and other exp'n's	195,436	80
Net earnings	$866,095	$357
Su'pl's from prev's year	624,628	....
Total	$1,490,723	....

Out of this dividends were paid amounting to $1,000,000, leaving a balance of $490,723 at the close of the year.

An appended statement of production for the year 1906 is as follows:

	Tons.	Silver, Oz.	Value.
First-class ore.	986.5	1,320,909	$902,165
Second-class ore	838.0	159,857	109,532
Speiss, etc.	....	.....	12,207
Total	1,824.5	1,480,760	$1,123,904

The average for first-class ore was 1339 oz. silver per ton; of the second-class ore, 193 oz. per ton.

The report of President Samuel Newhouse says, in part: "There is a large area yet unexplored, and to come to any accurate knowledge as to its value it will be necessary to extend operations considerably. Already accommodations for an additional 300 miners are well under way. When completed there will be sufficient room for 600 men. Such a force will permit the prospecting of the unexplored parts of the property, at the same time allowing us to continue the deep mining which is now under way, and the surface work later when the snow is off the ground.

"Experiments looking toward economy in the smelting and refining of ore are now being made, with a view of ascertaining whether it would be profitable to the company to erect its own smelter, but the settlement of this question can only be reached after thorough and definite tests have been made. There has accumulated at the mine a large quantity of low-grade ore, which is not of sufficient value to make it profitable to ship and smelt at present. The board of directors now has under consideration a proposition submitted by a reduction company for the concentrating of these low-grade ores, and will test and experiment with other systems.

"The activity of the surrounding profitable mines, of which the property of the Nipissing Company is the center, has been of much interest. On many of them bonanza veins have been opened up which run into this company's ground.

"During the year there has been improvement in the equipment of the property. New accommodations for the manager and his staff were made; a new office, water works and steam-heating system were installed; a hydraulic plant was set up and operated during the open season, and a new compressor plant was placed in operation. To protect the company more thoroughly and insure economy of operation, sampling works were constructed and should be in operation soon. Shaft-houses, engine-houses and sorting rooms were erected on seven of the veins.

"Since the first of the year the sinking of shafts and crosscutting to determine the depth to which values extend has been pushed forward and the results have shown the advisability of continuing this work."

Personal

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

Washington B. Vanderlip, who has been examing copper properties in Nevada, California and Montana, has returned to New York.

C. W. Purington, mining engineer, of Denver, Colo., left London, May 18, for eastern Siberia, where he is to examine placer deposits. Mrs. Purington accompanied him.

Captain Thomas Pollard, for a long time in charge of the Wolverine mine in the Lake Superior copper country, has resigned that position, to take charge of the Victoria mine.

Leo Gluck has been appointed assistant to the president of the Pittsburg Coal Company. He has been for some time chief engineer of the coal mines of the Chicago, Milwaukee & St. Paul Railroad.

F. F. Sharpless, mining engineer, of New York, left May 25 for the West, where he will be engaged on professional work for six to eight weeks. He will visit Colorado, and also will investigate property in Idaho.

Lewis E. Ashbaugh has resigned his position as associate professor of civil engineering at Iowa State College, Ames, Iowa, and is now engineering assistant in the development of water power to Robert McF. Doble, with office at Colorado Springs, Colorado.

George Sydney Binckley, late chief engineer and manager of construction of the Monterey Water Works and Sewer Company, and the Monterey Railway, Light and Power Company, at Monterey, Mexico, has accepted the position of manager of the mining properties and smelter of the Douglas Copper Company, in the State of Sonora, Mexico.

Francis J. Peck & Co. have opened an office as mining engineers, chemists, assayers and metallurgists, 731 Williamson building, Cleveland, O. Mr. Peck was formerly of the firm of Crowell & Peck, which was recently dissolved without formal succession, Mr. Crowell entering the firm of Crowell & Murray and Mr. Peck entering the firm above mentioned.

Hood McKay, superintendent of Short Mountain and Summit Branch collieries at Lykens and Williamstown, Penn., has tendered his resignation to take effect June 1, to accept a similar position under the Lehigh Coal and Navigation Company, with headquarters at Lansford. Wm. Auman, superintendent of William Penn colliery, Shenandoah, succeeds Mr. McKay, and D. V. Randall, division engineer for the Nanticoke & Glen Lyon Coal Company, takes Mr. Auman's place at William Penn.

Obituary

Wm. M. Cook, of Cullman, Ala., president of the Globe Coal and Coke Company, died suddenly in Chicago, May 13. He had operated extensively in Alabama coal lands.

John A. Walker, vice-president and treasurer of the Joseph Dixon Crucible Company, died at his home, at Jersey City, May 23. He was born in New York city, Sept. 22, 1837, the son of Andrew Walker, a sea captain. He entered the employ of Joseph Dixon & Co. in 1867 as a bookkeeper and accountant and in the following year became secretary of the newly organized crucible company. He was chosen secretary and general manager in 1890 and two years later was elected to the positions he held at the time of his death. To his ability was credited much of the success of the concern. The Joseph Dixon Crucible Company has been for many years the largest producer of graphite in the United States, in connection with which it operates extensive mines in the Adirondack region, New York. Mr. Walker became recognized as the leading authority in the United States upon the mining, preparation and manufacturing of graphite, upon which subjects he made various contributions to the JOURNAL and THE MINERAL INDUSTRY. Mr. Walker was vice-president of the Colonial Life Insurance Company and a director of the New Jersey Title Guaranty and Trust Company. He was appointed a member of the Board of Education by ex-Mayor Gilbert Collins in 1885 and for two terms acted as president of the board. Mayor Mark M. Fagan appointed him to the Board of Free Public Library Trustees in 1902. He resigned the position three years later. He belonged to the Board of Trade, the Union League Club, the Cosmos Club, the Carteret Club, and the Twilight Club of New York city. He leaves a widow.

Societies and Technical Schools

American Institute of Mining Engineers—The Ninety-third meeting of the Institute will be held at Toronto, Canada, beginning on Tuesday afternoon, July 23, 1907. W. G. Miller, Provincial geologist, Bureau of Mines, Toronto, may be addressed as the representative of the local committee in charge of the program and excursions. The following program is provisionally announced, subject to such changes as may be found advisable: Tuesday, July 23—Afternoon, session at the King Edward Hotel; evening, reception in the Parliament buildings. Wednesday, July 24—Morning and afternoon, sessions; evening, departure by special train at 9 p.m. for Cobalt. Thursday, July 25—Visits to mines, and an evening reception in the opera house. Friday, July 26—Additional visits to mines, and optional excursions in the afternoon to points of scenic or scientific interest. Saturday, July 27—Steamboat trip up Lake Temagami, or optional trips to mining districts. Sunday, July 28—To be spent by those who so desire at the hotels at or near the lake. Monday, July 29—Visit to Sudbury, etc., to be continued on Tuesday, the party returning to Toronto by train leaving Sudbury Tuesday night.

Industrial

The Davenport Locomotive Works, Davenport, Ia., has commissioned architects to draw plans for a new foundry to be built on property recently purchased near the present plant. The building will be 104x220 ft., of brick, concrete and steel construction.

At the annual meeting of the stockholders of the Jeffrey Manufacturing Company, Columbus, O., J. A. Jeffrey, R. Grosvenor Hutchins, Robert H. Jeffrey, C. W. Miller and Frederick Shedd were re-elected directors. The board organized by the election of J. A. Jeffrey, president and general manager; R. Grosvenor Hutchins, vice-president and manager of the mining department; Robert H. Jeffrey, vice-president, assistant general manager and purchasing agent, and C. W. Miller, secretary and treasurer.

Trade Catalogs

Receipt is acknowledged of he following trade catalogs and circulars:

Fulton Iron Works, San Francisco, Cal. Catalog No. 106. Machinery for Gold and Silver Milling, Amalgamating, Concentrating. Pp. 94, indexed, illustrated, paper, 7½x10 in.

Brown & Sharpe Manufacturing Company, Providence, R. I. B. & S. Cutters. Pp. 79, illustrated, paper, 3x6 in. B. & S. High-speed Steel Cutters. Pp. 48, illustrated, paper, 3x6 in. New B. & S. Machinists' Tools. Pp. 7, illustrated, paper, 6x9 in.

Construction News

Ophir, Colorado—The Morning Star Mining Company will shortly install compressors and drills, and will utilize a water-power for their operation. The company also comtemplates the erection of a mill before long. H. L. Brown, Ophir, Colo., is superintendent in charge.

Alta, Utah—Regular ore shipments will be inaugurated from the Albion mine before the middle of June. A great deal of high-grade ore has been opened in this property during the past few months. Plans are being discussed for the erection of a mill. William Hatfield, Provo, Utah, is manager.

Special Correspondence from Mining Centers

News of the Industry Reported by Special Representatives at Denver, Salt Lake City, San Francisco and London

REVIEWS OF IMPORTANT EVENTS

San Francisco

May 22—The Los Angeles Chamber of Mines is preparing to coöperate with the Chamber of Commerce, Jobbers Association, and the Merchants and Manufacturers Association in order to make a joint excursion to the new mining camps of southern Nevada to promote closer business relations. This is a similar move to that made some months ago by the San Francisco business men.

The United States Gold Dredging Company has been organized at Redding, Shasta county, by W. D. Egilbert, P. W. Mark and S. D. Farber who are having a dredge built under the patents of G. A. DuBois, of the same place. The machine will operate at Middle creek, a few miles from Redding. This is a suction dredge of larger size than the one now operated by Mr. DuBois at Middle creek.

The new Masonic camp in Mono county is expected now to come to the front rapidly as Geo. S. Nixon and Geo. Wingfield, of Goldfield, Nevada, have purchased for a large sum the principal mine there—the Pittsburg-Liberty. On this mine considerable development has been done within the year and the results have been very favorable. The sellers are J. Phelps, J. M. Bryan, Caleb Dorsey, W. H. Paul and L. G. Campbell.

The Bay Counties Power Company has commenced construction of the line which is to carry electric power from the Rome powerhouse, on the south Yuba river, near Hoyt's crossing, to the Alaska mine near Pike City, Sierra county. The line will be ten miles in length. Previous operations at the mine have been with steam power and the expense was heavy because of the great flow of water to be handled, resulting in the profits being cut to a minimum. This power line will probably be extended to Alleghany and Forest, where there is great activity in mining developments, and need of cheaper power.

The test run of the new electric iron-ore smelter at Heroult, Pitt river, Shasta county, will begin on June 15. The buildings are all completed and the kilns are in readiness. The furnace itself is completed and with the exception of one carload of carbons, which has gone astray en route, all the material is on the ground, and there should be no trouble in turning on the current at the time announced.

Purchasers of the southern Nevada stocks are making trouble for San Francisco brokers by turning back many drafts for payment of stocks ordered by them and repudiating their orders to buy, thus leaving the brokers to cope with the loss as best they may. It may be necessary to institute a black list, so some brokers say. The falling off in the selling prices for mining stocks has led buyers to repudiate their orders. Thousands of dollars have been represented in each of a number of transactions of this sort. The abuse has become so common that the brokers are liable to take some concerted action in their own behalf.

The suits of the 30 or more residents of Benicia and vicinity against the Selby Smelting Company for alleged damages to livestock and crops from the ravages of the poisonous fumes of the big smelter at Vallejo Junction are to be prosecuted in Court unless Ex-District Attorney T. C. Gregory, who has become associated in the handling of the various claims, can compromise matters with the smelting corporation.

Since the closing down of the mines at Angels Camp, Calaveras county, owing to labor troubles, the place is without commercial activity. It is said that under no conditions will the mine operators consent to anything other than the resumption of the mines under the old pay basis, and this the miners as emphatically insist shall never be. The closing of the mines means that $50,000 per month has been put out of circulation, and not only the business men who by thrift and economy, have built for themselves small homes, are seriously contemplating moving to other fields. The non-resident and alien elements are causing the greater part of the trouble. The Utica, Angels and Lightner companies, the largest producers in the camp, say that rumors of compromise are idle talk, and that the mines will not resume except under the old order of wages.

At Grass Valley, the most productive gold-mining camp in the State, while no strike has taken place, the miners have demanded an extra 50c. per day wages. The Mine Operators' Association, and the local miners' union, are trying to settle the matter, but no conclusion has yet been reached. The North Star and the Empire companies could doubtless stand the raise but the other mines of the camp could not well do so, and be worked at a profit. Meantime numbers of miners are leaving for the southern Nevada camps, where wages are higher.

A syndicate of Pasadena men headed by J. Edward Kent, Dr. A. B. Royal, J. D. Klepper, C. E. Chamberlain, H. J. Rowe and Alfred Larsen, has secured control of valuable tungsten deposits in the Ivanpah district, in San Bernardino county, and will proceed at once with the development of their claims, which are within twelve miles of the old town of Ivanpah. Ivanpah was one of the famous silver-producing districts of the early days before the increase in the country's gold production caused a slump in the demand for the white metal.

Salt Lake City

May 24—Stockholders of the Gibraltar Mines Syndicate, operating the Gibraltar mine in the Bullfrog, Nev., district, have received notice of the annual meeting which will be held at Goldfield on June 4. Aside from the election of a new board of directors a resolution will be presented and which will probably be adopted, changing the headquarters of the corporation to Salt Lake City, where a majority of the stock is held.

In Beaver county, there has been a decided improvement, where several new and important producers, are being brought to the front. Among the number may be noted the Talisman, Moscow, Cedar and Commonwealth, all of which are now regular contributors to the Salt Lake ore markets. The Newhouse Mines and Smelters corporation is getting out a larger tonnage.

A special meeting of the shareholders of the Nevada-Utah Mines and Smelters Corporation has been called to meet in Portland, Maine, on June 10, at which time there will be a reorganization of the board of directors. An effort is being made to bring about a coalition, if not a consolidation of this company with the Ohio-Kentucky Mining Company. Both have their principal interests at Pioche, Nevada.

It has been learned that the management of the San Pedro, Los Angeles & Salt Lake will take up the construction of a branch line into the Deep Creek mining district in western Utah, with Ely, Nev., as the probable destination, soon after the completion of the Pioche & Caliente branch.

Shareholders of the Star Consolidated Mining Company, operating in the Tintic district, have accepted a proposition to join interests with the Black Jack Mining Company. If ratified by the shareholders of the latter, the Black Jack will be reorganized and the assets of the Star Consolidated transferred in consideration of a half interest in the capital stock of the new company.

The United States Smelting, Refining and Mining Company's lead and copper smelters have been practically closed for a week on account of labor difficulties. The employees of the plants struck for higher wages. The management is inclined to grant some concessions. The plant of the American Smelting and Refining Company is being operated at capacity again, the difficulty there having been settled.

The machinery of the first unit of the Utah Copper Company's new mill at Garfield is being tried out and the management expects to have the plant in regular commission soon.

Denver

May 24—The trial of an important suit has just commenced in the United States court, that of the Portland Gold Mining Company against the Stratton Independence Company, the former claiming that, since 1904 the Stratton company has trespassed on its property in 15 different places, and abstracted nearly a million dollars' worth of ore.

There are indications that a sale of the Pennsylvania and the Lotus groups of mines in the Russell district of Gilpin county, to a New England syndicate, will be consummated within a few days, involving about $1,500,000. The property covers a large area and extensive development work will probably be undertaken before long.

The El Paso & Southwestern Railway Company, the property of the Phelps-Dodge interests, has acquired about 60 miles of the Chicago, Rock Island & New Mexico Railway, giving a continuous trackage from the Dawson coal mines to Bisbee, Arizona, and it is stated that the output of its northern New Mexico mines will be increased largely.

The Federal grand jury, which is at present in session in this city, is continuing the investigations of the coal and forest land frauds, and the United States attorneys of the affected States are said to be acting under direct orders from the department of justice, in Washington. Interesting developments are expected when the report is made and indictments against very prominent men are probable. The Federal Government expects to regain possession of large areas of forests, which are now held by lumber operators, and of thousands of acres of coal land, obtained by fraud.

Scranton

May 28—At a meeting of the Conciliation Board, held in Wilkes-Barre last week, a grievance was settled without being submitted. It was that of a pumpman employed at one of the Lehigh Coal Company's collieries at Derringer, who claimed that according to the award of the Anthracite Commission, he was entitled to seven shifts a week, and that he was not paid the extra shift. The representative of the mine workers brought the matter up for an informal discussion and it was agreed that there was no necessity for filing a grievance and that it could be taken up with the district superintendent, and satisfactorily adjusted.

Mr. Richards suggested that they should proceed with the Lattimer grievance and that Mr. McElhenny take the miners' side of the case, whereupon he declined, remarking that he did not represent non-union miners. Mr. Richards took exception to this stand, claiming that he represented all the miners whether union men or not. This opens up an interesting argument. The three miners' representatives were appointed to represent the miners at large, but they are officers of the United Mine Workers and there would be trouble of the most serious kind were they to act for the non-union men. At the same time if the non-union men are not represented they are debarred from the benefits of the award of the Anthracite Commission, although represented by counsel before the commission.

No. 2 breaker of the Jermyn Coal Company at Old Forge, near Scranton, was destroyed by fire last week. The colliery employed 800 men, who will be idle until a breaker is built. The other breaker of the company was destroyed by a windstorm six months ago, and has not yet been rebuilt.

The Black Diamond Coal Company, of which T. V. Powderly is president, has sold its colliery in Schuylkill county to Cornelius E. Parker, of Boston, for $34,500. After spending $150,900 in developing the tract of land and building an expensive breaker, it was found that the company was practically penned in by the big tracts owned by the large companies and the stockholders have been glad to sell out at a small fraction of their investment.

The Delaware, Lackawanna & Western Railroad is placing larger cars in the Auchincloss mine. The narrow places in the workings are being widened and the gage is being widened from 30 to 36 inches.

London

May 18—The reports of various copper companies continue to show excellent results. This week the Namaqua and the Tilt Cove companies have issued their reports. The former operates in Cape Colony and the mine adjoins that of the Cape Copper Company, while the latter works in Newfoundland. The ores and matte of both are treated at the works of the Cape Copper Company at Briton ferry, near Swansea.

The Namaqua Company made a profit of close on £100,000 during 1906 and distributed £69,000 as dividend, being at the rate of 35 per cent. on the share capital. The output for the year was 2648 tons of copper. A great deal of the lower-grade ore which gave so much trouble in concentration is now being smelted direct, and an additional furnace is being erected in order to extend this part of the work.

The Tilt Cove mine made a profit during 1906 of £99,340, of which one half goes to the Cape Copper Company for management and smelting. The share holders in the Tilt Cove Company receive the remainder and dividends for the year amounting to 26¼ per cent. were distributed. The Tilt Cove ore contains gold and silver, and 35 per cent. of sulphur, which is utilized in making sulphuric acid at the Cape Company's works. The output of the Tilt Cove mines is not given.

Cable advices are to hand giving the result of the half year's working to March 31 of the Mount Lyell Mining and Railway. Of Mount Lyell ore 140,963 tons were treated and of North Mount Lyell ore 63,035 tons, being a total of 203,998 tons. The average contents were 2.18 per cent. copper, 1.65 oz. of silver and 0.94 dwt. of gold. Metal-bearing fluxes to the extent of 2172 tons and purchased ore to the extent of 571 tons were also treated. The production of blister copper was 3839 tons. The net profit was £264,935, out of which £210,000 was distributed as dividend. The cost of producing the blister copper was 14s. 5d. per ton, being 1s. 5½d. less than in the previous six months. The proposition to take up tin mining and smelting has fallen through owing to the Blue Tier property that was taken on lease having proved to be of too low grade. The chemical business connected with the company has been fairly good, and the demand for superphosphates in South Australia has been so great that the company intends to erect a chemical works at Port Adelaide.

Several properties at Cobalt, Ontario, have been introduced in London recently. One is called England's Premier Cobalt Mining Company, Ltd., a Canadian company located at Toronto. The mine is in the neighborhood of the Nipissing. As far as I can ascertain, no development work has actually been done, but it is stated that the veins of the neighboring mine can be traced over the surface of the Premier property. Another property is the Casey Cobalt mine, which is locally known as the Bucknell mine, and is situated seven miles from New Liskeard, which in its turn is seven miles from Cobalt. Sufficient development is stated to have been done to warrant the expenditure of money on machinery of all sorts. The veins are said to carry cobalt, nickel, silver and bismuth. Neither of these properties is being introduced in London by very influential people, and it is difficult to judge of their actual values.

Mining News from All Parts of the World

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

THE CURRENT HISTORY OF MINING

Alaska

PRINCE OF WALES ISLAND

The Government Alaska road commission decided upon a road between the east and west coasts of this island, the point selected being Chalmondeley portage. Some work was done last season; at present the engineer in charge has a large number of men and horses at work there, and expects to rush it to completion.

Crackerjack—This mine at Hollis is adding a compressor to its mechanical plant.

Hydah—The cars and sheaves have arrived for tramway at this mine and ore shipments to the Hadley smelter will commence immediately.

Niblack Copper Company—This company is sinking an additional 100 ft. down to the 325-ft. level. The expectation is to crosscut from there and develop the ore shoot disclosed on the 225-ft. level.

Rush & Brown—This property, at Karta bay, under the new management of John Rigby, is putting a large force of miners at work. Some 15,000 tons of ore were already broken in the mine, when the company was forced to reorganize. This ore will now be raised, sorted and shipped; 10,000 tons already being contracted for delivery at the Tyee smelter, in British Columbia.

REVILLAGIGEDO ISLAND

A company owning some 20 claims upon Revillagigedo island, and near the town limits has announced that it will soon install a plant of machinery consisting of a 35-h.p. hoist, boiler and compressor. The company expects to do considerable development on several of the prospects this coming season.

Arizona

YAVAPAI COUNTY

Independence Mill—This mill has again resumed after an idleness of over a month on account of the failure of the railroads to deliver supplies.

Peerless Mining Company—This company has been organized during the last week by local people for the purpose of taking over the Peerless group of mines, situated in the Turkey Creek mining district, about 8 miles southwest of the town of Mayer, on the Bradshaw Mountain Railway, a branch of the Santa Fe system. This group of mines has not been worked since about 1889. During the time it was worked the ore shipped had to be hauled by wagon a distance of over 200 miles. The property is developed by a number of shafts, open cuts and holes, covering a distance along the ledge of about 4500 ft. It is the purpose of the new owners to equip the property with modern machinery. C. S. Bottorff is the president of the company and the secretary and treasurer, W. L. Fox.

California

AMADOR COUNTY

Zeila Mining Company—This company at Jackson has closed down its chlorination works and will hereafter ship its sulphurets to the Selby smelter for treatment. Uncertainty of fuel supply is given as the cause of this change.

BUTTE COUNTY

Yukon Gold Company—This company has filed articles of incorporation with the county clerk. The directors of the company are all residents of the State of Maine. They are Joseph Williamson, E. L. McLean, Louis A. Burleigh, Paul Cross, I. E. Chadburne and W. H. Simmons. This is supposed to be a subsidiary Guggenheim corporation, these gentlemen having transferred to it recently certain mining interests at Oroville.

EL DORADO COUNTY

Short Handle—This mine at Spanish Dry Diggings, owned by Lewis Sites, is being equipped with hoisting and pumping apparatus.

INYO COUNTY

Keane Wonder—This property at Keane Springs, on the Death Valley slope of the Funeral range, is showing up a large body of high-grade ore. The company owns 25 claims. Machinery for a 20-stamp mill is on the ground and a cyanide plant is being installed. Homer Wilson is manager, and 25 men are at work.

KERN COUNTY

Greenfield—In this new desert mining section J. Cunningham and T. E. Champion have bonded one of their eight claims to San Francisco men for $17,000.

LASSEN COUNTY

Milford—Developments at this place are satisfactory as at first reported. The claim being worked by McNab and partners has a 3½-ft. vein. which averages $16 per ton in gold.

MARIPOSA COUNTY

Mount Gaines Mining Company—The old quartz mill and the hoist have been moved to No. 8 mine at Hornitos, which is an extension of the famous No. 9. The new 100-stamp mill for the Mount Gaines has arrived at the railway station.

NEVADA COUNTY

Niagara—At this mine men are drifting both ways in the ledge. A hoist is being built and when completed the shaft will be sunk 100 ft. deeper.

Inkmarque—A rich strike in this mine near the North Star mine, Grass valley, is causing great interest in the district. The mine is owned by John Rosenfeld's Sons, of San Francisco, who have been reopening it for the past three years.

Iron Mountain Copper Mine—This property, under bond to E. A. Wiltsee and associates, has been sold to C. L. Wilson, who will put a force of men at work and will soon begin to ship ore. The mine is owned by Taylor Bros., of Grass Valley.

PLACER COUNTY

Three Queens—Another rich strike has been made in this mine in Forest Hill district, owned by Geo. Wingfield, of Goldfield.

SHASTA COUNTY

Great Western Gold Company—It is reported that a large body of ore, carrying gold, silver and copper, has been struck in the Afterthought mine of this company. The second smelter is under construction at Ingot.

SIERRA COUNTY

Mott—This claim, along the old Bald Mountain Extension channel at Forest, is to resume work. It is owned by C. E. Mott and M. Morrison. When this claim is opened, the Copeland claim adjoining will also be again worked.

STANISLAUS COUNTY

Oak Hill—Ore is being hauled from this mine, near La Grange, for shipment to the Selby smelter. A new level is being run at 300 ft. depth.

TULARE COUNTY

Copper—Wm. Carter has commenced shipping copper ore to the smelter from his claim in the foothills east of Lindsay.

TUOLUMNE COUNTY

Montezuma—In this mine, at Table mountain, the new owners will run the tunnel an additional 4000 ft. to cut completely across the ancient gravel channel.

Colorado

LAKE COUNTY—LEADVILLE

Ball Mountain—The sinking of the Sunday shaft has been completed and is now down 450 ft.; the vein opened at this depth is well defined. A drift is being run north to connect with the old shaft. Work has been resumed on the Elma Alva, Tiger, Green mountain.

Breece Hill—The Fanny Rawlins, Big Four, Elk lease, Highland Chief, Penn President, etc., are all shipping from 15 to 30 tons daily of ore.

Cleveland Shaft—New Monarch Mining Company, South Evans gulch. The work of cutting two large stations and installing pumps at the 600-ft. level has been completed, and drifting on the new oreshoot opened in the shaft has been started. The shaft has opened four distinct ore channels.

Coronado—Two hundred tons daily are being shipped from this property and an extensive system of exploration is being carried on to determine the location of the orebody to the west.

Fitzhugh—East Fryer hill. At the 450-ft. level a good body of ore has been opened and 30 tons daily of silicious carbonate ore is being shipped. In the Jimmie Lee, another body of the same character has been opened from which 15 tons are being shipped daily. The silver in this orebody frequently reaches 500 oz. per ton.

Little Jonny—Two or three sets of lessees at work on Nos. 2 and 4 shafts have opened up bodies of copper. The copper runs from 3 to 15 per cent. At the 1300-ft. level of No. 4 shaft copper is found in small streaks running high in gold.

Placer Mining—Lord's ranch, situated below Leadville on the Arkansas river, has been examined by a Chicago capitalist. The river has been turned on the ground to wash off the surface dirt preparatory to installing a dredge to work the gravel.

Indiana

GREENE COUNTY

Linton Bituminous Coal Company—The German American Trust Company, of Indianapolis has been appointed receiver for this company, of Linton. It is said the property of the company, near Linton, is one of the most productive in that territory. It is under lease to the Diamond Coal Company, of Chicago.

VANDERBURG COUNTY

Indiana & Kentucky Fluorspar and Lead Mining Company—This company has been incorporated with headquarters at Evansville. The company proposes to mine lead, fluorspar, zinc and other ores, and construct and operate smelting plants. The business will be conducted in Indiana and Kentucky. M. M. Haas, Harry Watkins and J. S. Beeler are directors.

VIGO COUNTY

Seeleyville Coal and Mining Company—This company has gone into voluntary dissolution. W. W. Ray is president.

SULLIVAN COUNTY

Recent discoveries of coal and gas have brought about a boom in this county, and speculators are buying and leasing land freely.

Sullivan county now leads all other counties in the production of coal. A few years ago only a few carloads were mined, but now the total value of the output is estimated at close to $10,000,000 a year. There are now 40 mines in operation in the county and a number of additional mines will be opened this year. Most of these mines are reached by branch railroads, although some are still "wagon mines."

Kentucky

MUHLENBERG COUNTY

Nelson Creek Coal Company—This new company has bought 1500 acres of land on the Illinois Central Railroad near Nelson, said to contain three distinct veins of coal, two of which are 4 ft. and one 5 ft. thick. It is to install a plant having a capacity of 1000 tons of coal per day, equipped with electrically driven machinery. Officers of the company are R. A. Lytle, president, and John W. Bastin, Nelson, Ky., general manager.

Michigan

HOUGHTON COUNTY—COPPER

Globe—The development shaft being sunk by the Copper Range Consolidated Copper Company on the Globe property has encountered the ledge at a depth of 228 ft.

This eliminates the possibility of the loss of the work of two years; and if good values are found Copper Range will be greatly benefited. The Globe property has been under option from the Stanton interests for about two years.

Hancock—The shaft is now down 100 ft. from the 1000-ft. level, which was the bottom of the old workings. Good copper rock is found at this depth. The hoisting and compressing machinery is beginning to arrive.

Superior—Shaft No. 1 is now down 70 ft below the fifth level and good mill rock is being taken out. Drifting on the fifth level extends 200 ft. in each direction, north and south, and values continue better than in the upper levels. The rock contains about 20 lb. refined copper per ton, but the metal is in a finely divided state with little mass or barrel copper. No sinking is being done in shaft No. 2 below the 200-ft. level on account of considerable water in the shaft. This is being pumped and sinking will soon begin.

Missouri

ZINC-LEAD DISTRICT

Slushman Land—James H. Luke, of Carthage, who is operating on this land, two miles west of Joplin, has disposed of the southeast—10 acres of the lease to J. C. Stineman, Charles J. Burggraff, J. D. and Clyde Wentworth and John S. Wicks, for a consideration of $16,000. This company has been operating on the tract for some time, and has it developed by sinking a shaft on a drill hole, which showed ore from the 150-ft. to the 178-ft. level, and which the shaft proved up. The company will immediately let the contract for the erection of a modern 300-ton concentrating plant.

Nevada

ESMERALDA COUNTY—GOLDFIELD

Goldfield Consolidated Mines Company—George Wingfield, a director, states that this company will probably not pay any dividends during 1907, and no ore will be shipped. The directors propose to build a new reduction plant in Goldfield at a cost of between $600,000 and $700,000, and the mill will have a capacity of from 600 to 1000 tons per day.

Jumbo Extension—The Mohawk-Jumbo Lease Company has struck a bonanza ore shoot at a depth of 400 ft. on the Gold Wedge Fraction claim. Assays of samples of the ore average over $5000 per ton.

Mohawk—This mine has been re-timbered, and the work of straightening the shaft and erecting a new hoist is nearing completion. Regular mining operations will shortly be resumed. A large body of rich shipping ore has been developed. A shipment of 400 tons of ore secured during recent development operations was sent to Salt Lake during the week. This shipment is valued at $30,000.

St. Ives—The shaft is down 300 ft., and a drift is being started to catch the main ledge. The St. Ives Leasing Company is shipping ore averaging between $200 and $500 per ton.

Vernal—A Chicago company has secured a week's option on the holdings of Thomas G. Lockhart in this property. The stock amounts to 350,000 shares, and the optional price is 50c. per share.

NYE COUNTY—BULLFROG

Croesus—The shaft has reached a depth of 170 ft., and although no regular ledge has yet been encountered, the country rock is carrying numerous quartz stringers, which indicate close proximity to a ledge.

Homestake-King—Drifts are being extended at the 400-ft. level, and three shifts of men are running the shaft down to the 800-ft. level as rapidly as possible. Large

ore reserves have been developed in the different levels, and it is expected that the 400-ft. drifts will soon strike the pay-shoots. A new and more powerful hoist is being installed with the view of raising regular ore shipments.

Puritan—This property is situated a little to the north of the famous May-flower mine, and promises to develop into an important ore producer. During this week a ledge carrying ore of milling grade was cut in a tunnel near the surface. At present, it is over 15 ft. in width and appears to be a well-defined orebody.

NYE COUNTY—MANHATTAN

Manhattan Ore Reduction Company—The whole of the machinery for the new mill has arrived, and men are engaged in erecting it. This mill will have a capacity of sixty tons of ore daily, and is to be supplemented with other batteries as occasion demands. Manager Wolf announces that the plant will be in operation by midsummer. Contracts have been closed for the handling of an ore tonnage approximating $300,000 in value, and other and larger contracts are pending. It is estimated that the ore tonnage on the dump and blocked out in the various mine workings of this camp has an aggregate value close to $10,000,000.

Combination—The shaft has been sunk to a depth of 80 ft., and a trial crushing of the ore amounted to 5 tons, made last week at the Chapman-Mushett mill, at Round Mountain, yielded the average return of $1000 per ton. This remarkable return has stimulated the lessees to enlarge the mining force. The shaft will be run to the 200-ft. level with the greatest despatch, and double shifts will start drifts from the 100-ft. level as soon as it is reached.

Thanksgiving—This property continues to yield high-grade ore, and is one of the "show" mines on the field. There is a prospect of litigation with the Mustang Company over the apex of the vein.

NYE COUNTY—TONOPAH

Hasbrouck—After a period of idleness extending over three years, the Hasbrouck Gold Mining Company has resumed mining operations on its property, situated about six miles southwest of Tonopah. A new shaft is being sunk which has now reached a depth of 80 ft. During the past fortnight a shipment of 400 sacks of ore has been made to the smelters. This ore will average $70 per ton.

Jim Butler Annex—A company has been incorporated in Tonopah to develop this property, which comprises three and a half claims situated on the southern boundary of the Jim Butler mine. A two-compartment shaft has been started, and arrangements are being made to secure a 40-h.p. electric hoisting plant.

Midway—A new ledge has been cut in the 800-ft. level at a distance of 520 ft. north of the shaft. It is fully 10 ft. wide and carries ore of milling grade. It is proposed to run drifts on it, both east and west, with the view of developing pay shoots. The ledge is believed to be an extension of the rich Macdonald vein, which has been successfully developed in the Montana-Tonopah mine.

West End Consolidated—Work on the new working shaft has been temporarily suspended at a depth of 100 ft., pending the installation of a new hoisting plant. The old shaft is down 140 ft., and a new crosscut has been started at the 130-ft. level. A shipment of high-grade ore has been despatched to the smelters.

Ore Shipments—Shipments over the Tonopah Railroad for the week ending May 16 were: Tonopah Company, 700 tons; Belmont, 465; Tonopah Extension, 200; Montana-Tonopah, 147; total from Tonopah, 1512 tons. From Goldfield 520 tons were shipped, and from Liberty 16, making a total of 2048 tons. In addition the Tonopah Company sent 2960 tons of ore to its mill.

New Jersey

MORRIS COUNTY

Orchard Mine—This iron mine, which has been idle for more than ten years, is to be reopened by Joseph Wharton, William Phillips, of Hibernia, will be in charge. It is planned to drive a drift from the Hurd mine connecting the workings.

North Carolina

ALEXANDER COUNTY

Mining for gems is being carried on near Hiddenite, with some success.

MACON COUNTY

Franklin Kaolin and Mica Company—This company will erect works at Franklin for preparing mica for market. V. J. E. Fisher is president and general manager.

United States Ruby Company—This company will begin work soon on the ruby deposits of Macon county.

MECKLENBURG COUNTY

What is thought to be a rich gold mine has been discovered on the 43-acre farm of W. H. McQuay, five miles from Charlotte, on the Rozzell's Ferry road. Samples assay well. S. J. Wearn made an inspection of the vein and found it to be 5 ft. wide, running east and west. It is thought to be a branch, if not the main vein, of the Frazier gold mine, which property lies adjacent.

South Carolina

BEAUFORT COUNTY

Tilghman Phosphate Company—This company has been incorporated, with $1,000,000 capital stock, to operate phosphate properties. William B. Chisholm, Charleston, S. C., is president.

South Dakota

CUSTER COUNTY

Ideal—A new Stirling boiler, air compressor, and drills are being installed. The stock is held chiefly by the Van Camps of Indiana.

Niagara—An option has been given on these four claims to John Hazels of Pennsylvania. The consideration is $20,000, the option is to run for one year, and the first payment is due in 90 days.

LAWRENCE COUNTY

Imperial—There is a proposed merger between the Imperial, the Dakota, and the Portland, all in the Bald Mountain district. All companies have been mining and milling ore for from five to twelve years. The Imperial and Dakota each have cyanide plants in Deadwood of 150 and 100 tons capacity each, while the Portland, which has high-grade ore, has been shipping.

Homestake—Flooding of the mine was completed by May 22 and some of the mills will resume operations soon. The 600 stamps in the Desmet, Deadwood-Terra, Caledonia, and Highland will be dropping for the present, while the work ing is confined to surface and upper level ores. Explorations show that the upper workings are practically free from the gas which has been forced up by the great volume of water and has found its way out by the Savage and North End tunnels. The task of unwatering will commence at once, water being hoisted from the Old Abe and Ellison shafts by means of skips.

Golden Flat—For the consideration of $300,000, this company has obtained possession of a group of claims in Two-Bit gulch. This property was formerly part of the holdings of the Redwater Mining Company which has absorbed the Hardin, Two-Bit, Great Northern and other companies. Litigation ensued and the property finally passed into the possession of George G. Yeomans, of Chicago. The majority of stock in the new company is held by Mr. Yeomans and W. L. McLaughlin, of Deadwood.

PENNINGTON COUNTY

Mariposa—A complete steam plant has just been installed to take the place of the gasolene one and work has been resumed on the property. The tunnel, which has penetrated the mountain 600 ft. still has 200 ft. farther to go before encountering the vein sought for.

Burlington—Considerable surface prospecting is being done, with a view to locating contacts and finding other orebodies. A force of men is at work put-

ting the shaft down to the 100-ft. level where crosscutting will begin.

Auburn—The new mill has just been completed and commenced operations. It has a capacity of 100 tons and employs a new method of extraction—a modification of the cyanide.

Tennessee

MAURY COUNTY

Blue Bone Phosphate Company—This company has been organized to develop a phosphate property on the line of the Swan Creek Railroad. W. B. Greenlaw, J. F. Brownlow, F. D. Lander, James A. Smiser and H. A. Webster, of Columbia, Tenn., are directors.

Utah

BEAVER COUNTY

Pine Grove—This company is developing its property by means of a deep tunnel, which has been run 80 ft. and will have to be driven 300 ft. farther before an orebody can be reasonably expected. D. H. Wenger, of Salt Lake, is manager.

Revenue—The compressor plant recently installed at this property in the Pine Grove district has been placed in commission. The new mill will soon be in commission.

JUAB COUNTY

Eureka Railway—This company, which is building a line to connect all the principal mines of the Tintic district with the Tintic smelter, has several grading camps established and will push construction rapidly.

Bullock—This Tintic mine is reporting in the Salt Lake market with regular ore shipments.

SALT LAKE COUNTY

Utah Apex—A statement from the management indicates that this company has 6000 tons of low-grade mill ore in storage and on the dumps, which it has been necessary to remove from the mine to get at that of shipping grade. The completion of the Markham Gulch mill in the camp has given the company facilities of its own for ore treatment.

Markham Gulch Mill—This plant, owned jointly by the Utah Apex and Utah Development companies, will be in operation soon.

Fortuna—This company is constructing a surface tramway which will carry ore from the mine to ore-bins at a convenient point on the Bingham branch of the Rio Grande Western railroad.

Washington

FERRY COUNTY

Bridge Creek Mining Company—This has been organized with 1,500,000 shares, par $1 each. The directors are A. L. Bradley, of Spokane; S. L. Boyer, of Danville, Wash.; Dr. S. H. Arthur, of Scranton, Penn.; G. B. Bardwell, of Belle Plaine, Ia.; F. L. Maynard, of Boone, Ia.; and W. Humphrey, of Carroll, Ia. The company will develop a group of silver-lead claims, on Bridge creek, on the south half of the Colville Indian reservation.

OKANOGAN COUNTY

Bluffton—The tunnel contract is completed, the vein having been encountered on the tunnel level at a depth of about 250 ft. The ore contains iron sulphide and assays in gold and copper.

Standard Copper—Articles of incorporation have been filed. J. W. McBride, James A. Caughren, Patrick Welch, E. Garlinger and Fred N. Freer are the trustees. The company has purchased a group of claims on Copper mountain, in Meyers Creek district. Address Bolster P. O., Washington.

West Virginia

MINGO COUNTY

It is reported that F. H. Evans, of Williamson, has made arrangements to sell a large tract of coal land to a syndicate made up of New York and London parties. C. H. Evans, Chicago, Ill., and Russell Palmer, New York, N. Y., engineers, have made examinations of the property.

Canada

ONTARIO—COBALT DISTRICT

Ore Shipments—Shipments of Cobalt ore for the week ending May 18, were as follows: Coniagas, 171,620 lb.; O'Brien, 170,270 lb.; Temiskaming, 54,500 lb.

Colonial—Operations are being actively carried on on the shore of Cross lake, Cobalt, by a force of 90 men working day and night. Drifting under the lake has been done for 40 ft. at the 100-ft. level. Three tunnels are also being driven into the hillside.

Coniagas—Large shipments have recently been made from this mine, at Cobalt, and a car a day has been ordered from the railroad. In all 1450 ft. of drifting and crosscutting has been done at the 75-ft. level, and six veins are being worked. The building for the concentrator is about completed. It will have a capacity of 100 tons daily, and will handle all ore below 300 oz. to the ton.

Foster—Recent changes in the management and prevalent reports of a disquieting character regarding this mine, at Cobalt, which had a depressing effect on the market generally, have resulted in arrangements by the directorate to have a thorough examination of the property by competent engineers. President John G. Kent and Joseph Oliver, one of the board went to Cobalt this week to take measures for the inspection. The services of Frank C. Loring, consulting engineer, have been secured.

Gould Playfair Gold Camp—A company under this name has been organized to work 14 claims in Playfair township, north of the Hight of Land, staked by Frank Gould. The ore on the surface shows $25 gold to the ton.

Larder Central Goldfields Company—A good calcite vein has been discovered on one of the company's properties, Lemieux lake (near Larder), larger than the surface veins usually found at Cobalt. The ore has copper contents besides silver and gold. The vein runs over a hill rendering it easy to work.

Manhattan Cobalt Company—W. F. Brunne, of New York, has returned after a week's inspection of Larder lake for the company, bringing numerous samples of free gold from various points. On the company's properties situated on the trail to Lemieux lake, a shaft is down 20 ft. on a quartz vein rich in free gold. Another shaft has been sunk 14 ft.

University Mine—A strike was made near the surface at this mine, at Cobalt, on May 23, when a network of pure native silver veins was uncovered. The rock round each vein is broken and loose, indicating that they probably unite to form one large vein.

Africa

RHODESIA

Gold production in April was 49,772 oz. bullion, the largest ever reported for a single month, with the exception of August, 1906. For the four months ended April 30 the total was 169,667 oz. bullion in 1906, and 184,189 oz. in 1907; an increase of 14,522 oz. The bullion reported this year was equal to 163,928 oz. fine gold, or $3,388,392.

Other production reported for the four months included 27 tons copper; 216 tons lead; 50 tons antimony ore; 2 tons wolframite; 15 tons scheelite; chrome ore, 4295 tons; coal, 38,164 tons. Exports of diamonds were 1673 carats; other precious stones, 9907 carats.

WEST AFRICA

Gold production reported for April was 25,927 oz., the largest monthly output yet made. For the four months ended April 30 the total was 70,866 oz. in 1906, and 95,380 oz. in 1907; an increase of 24,514 oz. this year.

Asia

INDIA—MYSORE

Kolar Goldfield—The gold production in April was 44,573 oz. bullion, being 29 oz. less than in March, and 1460 oz. less than in April, 1906. For the four months ended April 30 the total was 196,625 oz. bullion in 1906 and 178,409 oz. in 1907, a decrease of 18,216 oz. The bullion reported this year was equal to 160,568 oz. fine gold, or $3,318,941 in value.

Metal, Mineral, Coal and Stock Markets

Current Prices, Market Conditions and Commercial Statistics of the Metals, Minerals and Mining Stocks

QUOTATIONS FROM IMPORTANT CENTERS

Coal Trade Review

New York, May 29—The coal trade in the West is about in normal condition. The demand for steam coal is good, and railroad conditions are also good, so that coal finds its way to market readily. In fact, there are signs of competition among the different producing districts, which will develop into sharp activity later.

In the East, also, conditions are about normal, and the demand for steam coal is the main feature in both the anthracite and bituminous trades. The coastwise trade is badly hampered by a short supply of vessels, due partly to tying up of carriers by delays in loading, and partly to a demand for boats in other lines more profitable than coal carrying.

It is reported that one or two important combinations in the bituminous coal trade are under negotiation; but it is not possible at present to secure any confirmation or positive denial of these rumors.

Coal-traffic Notes

Shipments of coal and coke originating on the Pennsylvania Railroad Company's lines east of Pittsburg for the year to May 18 were as follows, in short tons:

	1906.	1907.	Changes.
Anthracite.....	1,506,684	2,116,163	I. 609,479
Bituminous.....	12,356,088	14,226,969	I. 1,870,881
Coke.....	4,877,880	5,339,392	I. 461,512
Total.....	18,740,652	21,682,524	I. 2,941,872

The total increase this year was 15.7 per cent.

Shipments of Broad Top coal over the Huntingdon & Broad Top Railroad for the year to May 25 were 411,061 tons.

New York

Anthracite

May 29—The anthracite market conditions have changed very little from last week. The strong demand for small sizes still continues. Car supply is up to all demands and movements continue to be regular.

On June 1 prices on the large sizes will advance 10c. per ton over present quotations which are broken, $4.35; egg, stove and chestnut, $4.60. Small sizes are nominally quoted; pea, $3; buckwheat, $2.50; rice, $1.85; barley, $1.50. All f.o.b. New York harbor.

Bituminous

The Atlantic Seaboard soft-coal trade shows little change from last week, the important question being to move the coal when it arrives at tide. Scarcity of vessels is not relieved and shippers are offering 5c. advance over previous rates in order to secure charters of vessels to arrive. In the meantime orders are accumulating and the business doing is largely on season contracts.

Trade in the far East is fairly active and is determined largely by vessel supply. Stocks are not large, as consumers are not laying in any supply at this season of the year. This has brought about in a few instances outside purchases to keep going.

Trade along the Sound is showing some improvement and vessels are a little more available. New York harbor trade is unchanged. Accumulations at tide are pretty well relieved, giving a more healthy condition of affairs. Good steam coal can be purchased around $2.70 f.o.b. New York harbor ports. All-rail business is very dull and consumers appear to have about all the coal they need.

In the Coastwise trade vessels are in great demand and scarce. Quotations are unchanged as follows: Philadelphia to Boston, Salem and Portland $1@1.05; to Providence, New Bedford and the Sound, 90c.; to Lynn and Bangor, $1.25; to Portsmouth, Gardiner and Saco, $1.15; to Bath, $1.10; with towages where usual.

Birmingham

May 27—Coal operations in Alabama continue active. There is demand for all the coal being produced, and the railroads are giving good service. The production at present is at the rate of 14,500,000 tons per annum. All applicants for work in the coal regions of Alabama are finding jobs ready for them.

Governor Comer has appointed the following board of mine foremen examiners: P. J. Rodgers, Pratt City, and J. F. Beattie, Dora, in behalf of the operators; George Barbour, Pratt City, and T. H. Tinney, Hargrove, in behalf of the miners. The State mine inspector is chairman of the board. Examinations are held at stated periods through the year.

Coke is being manufactured in large quantities in Alabama, and prices are still a little weak.

Chicago

Domestic coals continue to sell largely, because of the cold weather and the consumption of steam coals seems to be materially increased. There is a better tone to the market than usually exists at this time of the year, and contract making is progressing favorably. Sales of all grades of coal are large in volume, but the market is fairly quiet because of the steadiness of the demand. Eastern coals are generally in good condition, the market being neither overstocked nor hampered with irregular receipts. Western coals, while low in price, are not weakening with the approach of summer.

Run-of-mine from Illinois and Indiana mines brings $1.70@2.50; lump and egg for $1.90@2.65 and screenings for $1.25@1.75.

Of eastern coals smokeless is perhaps strongest, run-of-mine being held at $3.35 and prepared sizes at $3.65. Hocking holds up to circular price of $3.15 and Youghiogheny continues at $3.15 for ¾ in., somewhat scarce, though not in heavy demand.

Cleveland

May 28—The coal market is very weak, with small prospects of betterment before July 1. Prices have dropped 10c. on all grades of soft coal. This is due to the fact that only small quantities are being shipped up the lake because of large supplies there. Heavy supplies are being carried here, and dealers are selling in order to avoid demurrage fees. Pittsburg No. 8 slack is quoted $1.60 f.o.b. Cleveland; lump, $1.95; run-of-mine, $1.80@1.85. Goshen steam coal is quoted $1.70@1.75 for run-of-mine and $1.60 for slack.

In the vessel trade it is stated that considerable loading is going on for up-lake delivery. Shipments have been light heretofore, but several large orders have been placed this week, including 50,000 tons for Depot Harbor. Considerable chartering is going on at 30c. to the head of the lakes from Lake Erie ports. Shipments to Lake Michigan ports started the season at 40c., but wild tonnage rates at 50c. soon boosted the regular rate to that figure.

Indianapolis

There is an encouraging tone to the coal-mining industry in this State. Orders are coming quite freely and a number are from dealers and consumers in new territory. The output for April was not up to the corresponding period of last year, but it was satisfactory. The demand for steam coal is growing; the industrial consumer is using a better grade for steam purposes than previously. Orders for run-of-mine are now superseding orders for slack coal. The Northwestern trade will be much stronger this

year than last, and Indiana operators are endeavoring to secure a full share of it.

The resumption of work on the 38 miles necessary to complete the Chicago division of the Southern Indiana Railway will begin June 3. It is the purpose to have the line in operation in 90 days. A large coal traffic will be offered this direct line as soon as put in operation.

A case was settled in the Greene county circuit court, May 24, which was brought by the State of Indiana against the Vandalia Coal Company for violation of the mining law. The Brotherhood of Coal Hoisting Engineers averred that the Vandalia Coal Company was hiring men who did not hold certificates as having passed the engineer's examination, as required by the law. The attorneys for the defense contended that the law was not applicable except during the working hours when the mine was hoisting, from 7 a.m. to 3:30 p.m., and that the service of licensed engineers was required only when the mine was in operation. The test case was made on the arrest of a night engineer employed at Vandalia mine No. 3, near Clinton. The judges' instructions were favorable to the defendant and the jury's verdict was in accord with the instructions.

Pittsburg

May 28—There was a slightly better supply of railroad cars during the week, and today about 90 per cent. of the mines in the district are in operation. A shortage, however, is expected, and the uncertainty of deliveries has had the effect of keeping up prices. Quotations are on a basis of $1.20 for mine-run coal at the mine. Nearly all the coal loaded in the pools and harbor got out on the last rise, and for the first time in the history of the river coal trade there will be but little ready for shipment on the regular June rise. All the river coal mines are being operated to capacity, and there is a good supply of empty coal boats and barges.

Connellsville Coke—The production of coke has been unusually heavy, and as the demand was not up to expectations, prices have declined. Some furnaces are stocking coke and sales of furnace coke this week were made as low as $2 a ton, but $2.15 is regarded as the minimum for early delivery. Foundry coke has dropped to $3, but for delivery in the second half from 25c. to 50c. higher is quoted. The *Courier*, in its summary for the week, gives the production in both regions at 420,732 tons. The shipments aggregated 14,606 cars, distributed as follows: To Pittsburg, 4912 cars; to points west of Connellsville, 8937 cars; to points east of Connellsville, 755 cars.

Foreign Coal Trade

Exports of coal from Newcastle, New South Wales, for the quarter ended March 31 were: Commonwealth of Australia, 457,877; foreign, 465,194; total, 923,071 tons. The exports to the Commonwealth and New Zealand increased 59,910 tons over the first quarter of 1906, and were as follows: Victoria, 204,400; Queensland, 11,355; Western Australia, 28,020; South Australia, 115,967; Tasmania, 24,035; New Zealand, 74,060 tons. The exports, 465,194 tons, to places outside the Commonwealth and New Zealand, show an increase of 101,393 tons, principally to Chile, the Philippines, and the United States.

The coal production of the State of Queensland, Australia, was 529,326 tons in 1905, and 606,772 tons in 1906; an increase of 77,446 tons. The greater part of the 1906 coal production was shipped at Brisbane, either for use in ship's bunkers or as cargo for ports within and, in a very small degree, beyond the Commonwealth.

Iron Trade Review

New York, May 29—Activity in pig iron buying has subsided in some degree, though a good deal of business has been booked, running over into the first quarter of 1908. Southern makers are sold much further ahead than usual, and some large companies are practically out of the market for the balance of this year. Imports of pig iron promise to be considerable for some months.

In finished material the strongest demand seems to be for structural steel. Some large contracts are pending, or have just been closed, while there are many small requirements. Premiums are asked and given in many cases. There is also considerable demand for material for electric roads.

The discussion over the quality of steel rails is still going on, sharply divergent views being expressed on both sides. More investigation seems to be needed.

Cuban Iron Ore—A recent consular report gives the following figures of shipments from the Santiago district in Cuba, in long tons:

	Iron Ore.	Manganese Ore.
1903	557,960	23,610
1094	376,470	20,214
1905	554,200	6,771
1906	636,900	8,300

The increase in iron-ore shipments in 1906, as compared with 1905, was 82,700 tons, or 14.9 per cent.

Baltimore

May 28—Imports for the week included 2723 tons spiegeleisen, 1241 tons ferromanganese and 274 casks ferrosilicon. Arrivals of iron ore were 5600 tons from Cuba and 3950 tons from Greece; 9550 tons in all. One cargo of manganese ore, 5600 tons, was received from India.

Birmingham

May 27—If the demand for pig iron for delivery during the fourth quarter of this year and the first three months in next year continues for a few weeks more as it has been during the last three or four weeks, the manufacturers will be out of the market. There has been steady buying, and the manufacturers are convinced that there will be need for large quantities of iron before present contracts held have been filled. Quotations remain firm. Prices for the first quarter are only about 50c. under those of the iron to be delivered during the fourth quarter in this year. Alabama and Southern manufacturers are not making much more iron than during the past several weeks. Local troubles continue to interfere. The Shelby Iron Company will hardly be able to repair damage done by fire recently at their coke-iron furnace at Shelby within a month. The Tennessee and Alabama Consolidated Coal and Iron companies had troubles at furnaces, but repairs have been made. Much effort is being given to repairs. Labor for this work is rather scarce, and some of the companies are shifting their hands from place to place in order that the furnaces can be got into shape. The railroads continue to handle all the pig iron and kindred products offered easily. The report of the Alabama Car Service Association for the month of April shows an increase of 12,000 in the number of cars handled by the railroads belonging to the association, as compared with April of last year.

Cast-iron pipe and soil-pipe makers report a strong demand with prices up. J. B. Babb, secretary of the Birmingham Commercial Club, is authority for the statement that correspondence is on looking to the removal to the Birmingham district of a large stove plant.

Rolling mills are doing fairly well. The Bessemer plant of the Tennessee company is running short to permit of repairs. The big Birmingham mills will probably also be run on slack operation soon to permit of repairs.

The steel situation continues good. The output is about the same. Talk of sales of steel rails for delivery during 1908 is still giving much encouragement.

Chicago

There are no significant developments in the market for pig iron. Sales continue good on both quick-delivery and future-delivery lots, with perhaps more quick-delivery business. The tone of the market is strong and no weakening seems apparent. Inquiries are large for second-half lots, and iron for the first quarter of 1908 is being freely figured upon. Melters seem to be of the opinion still that prices will weaken through a holding-off policy and are not yet inclined to place orders freely. It is the opinion of the trade that this condition cannot last and that large contracts must be placed within the next month.

The increase in quick-delivery lots is taken to be significant of the fact that

users of iron have business exceeding their contract supplies.

Southern No. 2 remains about $21 Birmingham for delivery in the second half, with quick-delivery lots about $23, making the Chicago prices $25.35 for contract and $27.35 for quick delivery. Northern No. 2 is scarce and is quoted at $25.50 for contract and $27.50 for quick delivery.

Coke is quiet, with the demand good and supplies plentiful. Connellsville 72-hour sells for $6 and Southern coke is 25@50c. lower.

Cleveland

May 28—The iron market continues quiet, with no change from last week. The disposition on the part of buyers is cautious as to purchasing for distant delivery, and as many are well stocked up, demand is slow. Movement of ores down the lakes has been heavy of late and docks are commencing to pile up again. The state of the weather has prevented outgoing shipments, and the outlook is for a heavy accumulation for the summer. Most of the wild tonnage offered by Cleveland fleets is for iron ore. The following rates are quoted by the Gilchrist Transportation Company on iron ore: From Duluth to lower Lake Michigan and Erie ports, 75c. ton; from Marquette, 70c.; from Escanaba, 60c. Rates for wild tonnage are the same, and there will be no difference until fall, when legitimate business will stop. The following prices are quoted on pig iron for last-half delivery: No. 1 foundry, Northern, $24.50; No. 2, $24; No. 3, $23.50; bessemer, $23.90; No. 2 Southern, $24.35; gray forge, $22.50 per ton.

Pittsburg

May 28—Interest in the iron and steel trade this week is centered in the demands for higher wages made by the blast-furnace workers' organization and the Amalgamated Association of Iron, Steel and Tin Workers. Strong efforts will be made by manufacturers to arrange terms and avoid a strike. A suspension of operations at the blast furnaces at this time would prove serious. Included in the demand of the furnacemen is an eight-hour workday. This, producers insist, cannot be conceded for many reasons. The principal one is that it will be impossible to get a sufficient number of men to work a third turn. Notice was served yesterday on the United States Steel Corporation, the Bessemer Pig Iron Association, W. P. Snyder & Co., and other independent interests that the proposed scale must be in force on July 1, or a strike will be ordered.

Pig Iron—The demand for pig iron seems to be increasing, and furnaces are making strenuous efforts to help out some concerns that are in urgent need of iron. The accident last week to Furnace 1 of the Eliza group of the Jones & Laughlin Steel Company, has caused that concern a loss of 500 tons of bessemer pig iron daily, and it is not likely that the damage to the furnace will be repaired inside of two weeks. Inability to supply the loss will affect consumers of finished material. The high price for bessemer iron was reached late last week, when a sale of 500 tons was made at $24, Valley furnaces, for May delivery. For small lots for prompt shipment, however, $25 and as high as $26 has been paid. The minimum price for last half was established yesterday when 1000 tons of bessemer iron was sold at $23.50, Valley furnaces. Some inquiries have been received for bessemer for first quarter of 1908 and the Bessemer Pig Iron Association has named a price of $22; but so far sales for next year are confined to malleable bessemer, and the price is the same as for standard bessemer. A few small lots of No. 2 foundry for prompt delivery sold during the week at prices ranging from $25 to $27, Valley furnaces. Gray forge is strong at $22.85, Pittsburg, but there have been no transactions lately of any consequence. New freight rates on pig iron go into effect on June 1, and the rate from the Valley furnaces to Pittsburg will be increased from 85c. to 90c. a ton.

Steel—There is no improvement in the crude steel supply, and prices are still nominal, bessemer billets being quoted at $31.50, and open-hearth at $33, Pittsburg. The Carnegie Steel Company has fixed the price for sheet-bars for June delivery at $31, an advance of $1 over the rate prevailing since the opening of the year. Steel bars continue strong at 1.60c., and plates at 1.70c.

Sheets—Mills are catching up somewhat on deliveries, but new business is still being placed. For prompt shipment sheets command premiums ranging from $1 to $3 a ton. Prices remain at 2.60c. for black and 3.75c. for galvanized No. 28 gage.

Ferro-Manganese—Despite reports to the contrary, ferro for prompt shipment has not dropped below $68, and a sale was made this week at $68.50 per ton.

Cartagena, Spain

April 27—Messrs. Barrington & Holt report shipments of iron ore for the week: Great Britain, 12,375 tons; Rotterdam, 7150; Philadelphia, 4975; total, 24,500 tons. The mines continue to be fully employed, and one or two new contracts have been made at about the same prices as those previously ruling. There has been a considerable reduction in the amount of tonnage in port.

Quotations for iron ores are: Ordinary 50 per cent. ore, 9s. 9d.@10s. 3d.; low phosphorus, 10s. 9d.; specular ore, 55 per cent., 12s. 6d., all f.o.b. shipping port. For manganiferous ore, same terms, quotations for No. 3—12 per cent. manganese, and 35 iron—are 14s. 6d. No higher grades on the market.

Metal Market

NEW YORK, May 29.

Gold and Silver Exports and Imports

At all United States Ports in April and year

Metal.	Exports.	Imports.	Excess.
Gold:			
Apr. 1907..	$2,201,659	$ 4,928,490	Imp. $2,726,831
" 1906 .	2,485,552	14,941,583	Imp. 12,456,031
Year 1907..	7,904,963	16,575,105	Imp. 8,670,142
" 1906..	22,632,174	25,257,670	Imp. 2,625,496
Silver:			
Apr. 1907..	4,862,998	3,921,484	Exp. 941,514
" 1906..	4,213,687	2,833,859	" 1,379,828
Year 1907..	19,532,394	15,307,010	" 4,225,384
" 1906..	23,379,295	15,510,857	" 7,868,438

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

Gold and Silver Movement, New York

For week ending May 25 and years from Jan 1.

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week.....	$ 4,250	$ 19,518	$ 755,136	$ 6,720
1907.....	1,882,696	5,529,592	15,058,706	749,273
1906.....	5,321,221	43,697,105	25,840,148	826,570
1905.....	32,990,546	5,131,462	12,844,738	1,515,140

Exports of gold for the week were to Brazil; of silver chiefly to London. Imports for the week, both gold and silver, were from the West Indies and South America

The joint statement of all the banks in the New York Clearing House for the week ending May 25 shows loans $1,126,389,500, an increase of $6,129,400; deposits, $1,112,640,500, an increase of $6,539,600, as compared with the previous week. Reserve accounts show:

	1906.	1907.
Specie.....	$180,981,000	$221,189,500
Legal tenders.....	83,896,100	72,659,500
Total cash	$264,877,100	$293,849,000
Surplus.....	$ 6,694,150	$ 15,688,875

The surplus over legal requirements shows an increase of $4,216,200 as compared with the previous week this year.

Specie holdings of the leading banks of the world, May 25, are reported as below, in dollars:

	Gold.	Silver.	Total.
Ass'd New York	.....	.....	$221,189,500
England.....	$175,708,635	.....	175,708,635
France.....	526,600,200	$197,028,800	723,629,000
Germany . .	175,390,000	58,465,000	233,855,000
Spain.....	77,460,000	126,985,000	204,445,000
Netherlands....	26,528,500	27,546,500	54,075,000
Belgium.....	16,176,665	8,088,335	24,265,000
Italy	161,775,000	24,930,000	186,705,000
Russia	579,655,000	30,485,000	610,140,000
Aust.-Hungary.	227,680,000	63,240,000	290,920,000
Sweden.....	20,730,000	.....	20,730,000

The banks of England and Sweden report gold only. The New York banks do not separate gold and silver in their reports. The European statements are from the cables to the *Commercial and Financial Chronicle* of New York.

Shipments of silver from London to the East are reported by Messrs. Pixley & Abell as follows, for the year to May 16:

	1906.	1907.	Changes.
India.....	£ 6,762,203	£5,006,034	D. £ 1,756,169
China.....	.....	.....	.....
Straits..	1,750	426,062	I. 424,312
Total.....	£ 6,763,953	£5,432,096	D. £ 1,331 857

Receipts for the week were £10,000 from the West Indies; £74,000 in bars and £11,800 in Mexican dollars from New York; £194,000 in bars and £51,000 in Mexican dollars from China; a total of £340,800. Exports were £104,562 in coin to the Straits, and £395,700 in bars to India; £500,262 in all.

The position of the exchange market and the taking of $775,000 gold for export to France have led to discussion as to further gold exports. At present such shipments seem quite probable.

The Treasury Department on May 24 bought 100,000 oz. silver for coinage purposes, at 67.446c. per ounce, delivered in Denver.

The movement of gold and silver in Great Britain for the four months ending April 30, is reported as follows:

	1906.	1907.
Gold:		
Imports	£16,102,931	£16,353 862
Exports	12,722,964	10,842,463
Excess, imports	£ 3,379,967	£ 5,511,399
Silver:		
Imports	£ 7,145,703	£ 6,342,720
Exports	7,447,619	6,606,243
Excess, exports	£ 301,916	£ 263,523

Of the imports this year £4,029,306, or 63.5 per cent. of the total, were from the United States.

Prices of Foreign Coins

	Bid.	Asked.
Mexican dollars	$0.52	$0.54
Peruvian soles and Chilean	0.47	0.50
Victoria sovereigns	4.85	4.87
Twenty francs	3.85	3.89
Spanish 25 pesetas	4.78½	4.80

SILVER AND STERLING EXCHANGE.

		Silver.				Silver.	
May.	Sterling Exchange.	New York, Cents.	London, Pence.	May.	Sterling Exchange.	New York, Cents.	London, Pence.
23	4.8650	67	30 7/8	27	4.8670	67⅜	31
24	4.8670	67	30⅞	28	4.8675	67⅜	31⅛
25	4.8675	67	30⅞	29	4.8675	67⅜	31 1/16

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

Other Metals

	Copper.			Tin.	Lead.	Spelter.	
May.	Lake, Cts. per lb.	Electrolytic, Cts. per lb.	London, £ per ton.	Cts. per lb.	Cts. per lb.	New York, Cts. per lb.	St. Louis, Cts. per lb.
23	24¾ @25	23½ @24	102⅝	43¾	6.00	6.35 @6.45	6.20 @6.30
24	24¾ @25	23½ @24	102⅛	43¾	6.00	6.35 @6.45	6.20 @6.30
25	24¾ @25	23¾ @24	.....	43⅛	6.00	6.35 @6.45	6.20 @6.30
27	24½ @25	23¾ @23¾	100⅜	42¼	6.00	6.35 @6.45	6.20 @6.30
28	24⅛ @25	23 @23¾	98¼	41¾	6.00	6.35 @6.45	6.20 @6.30
29	24½ @25	23 @23¾	99⅜	41¾	6.00	6.35 @6.45	6.20 @6.30

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

Copper—The market is in a very unsatisfactory position. The continued absence of inquiry on the part of consumers is becoming rather trying, and a number of sellers have lowered their limit without, however, being able to stimulate business. The reports from Europe indicate a situation not very dissimilar from the conditions in the home market. Quotations at the close are lower, at 24½@25c. for lake copper; 23@23½c., for electrolytic in cakes, wirebars or ingots, and ¼@22½c., for casting copper.

After the demand from the bear element had been satisfied, a sudden sharp drop occurred in the London standard market, from which there was only a slight recovery at the close, which is cabled as £99 7s. 6d. for spot, and £96 17s. 6d. for three months'. For refined and manufactured sorts we quote: English tough, £105; best selected, £109; strong sheets, £116.

Exports of copper from New York for the week were 1150 long tons. Our special correspondent reports exports for the week from Baltimore at 904 long tons copper. The exports from Baltimore also included 44,925 lb. copper sulphate.

Imports of copper into France for the four months ending April 30 were 20,887 metric tons in 1906, and 19,371 in 1907; a decrease of 1516 tons.

Copper Sheets—The base price of copper sheets is 32c. per pound.

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

Tin—Owing to heavy arrivals and an improvement in unloading facilities, the premium for spot delivery is gradually disappearing. A good business is doing from day to day for near-by shipment, but consumers have not yet shown any inclination to cover their future requirements. The market closes unsettled at 41¾c.

The foreign market, after going through a number of gyrations, closes almost unchanged at £189 15s. for spot and £185 15s. for three months.

Lead—The market remains unchanged at 6c. New York.

In Europe, the market is very firm, owing to reports from Australia that mining operations are being considerably curtailed on account of a continued drought. It closes firm at £20 for Spanish and £20 2s. 6d. for English lead.

St. Louis Lead Market—The John Wahl Commission Company reports as follows: Lead is dull and lower. The latest sales are on a basis of 5.87½@5.90c. for Missouri brands.

Spelter—A little more interest is being shown by consumers at around the present level of prices, but the business transacted has not been of such volume that quotations have yet shown much effect from it. The close is unchanged at 6.35@6.45c. New York, and 6.20@6.30c. St. Louis.

A surprising weakness is apparent in the European market, where quotations declined at the close to £24 17s. 6d. for good ordinaries and £25 2s. 6d. for specials.

Zinc Sheets — The base price is now $8.60 per 100 lb. (less discount of 8 per cent.) f.o.b. cars at Lasalle and Peru, in 60-lb. case for gages No. 9 to 22, both inclusive; widths from 32 to 60 in., both inclusive; the lengths from 84 to 96 in., both inclusive. The freight rate to New York is 27.5c. per 100 pounds.

Antimony—The market continues to droop under the absence of any important buying. Quotations are 20c. for Cookson's; 17@17½c. for Hallett's; and 16½@17½c. for ordinaries.

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

Platinum—The market has declined and is in weak condition. Consumption remains normal, apparently not having been stimulated by falling prices. The latest quotations are: Ordinary metal, $27 per oz.; hard metal, $30 per oz. Scrap is $19@20, with light demand.

Quicksilver — Current prices in New York are $41 per flask of 75 lb. for large quantities and $42 for smaller orders. San Francisco orders are $38@39 per flask, according to quantities, for domestic orders, and $37@37.50 for export. The London price is £7 per flask, but £6 16s. 3d. is quoted by jobbers.

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

	Per Lb.
Cadmium, 99.5% f. o. b. Hamburg	1.40@1.46
Chromium, pure (N. Y.)	80c.
Copper, red oxide	50c.
Ferro-Chrome (70)	11½c.
Ferro-Chrome (7-9% carbon, per lb. Cr.)	10½c.
Ferro-Chrome (1% C. for each 10% Cr.)	11@11½c.
Ferro-Chrome (60-64% Cr., 3-4% C.)	12@12½c.
Ferro-Chrome (60-70% Cr., 1% C. or less)	38c.
Ferro-Molybdenum (50%)	90c.
Ferro-Titanium (20%)	80c.
Ferro-Tungsten (37%)	50c.
Ferro-Vanadium (25-50%, per lb. vanadium contents)	$5@10.
Magnesium, pure (N. Y.)	1.50
Manganese, pure 98@99% N. Y.	75c.
Manganese—Copper (30@70%) N. Y.	45c.
Molybdenum (98@99%, N. Y.)	$1.70
Phosphorus, foreign red (f. o. b. N. Y.)	90c.
Phosphorus, American yellow (f. o. b. Niagara Falls)	42c.
Tungsten (best) pound lots	1.35
Ferro-Silicon (50%) spot. Ex. ship Atlantic ports	$110 ton.

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

Missouri Ore Market

Joplin, Mo., May 25—The highest price paid for zinc was $49 per ton, on an assay base price of $45@47 per ton of 60 per cent. zinc, averaging $46.78. The highest price for lead was $83, medium grades selling at $80@82, averaging $79.68 per ton.

The Picher Lead Company and the Granby Mining and Smelting Company stepped quietly into the market and purchased heavily, the bulk of the purchases, however, being for next week's delivery. Prices were advanced from $1 to $2 per ton—whatever it took to get the ore.

Producers asked for advanced prices on zinc ore, on account of the restricted output occasioned by the inundation of the Badger mines, and the curtailing of the output in various mines by removing night shifts. No advance was definitely reported.

Following are the shipments of zinc and lead concentrate for the week ending May 25:

	Zinc, lb.	Lead, lb.	Value.
Webb City-Carterville	3,971,150	992,510	$133,021
Joplin	2,341,210	342,760	69,899
Duenweg	909,850	302,920	33,497
Galena-Empire	1,059,420	194,480	31,949
Alba-Neck City	1,085,000	.....	26,582
Aurora	954,590	8,800	21,180
Granby	442,510	100,000	10,548
Oronogo	384,900	.....	8,287
Prosperity	296,060	33,110	8,281
Spurgeon	305,020	37,730	7,346
Springfield	.....	128,060	5,122
Carthage	184,110	.....	4,510
Sherwood	72,510	30,900	2,976
Wentworth	104,640	.....	2,059
Badger	68 740	.....	1,685
Zincite	62,170	.....	1,492
Stott City	62,430	.....	1,435
Playter	42,300	1,700	1,040
Baxter Springs	44,130	.....	1,015
Diamond	21,200	.....	488
Totals	12,211,940	2,172,970	$372,410
Five months	254,245,520	39,909,880	$7,625,570
Zinc value, the week, $285,736; 5 mos.,			$5,991,197
Lead value, the week, 86,676; 5 mos.,			1,634,373

Average prices for ore in the district, by months, are shown in the following table:

ZINC ORE AT JOPLIN			LEAD ORE AT JOPLIN.		
Month.	1906.	1907.	Month.	1906.	1907.
January	47.38	45.84	January	75.20	83.53
February	47.37	47.11	February	72.83	84.58
March	42.68	48.66	March	73.73	82.75
April	44.63	48.24	April	75.13	79.76
May	40.51	.....	May	78.40	.....
June	43.83	.....	June	80.96	.....
July	43.25	.....	July	74.31	.....
August	43.56	.....	August	75.36	.....
September	42.58	.....	September	79.64	.....
October	41.55	.....	October	79.84	.....
November	44.13	.....	November	81.98	.....
December	43.68	.....	December	81.89	.....
Year	43.24	.....	Year	77.40	.....

Wisconsin Ore Market

Platteville, Wis., May 25—The greater part of the high-grade ores ready were loaded, leaving the lower grades in the bins at the mines. The price of 60 per cent. zinc ore at the beginning of the week did not change from last week's report, but before Friday it had stiffened up somewhat, and ore was selling at $47@50 per ton. Lead sold at $83. Dry bone and sulphur were steady at last week's prices.

The shipment of the district, by camps, for the week ending May 25 is as follows:

Camps.	Zinc ore, lb.	Lead ore, lb.	Sulphur ore, lb.
Platteville	119,930	.....	...
Buncombe-Hazel Green	696,000	.....	.....
Benton	427,100	.....	.....
Linden	264,520	131,980	.....
Rewey	192,000	.....	.....
Harker	131,130	.....	.....
Cuba City	88,900	.....	.....
Galena	69,800	.....	.....
Livingston	62,000	.....	.....
Mineral Point	28,500	.....	.....
Total for week	2,079,880	131,980	.....
Year to May 25	36,731,840	1,695,420	189,160

An entire week of rainy weather held up the shipments of ore a little, but as far as can be learned, the total production of the district was not materially decreased.

Chemicals

New York, May 29—The general market is steady, with good demand for all kinds of heavy chemicals.

Copper Sulphate—The demand continues steady. The quotations remain unchanged, at $7.50 per 100 lb. for carloads or over, and $7.75 per 100 lb. for smaller lots.

Nitrate of Soda—There is no change in the market. The demand continues good and prices remain for spot $2.70 per 100 lb. with 96 per cent. for all positions of 1907 at $2.50. The price for 95 per cent. is $2.45 for both 1907 and 1908. Stocks are extremely low, and spot nitrate is not to be had just now.

Sulphur—Messrs. Emil Fog & Sons write from Messina, Sicily, under date of May 10, as follows: The election of the permanent board of the Consorzio Obligatorio has not taken place yet, and until it has it will be impossible to report on the probabilities of the future tendency of our brimstone market. Everything depends on the men that will be elected, their capacities and intentions. The provisional board has so far pursued absolutely passive tactics. However, the definite board may show a greater spirit of enterprise and adopt more energetic measures, especially with regard to America. The constant rumors of American exports of brimstone to Marseilles and other continental ports, although most probably incorrect, are creating ill-feeling among the Sicilian producers. They held a protest meeting, at which it was proposed that retaliatory measures should be taken; the stock taken over from the Anglo-Sicilian Company should be dumped at cost price on the American markets. Should this policy of retaliation gain the upper hand, we may witness a lively aspect of affairs. Sicilian producers still consider the brilliant reports of the Louisiana mines exaggerated, especially regarding their future prospects, and therefore insist that Mr. Frasch should buy a certain quantity of brimstone annually from Sicily. The secrecy which is preserved concerning the agreement with Mr. Frasch is also a subject of discussion and discontent, as nobody understands why its terms should not be made public.

Mining Stocks

New York, May 29—A weak and uncertain tone has been characteristic of the general stock markets; culminating in sharp breaks at the close, in almost all classes of stocks. The markets are still largely professional, the public holding out, as a rule.

Amalgamated Copper closed at $85¾; American Smelting common at $112¾; United States Steel at $32, with $96 for the preferred.

The mining stocks dealt in on the exchange showed some weakness, in sympathy with the general market. Balaklala Copper closed at $9½; Tennessee Copper at $36, on light dealings.

On the curb market, trading in mining stocks was light, and prices inclined to shade off. The copper stocks were especially weak. Boston copper sold down to $25¾. The Cobalt stocks were more active but weak, Nipissing closing at $11¼. Tonopah stocks held their quotations better than any others.

Boston

May 28—It has been a week of steady liquidation in copper shares, and prices in the main are off from a week back. In a few cases prices are lower than the low recorded in the panic of March 14 last, and from 25 to 50 per cent. below the highest of the current calendar year. This in face of the fact that there has been little change in the price of the metal and some mining companies are still sold up for a month or more ahead. Most of them are stronger in their treasury position than ever. Amagamated tonight is but $4 above its March 14 price, having broken over $5 this week to $84. Calumet & Hecla is $70 below its price of last March and $170 below its $1000 record price early in the year. Calumet directors will meet as soon as President Agassiz returns from the mine, and take dividend action. Calumet & Arizona is at its lowest of the year, $160. The regular quarterly dividend of $5 was declared last week.

Copper Range closed off $2.50 for the week at $78.50. Its lowest this year was $73.50, and its highest $105. Mohawk fell $2 to $83. Its lowest this year was $74, and the highest $96.50. Directors of this company are expected to meet shortly and increase the dividend from $4 to $5. St. Mary's Mineral Land Company has declared a regular quarterly dividend of $1, and the Champion has declared its seventh $1 dividend this year.

Nipissing and Helvetia were the curb features during the week, both showing strength. The former is up $1.50 to $12.25. Helvetia advanced $1.25 to $6.25 on favorable advices from the property. Otherwise curb stocks are weak.

Colorado Springs

Mining stocks on the local exchange have been weak and inactive for some time, and seem to be getting gradually weaker. Occasionally, by a united effort of the brokers, some particular stock will show an advance for a few days, but quickly drops back when another stock is taken up and pushed in the same manner. The market will probably decline until late summer.

STOCK QUOTATIONS

NEW YORK	May 28
Name of Comp.	Clg.
Alaska Mine	....
Am.Nev.M.&P.Co.	....
Amalgamated	83⅞
Anaconda	55
Balaklala	....
British Col. Cop.	8¼
Buffalo Cobalt	....
Butte & London	....
Butte Coalition*	24
Butte Cop. & Zinc	....
Cobalt Contact	....
Colonial Silver	2⅝
Cum. Ely Mining	8⅛
Davis Daly	13
Dominion Cop	6⅛
El Rayo	5⅛
Foster Cobalt	1
Furnace Creek	¾
Giroux Mine	8¾
Gold Hill	1¼
Granby, New	....
Greene Gold	....
Greene G. & S	1½
Greenw'r & D.Val.	....
Guanajuato	3¾
Guggen. Exp.	....
Hanapah	....
McKinley Dar.	1⅛
Micmac	3½
Mines Co. of Am.	1½
Mitchell Mining	3¼
Mont.Sho.C.(New)	8¾
Nev. Utah M. & S.	4⅞
Newhouse M. & S.	....
Nipissing Mines	12
Old Hundred	3
Silver Queen	1¼
Stewart	2
Tennessee Copper	....
Union Copper	⅞
Utah Apex	....
West Columbus	....

N. Y. INDUSTRIAL	
Am. Agri. Chem.	15
Am. Smelt. & Ref.	113¼
Am. Sm. & Ref., pf.	105
Bethlehem Steel	....
Colo. Fuel & Iron	28⅛
Federal M. & S., pf.	83¾
Inter. Salt	....
National Lead	58¼
National Lead, pf.	97½
Pittsburg Coal	....
Republic I. & S.	23½
Republic I. & S., pf.	85
Sloss-Sheffield	53⅛
Standard Oil	...
Tenn. C. & I.	....
U. S. Red. & Ref.	13¾
U. S. Steel	31⅞
U. S. Steel, pf.	97
Va. Car. Chem.	24
Va. I. Coal & Coke	....

ST. LOUIS	May 25	
N. of Com.	High.	Low.
Adams	.40	.25
Am. Nettie	.06	.04
Center Cr'k	2.40	2.15
Cent. C. & C.	67.50	66.25
C.C. & C. pd.	78.50	77.50
Cent. Oil	120.00	100.00
Columbia	5.00	4.50
Con. Coal	26.50	23.00
Doe Run	160.00	140.00
Gra. Bimet.	.27	.20
St. Joe	18.00	16.00

BOSTON	May 28
Name of Comp.	Clg.
Adventure	2½
Allouez	....
Am. Zinc	35
Arcadian	5¾
Atlantic	....
Bingham	16¾
Boston Cop.	25¾
Calumet & Ariz.*	161
Calumet & Hecla*	830
Centennial	....
Con. Mercur	.42
Copper Range	78¾
Daly-West	16½
Franklin	15
Greene—Can. ctfs.	14½
Isle Royal	15¾
La Salle	15
Mass	....
Michigan	12⅝
Mohawk	82
Mont. C. & C.(new)	....
Nevada	13½
North Butte	81½
Old Colony	1
Old Dominion	47¾
Osceola	135
Parrot	20¼
Phoenix	....
Quincy*	115
Rhode Island	5½
Santa Fe	2⅞
Shannon	17⅝
Tamarack*	....
Trinity	20¼
United Cop., com.	58
U. S. Oil	9¾
U. S. Smg. & Ref.	51
U.S.Sm.& Re.,pd *	44
Utah Copper	58½
Victoria	7⅛
Washington	1
Winona	8
Wolverine	153
Wyandotte	1

*Ex. Div. †Ex. Rights.

BOSTON CURB	
Ahmeek	....
Ariz. Com	....
Black Mt.	7¾
Cananea Cent	....
East Butte	10½
Hancock Con.	....
Keweenaw	9
Majestic	3½
Raven	1½
Shawmut	.79
Superior	....
Superior & Pitts.	16¾
Troy Man	1¾

LONDON	May 29		
Name of Com.	Clg.		
Dolores	£1	8s	0d
Stratton'sInd.	0	3	0
Camp Bird	1	2	0
Esperanza	1	18	9
Tomboy	1	17	6
El Oro	1	5	0
Oroville	0	17	0
Somera	1	1	3
Utah Apex	1	8	9
Ariz.Cop.,pfd.	3	0	6
Ariz.Cop.,def.	3	3	0

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

S. FRANCISCO	May 22
Name of Comp.	Clg.
COMSTOCK STOCKS	
Belcher	.22
Best & Belcher	.79
Caledonia	.15
Challar	.09
Con. Cal. & Va.	.92
Crown Point	.18
Exchequer	.32
Gould & Curry	.14
Hale & Norcross	.39
Mexican	.45
Ophir	1.75
Overman	.11
Potosi	.12
Savage	.41
Sierra Nevada	.22
Union	.33
Utah	.01
Yellow Jacket	.75
TONOPAH STOCKS	
Golden Anchor	.24
McNamara	.29
Montana-Pitts.ex	.15
North Star	.28
Rescue	.19
GOLDFI'D STOCKS	
Black Ants	.06
Blue Bull	.28
Columbia Mt.	.49
Comb. Frac.	2.87
Conquerer	.13
Daisy	1.10
Florence	4.20
Frances-Mohawk	.80
Goldfield Con.	5.62
Grandma	.16
Great Bend	.70
Red Hills	.36
St. Ives	.95
BULLFROG STOCKS	
Amethyst	.35
Bonnie Claire	.44
Mayflower Con.	.36
Montgomery Mt.	.17
Original	.11
MANHAT'N STOCKS	
Gold Wedge	.06
Manhattan Mg	.12
Pine Nut	.12
Ruby Wonder	.18
Stray Dog	.15
Yellow Horse	.04

NEVADA (Weir Bros. & Co., New York)	May 29
TONOPAH STOCKS	Clg.
Tono'h Mine of N.	15.25
Tonopah Exten.	2.00
Montana Tonop'h	2.75
Belmont	3.25
Tonopah Midway	1.25
West End Con.	.92
Jim Butler	.88
GOLDFI'D STOCKS	
Sandstorm	.47
Kendall	.28
Red Top	3.00
Jumbo	3.00
Goldfield Mining	1.20
Dia'dfield B. B. C.	.23
Atlanta	.57
Mohawk	13.25
Silver Pick	.53
Laguna	1.20
BULLFROG STOCKS	
Mont. Shoshone C.	8 75
Tramps Con.	.43½
Gold Bar	.65
Bullfrog Mining	.17
Bullfrog Nat. B.	.21
Homestake Con.	...
MANHAT'N STOCKS	
Manhattan Con.	.54
Manhat'n Dexter	.15
Jumping Jack	.13
Stray Dog	16
Indian Camp	12

COLO. SPRINGS	May 29
Name of Comp.	Clg.
Acacia	9⅜
Black Bell	....
C. C. Con	4⅞
Dante	5⅛
Doctor Jack Pot.	7⅜
Elkton	55
El Paso	43½
Findlay	....
Gold Dollar	7⅛
Gold Sovereign	5
Isabella	23⅛
Index	....
Jennie Sample	5½
Jerry Johnson	....
Mary McKinney	55
Pharmacist	....
Portland	1.18
Un. Gold Mines	8¼
Vindicator	80
Work	18½

New Dividends

Company.	Payable.	Rate.	Amt.
Amalgamated Copper	May 27	$2.00	$3,061,758
Am. Smelters Sec., pf., B	June 1	1.25	375,000
Beck Tunnel Con.	.....	0.10	40,000
Butte Coalition	June 26	0.50	500,000
Calumet & Arizona	June 20	5.00	1,000,000
Col. & Hocking C. & I., pf.	July 1	1.50	3,000
Federal M & S.	June 15	5.00	300,000
Federal M & S., pf	June 15	1.75	210,000
Lehigh Coal & Nav.	May 27	2.00	395,110
Mexico Con. Mg. & Sm.	May 25	0.50	120,000
National Lead	July 1	1.25	186,318
National Lead, pfd.	June 15	1.75	261,820
North Butte	June 10	2.00	800,000
N. Y. & Hon. Rosario	May 25	0.10	15,000
Quincy, Mich.	June 10	4.50	93,750
Sloss-Sheffield S. & I.	.....	1.25	8,730,000
Standard Oil	June 15	9.00	495,000
U.S. Cast Iron Pipe & Fdy.	June 1	1.00	150,000
U.S. C. I. Pipe & Fdy, pfd.	June 1	1.75	262,500
U. S. Steel Corp.	July 1	0.50	2,541,513
U. S. Steel Corp., pf.	May 31	1.75	6,304,919
U. S. Cast Iron Pipe & Fdy.	June 1	1.00	125,000
U. S. C. I. Pipe & Fdy., pfd.	June 1	1.75	218,375
U. S. Reduction & Ref., pfd.	July 1	1.50	59,187
Utah (Fish Springs)	.....	0.03	3,000

Assessments

Company.	Delinq.	Sale.	Amt.
Benson,Cal.	June 9	June 29	$0.10
Bullion, Nev.	June 10	July 2	0.05
Con. Imperial, Nev.	May 7	May 29	0.01
Little Chief, Utah	May 14	May 30	0.01
Lyon, Utah	May 13	June 3	0.02
Lost Packer, Idaho	May 6	May 27	1.00
Lucky Dutch'n, Nev.	May 4	May 25	0.01
Mabel Gravel, Cal.	June 3	June 25	0.10
N. Y. Bonanza, Utah	May 11	May 31	0.03
Overman, Nev.	May 17	June 7	0.10
Potosi, Nev.	May 13	June 5	0.10
St. Joe, Utah	June 13	July 3	0.02
Sierra Nevada	May 28	June 18	0.10
Union Con., Nev	May 8	May 29	0.10
Utah, Nev.	May 27	June 17	0.05
Wabash, Utah	May 11	June 3	0.05

Monthly Average Prices of Metals

AVERAGE PRICE OF SILVER

Month.	New York.		London.	
	1906.	1907.	1906.	1907.
January	65.288	68.673	30.113	31.769
February	66.108	68.835	30.464	31.852
March	64.597	67.519	29.854	31.325
April	64.765	65.462	29.984	30.253
May	66.976	.....	30.968	.....
June	65.394	.....	30.185	.....
July	65.105	.....	30.113	.....
August	65.949	.....	30.529	.....
September	67.927	.....	31.483	.....
October	69.523	.....	32.148	.....
November	70.813	.....	32.671	.....
December	69.050	.....	32.003	.....
Year	66.791	.....	30.868	.....

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

AVERAGE PRICES OF COPPER

	NEW YORK.				LONDON.	
	Electrolytic		Lake.			
	1906.	1907.	1906.	1907.	1906.	1907.
January	18.310	24.404	18.419	24.825	78.869	106.739
February	17.869	24.869	18.116	25.236	78.147	107.354
March	18.361	25.065	18.641	25.560	81.111	106.594
April	18.375	24.224	18.688	25.260	84.793	98.625
May	18.475	.....	18.724	.....	84.867	.....
June	18.442	.....	18.719	.....	83.994	.....
July	18.190	.....	18.585	.....	81.167	.....
August	18.380	.....	18.706	.....	83.864	.....
September	19.033	.....	19.328	.....	87.831	.....
October	21.203	.....	21.722	.....	97.269	.....
November	21.833	.....	22.398	.....	100.270	.....
December	22.885	.....	23.850	.....	105.226	.....
Year	19.278	.....	19.616	.....	87.282	.....

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

AVERAGE PRICE OF TIN AT NEW YORK

Month.	1906.	1907.	Month.	1906.	1907.
January	36.390	41.548	July	37.275	.....
February	36.403	42.102	August	40.606	.....
March	36.662	41.313	September	40.516	.....
April	38.900	40.938	October	42.852	.....
May	43.313	.....	November	42.906	.....
June	39.260	.....	December	42.750	.....
			Av. year	39.819	.....

Prices are in cents per pound.

AVERAGE PRICE OF LEAD

Month.	New York.		London.	
	1906.	1907.	1906.	1907.
January	5.600	6.000	16.850	19.828
February	5.464	6.000	16.031	19.531
March	5.350	6.000	15.922	19.703
April	5.404	6.000	15.959	19.975
May	5.685	.....	16.725	.....
June	5.750	.....	16.813	.....
July	5.750	.....	16.525	.....
August	5.750	.....	17.109	.....
September	5.750	.....	18.266	.....
October	5.750	.....	19.350	.....
November	5.750	.....	19.281	.....
December	5.900	.....	19.609	.....
Year	5.657	.....	17.370	.....

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

AVERAGE PRICE OF SPELTER

Month.	New York.		St. Louis.		London.	
	1906.	1907.	1906.	1907.	1906.	1907.
January	6.487	6.732	6.337	6.582	28.225	27.125
February	6.075	6.814	5.924	6.664	25.844	25.938
March	6.209	6.837	6.056	6.687	24.563	26.094
April	6.078	6.685	5.931	6.535	25.781	25.900
May	5.997	.....	5.846	.....	27.000	.....
June	6.096	.....	5.948	.....	27.728	.....
July	6.006	.....	5.856	.....	26.800	.....
August	6.027	.....	5.878	.....	26.938	.....
September	6.216	.....	6.056	.....	27.563	.....
October	6.222	.....	6.070	.....	28.075	.....
November	6.375	.....	6.225	.....	27.781	.....
December	6.593	.....	6.443	.....	27.938	.....
Year	6.198	.....	6.048	.....	27.020	.....

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

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

ABRASIVES—		
Bort, good drill quality, carat		$85.00
Carborundum, f.o.b. Niagara Falls, powd	lb.	.08
Grains	"	.10@.17
Corundum	"	.07@.10
Crushed Steel, f.o.b. Pittsburg	"	.05¾@.06
Emery, in kegs: Turkish flour	"	.01⅞@.02½
Grains	"	.03½@.04½
Naxos flour	"	.01½@.02½
Grains	"	.03½@.04½
Chester flour	"	.01⅞
Grains	"	.03½@.04½
Peekskill, f.o.b. Easton, Pa., flour	"	.01½@.01½
Grains, in kegs	"	.02½@.02½
Garnet, per quality	sh ton	25.00@35.00
Pumice Stone, Am. Powd.	100 lb.	1.60@2.00
Italian, powdered	"	.01¾@.01½
Lump, per quality	"	.03@.20
Rottenstone, ground	"	.02½@.04½
Lump, per quality	"	.05@.25
Rouge, per quality	"	.05@.30
Steel Emery, f.o.b. Pittsburg	"	.07¼@.07¾
ACIDS—		
Acetic 28%	lb.	.02¼@.02½
Boric	"	.09¾@.10
Hydrofluoric, 30%	"	.02¾@.03
" 48%	"	.06
" 60%	"	.10
Hydrochloric acid, 20°, per lb		1.25@1.50
Nitric acid, 38°	per lb.	4.25@4.62½c.
Sulphuric acid, 50°, bulk, per ton		$12 up.
60°, 100 lb. in carboys		.85@1.12½
60°, bulk, ton		16.00@18.00
66°, 100 lb. in carboys		1.00@1.25
66°, bulk, ton		18.00@20.00
Oxalic	"	.08½@.09
ALCOHOL—Grain	gal.	2.46¼
Refined wood, 95@97%	"	.70@.75
ALUM—Lump	100 lb.	$1.75
Ground	"	1.85
Chrome Alum	lb.	.04¼
ALUMINUM—Sulphate, com'l.	"	1.25@1.60
AMMONIA—24 deg.	lb.	.04½@.05½
" 26 "	"	.04¾@.05¾
AMMONIUM—		
Bromide	lb.	.23
Carbonate	"	.07¾@.08
Muriate grain	"	.06¼@.06¾
Lump	"	.09½@.09¾
Sulphate, 100 lb		3.05@3.10
Sulphocyanide com	"	.30
" " chem. pure	"	.40
ANTIMONY—needle, lump	lb.	.12½@.13
ARSENIC—White (nominal)	"	.07¼@.07¾
Red	"	.07½@.07⅝
ASPHALTUM—		
Barbadoes	per ton.	40.00@80.00
West Indies	"	20.00@60.00
Egyptian	lb.	.14@.18
Gilsonite, Utah ordinary	per ton.	50.00
Trinidad	"	30.00@40.00
California	"	20.00@35.00
BARIUM—		
Carb. Lump, 80@90%	lg. ton.	30.00@35.00
Powdered, 80@90%	lb.	.02@.02½
Chloride com'l	ton.	37.50@40.00
Nitrate, powdered, in casks	lb.	.05½@.06
Sulphate (Blano Fixe)	"	.02¼
BARYTES—		
Am. Ground	sh. ton.	16.00@21.00
Floated	"	22.00
Foreign floated	"	19.50@22.50
BISMUTH—Sub-nitrate	lb.	1.50
BLEACHING POWDER—35%,	100 lb.	1.25@1.40
BLUE VITRIOL—(copper sulphate), carload, per 100 lb		7.50@7.75
BONE ASH	lb.	.02½@.04
BORAX	"	.07½@.08
CALCIUM—Acetate, gray	"	2.35@2.40
Acetate, brown	"	1.60@1.65
Carbide, ton lots f.o.b. Niagara Falls, N. Y., for Jersey City, N. J.	sh. ton.	65.00
Chloride, f.o.b. N. Y.	"	16.00@18.00
CEMENT—		
Portland, Am. 500 lb.	bbl.	1.55@1.60
Foreign	"	2.25@2.90
"Rosendale," 300 lb.	"	.85
(in sacks)		.65
Slag cement	"	.75@1.25
CHROME ORE—		
New Caledonia 50% ex. ship N. Y.	per lg. ton	17.50@20.00
Bricks, f.o.b. Pittsburg, M.	"	175.00
CLAY, CHINA—Am. common ex-dock, N. Y.	"	9.00@12.00
Foreign	"	11.50@17.50
COBALT—Oxide	lb.	2.50
COPPERAS—Bulk	100 lb.	$0.55
In bbls	"	.65@.75
In bags	"	.60@.70
CRYOLITE	lb.	.06½@.06¾
FELDSPAR—Ground best	sh. ton.	7.00@15.00
FIRE BRICK.		
American	per M.	30.00@40.00
Imported	"	26.00@45.00
St. Louis No. 1	"	16.00
" No. 2	"	14.00
Extra	"	20.00@23.00
FIRE CLAY.		
St. Louis mill, dom	per ton	2.50
FLUORSPAR—		
Domestic f.o.b. shipping port:		
Lump	lg. ton.	8.00@10.00
Ground	"	11.50@13.50
Gravel	"	4.25@4.50
Foreign crude ex. dock		8.00@10.00
FULLER'S EARTH—Lump	100 lb.	.80@.85
Powdered	"	.90@1.05
GRAPHITE—		
American, ore, common	lb.	.01@.10
Artificial	"	.06
Ceylon, common pulv	"	.02½@.03½
Best, pulverized	"	.04@.08
German, com. pulv	"	.01½@.01½
Best, pulverized	"	.01½@.02
Italian, pulverized	"	.01@.02
GYPSUM—		
Fertilizer	sh. ton.	7.00
Powdered	sh. ton.	10.00
INFUSORIAL EARTH—		
Ground Am. best	lb.	.01¾
French	lg. ton.	56.00
German	lb.	.02½@.02¾
LEAD—Acetate (sugar of) brown	lb.	.07¾
Nitrate, com'l	"	.08½@.09
MAGNESITE—Greece.		
Crude (95%)	lg. ton.	7.00@8.00
Calcined, powdered	sh. ton.	30.00@40.00
Bricks, domes, per qual. f.o.b. Pittsburg	M.	160@200
MAGNESIUM—		
Chloride, com'l	100 lb.	.80@1.15
Sulphate (Epsom salt)	100 lb.	.85@1.15
MANGANESE—		
Crude powdered:		
70@75% binoxide	lb.	.03
75@85% binoxide	"	.03½
85@90% binoxide	"	.05
90@95% binoxide	"	.06½
Ore, 80%-85%	sh. ton.	35.00@45 00
MARBLE—Flour	sh. ton.	9.50@10.00
MINERAL WOOL—		
Slag, ordinary	"	19.00
Selected	"	25.00
Rock, ordinary	"	32.00
Selected	"	40.00
MONAZITE SAND—		
Guar. 97%, with 5% Thorium oxide, nominal	lb.	.08 and up.
NICKEL—		
Oxide, crude, lb. (77%) for fine metal contained		.47
Sulphate, single	lb.	.13@.18
" double	"	.09@.13
NITRATE OF SODA—100 lb. 96% for 1907		2.50
95% for 1908		2.45
95% for 1909		2.40
96% is 5c higher per 100 lb.		
OZOKERITE—best	lb.	.14@.17
PAINTS AND COLORS—		
Litharge, Am. powdered	"	.07½@.07¾
English glassmakers'	"	.08½@.08¾
Lithopone	"	.03½@.07
Metallic, brown	sh. ton.	16.50@22.00
Red	"	16.00
Ocher, Am. common	"	8.50@9.00
Best	"	16.00
Dutch, washed	lb.	.02½@.03
French, washed	"	.01¾@.02½
Paris green, pure, bulk	"	.26
Red lead, American	"	.07½@.07¾
Foreign	"	.08½@.08¾
Turpentine, spirits bbl., per gal.		.64@.65
White lead, Am., dry	lb.	.06½@.07
American, in oil	"	.07½@.07½
Foreign, in oil	"	.09¾@.10
Zinc white, Am. extra dry	"	.05½@.05½
Foreign, red seal, dry	"	.07½@.07¾
Green seal, dry	"	.08@.08½
PHOSPHATES—Acid	.65@67½c	per unit
*Fla., hard rock		7.50
land pebble 68%		4.50
†Tenn., 78@80%		6.50@7.00
78%		5.50
75%		5.00
68@72%		4.50
‡So. Car. land rock		6.00
" " river rock		....
POTASSIUM—		
Bicarbonate crystal	lb.	$0.8½@.09
Powdered or granulated	"	.09@.09½
Bichromate, Am	"	.08½@.08¾
Scotch	"	.11
Bromide	"	.16
Carbonate (80@85%)	"	.03⅞@.04
Caustic, ordinary	"	.04½@.05½
Elect. (90%)	"	.05½
Chloride (muriate), 100 lb.		1.90
Chlorate, powdered	"	.09½@.09½
Crystals	"	09@09½
Cyanide (98@99%)	"	.18@.19
Kainite, long ton, bulk, 8.50; bags, 9.50.		
Permanganate	lb.	10@10½
Prussiate, yellow	"	.16@.16½
Red	"	.33@.38
Sulphate	100 lb.	2.18½@2.21½
PYRITE—		
Domestic, non-arsenical, furnace size, f.o.b. mines	per unit	11@11½c
Domestic, non-arsenical, fines, per unit, f.o.b. mines		10@10½c.
Imported non-arsenical, furnace size, per unit		.13@.13½
Imported, arsenical, furnace size, per unit		12@12½c.
Imported fines, arsenical, per unit.		.8½@9c.
" " non-arsenical, per unit		10½@11c.

Pyrite prices are per unit of sulphur. An allowance of 25c. per ton is made when delivered in lump form.

SALT—N. Y. com. fine 280 lb.	bbl.	.72@1.18
N. Y. agricultural	sh. ton.	3@4.40
SALTPETER—Crude	100 lb.	3.75@4.00
Refined, crystals	"	5.25@5.75
SILICA—		
Ground quartz, ord'ry	lg. ton	13.00@15.00
Silex	"	13.00@30.00
Lump Quartz	"	2.50@4.00
Glass sand	"	2.75
SILVER—Nitrate, crystals	oz.	.43⅛@.45⅛
SODIUM—		
Acetate	lb.	.04@.04¼
"Alkali," per 100 lb., 58/48		.80@.87½
Bicarb. soda, per 100 lb		1.20@1.50c.
Soda, caustic, per 100 lb., 76/60		1.80@1.90
" " powdered		.02¾@.03½
Salt cake, per 100 lb		.65@.85
Soda, monohydrate, per lb		1¼c.
Bichromate	lb.	.06⅛@.06¾
Bromide	"	.16
Chlorate, com'l	"	.08½@.09
Cyanide, ("100% KCN")	"	.18@.19
Hyposulphite, Am	"	1.35 up
German	"	1.60@1.70
Phosphate	100 lb.	1.80@1.90
Prussiate	"	.10½@.11½
Sal soda, f.o.b. N. Y	100 lb.	.70@.75
Foreign, f.o.b. N. Y.	"	.80@1.00
Silicate, com'l	100 lb.	.75@1.15
Sulphate, com'l, (Glauber's salt)	100 lb.	.45@.50
" " calcined		.01@.01½
STRONTIUM—Nitrate	lb.	.08½@.08¾
SULPHUR—		
Louisiana (prime) to New York, Boston or Portland	lg. ton	22.12½
To Philadelphia or Baltimore	"	22.50
Roll	100 lb.	1.85@2.15
Flour	" "	2.00@2.40
Flowers, sublimed	" "	2.20@2.60
TERRA ALBA—French & Eng.	100 lb.	.90@1.00
TALC—Domestic	sh. ton.	15.00@25.00
French	"	16.00@25.00
Italian, best	"	35.00@40.00
TIN—Bi-chloride, 50%	lb.	.12½ up
Crystals	"	.25¾ up
Oxide, lb		.46@.49
URANIUM—Oxide	"	3.50
ZINC—Metallic ch. pure	"	.15
Chloride solution, com'l	"	.02½@.04
Chloride, granular	"	.04½@.05
Dust	"	.05½@.06½
Sulphate	"	.02½@.02¾

Note—These quotations are for wholesale lots in New York, unless otherwise specified, and are generally subject to the usual trade discounts. Readers of THE ENGINEERING AND MINING JOURNAL are requested to report any corrections needed, or to suggest additions which they may consider advisable.

*F. o. b. Florida or Georgia ports. †F. o. b. Mt. Pleasant. ‡On vessel Ashley River, S. C.

DIVIDENDS.

Metal and Mining Companies—U. S.

Name of Company and Location.		Author-ized Capital	Shares. Issued.	Par Val.	Dividends. Total to Date.	Latest. Date.	Amt.
Alaska Mexican, g.	Al'ka	$1,000,000	180,000	$ 5	$1,572,381	Jan. 1907	$ .50
Alaska Treadwell, g.	Al'ka	5,000,000	200,000	25	9,235,000	Jan. 1907	1.00
Alaska United, g.	Al'ka	1,000,000	180,200	5	306,340	Jan. 1907	0.30
Amalgamated, c.	Mont	155,000,000	1,530,879	100	50,584,788	May 1907	2.00
Am.Sm.&Ref.,con.	U. S.	50,000,000	500,000	100	9,625,000	Apr. 1907	1.75
Am. Sm. & Ref. pf.	U. S.	50,000,000	500,000	100	23,588,053	Apr. 1907	1.75
Am. Smelters, pf. A	U. S.	17,000,000	170,000	100	1,430,000	Mar. 1907	1.50
Am. Smelters. pf. B	U. S.	30,000,000	300,000	100	3,000,000	June 1907	1.25
Anaconda, c	Mont	30,000,000	1,200,000	25	34,850,000	Apr. 1907	1.75
Annie Laurie, g.	Utah	5,000,000	25,000	100	465,061	July 1905	.50
Arizona, c	Ariz	3,775,000	3,682,520	....	6,182,361	Apr. 1906	.05
Atlantic, c	Mich	2,500,000	100,000	25	990,000	Feb. 1905	.02
B. & H., l. z.	Mo	400,000	400,000	1	40,000	Dec. 1905	.01
Beck Tunnel, g.s.l.	Utah	100,000	1,000,000	0.10	535,000	 1907	.10
Bingham & N.H.,c.g	Utah	2,000,000	226,000	5	22,600	Sept. 1906	.10
Boston & Montana.	Mont	3,750,000	150,000	25	47,875,000	Nov. 1906	12.00
Bull.Beck.&Cham.g	Utah	1,000,000	100,000	10	2,558,400	Apr. 1907	.10
Bunker Hill & Sull.	Ida	3,000,000	300,000	10	8,766,000	May 1907	.60
Butte Coalition,c.s.	Mont	15,000,000	1,000,000	15	1,800,000	June 1907	.50
Calumet & Arizonac	Ariz	2,500,000	200,000	10	7,000,000	Mar. 1907	5.00
Calumet & Hecla,c.	Mich	2,500,000	100,000	25	101,400,000	Mar. 1907	20.00
Camp Bird, g., s.	Colo	5,500,000	820,000	5	3,784,300	Apr. 1907	.24
Carisa, c.g.	Utah	500,000	500,000	1	55,000	Nov. 1906	.01
Central Eureka, g.	Cal	400,000	398,425	1	778,921	Mar. 1906	.07
Columbus Con. c.	Utah	1,500,000	300,000	5	105,000	Apr. 1907	.20
Combi'tion Co.G'f'd	Nevada	400,000	320,000	1	688,000	Sept. 1906	.15
Con. Mercur, g.	Utah	1,000,000	1,000,000	1	1,205,000	Dec. 1906	.02½
Continental, z. l.	Mo	550,000	22,000	25	187,000	Jan. 1907	.50
Copper Range Con.	Mich	38,500,000	383,781	100	4,558,896	Apr. 1907	2.00
Creede United, g.	Colo	2,000,000	1,625,000	1	214 053	July 1906	.00½
Cripple Creek Con.g	Colo	2,000,000	2,000,000	1	180,000	Mar. 1905	.00½
Daly Judge, g. s. l.	Utah	300,000	300,000	1	225,000	Apr. 1907	.37½
Daly West, g. s. l.	Utah	3,600,000	180,000	20	5,607,000	Mar. 1907	.60
De Lamar, g. s.	Ida	400,000	67,180	5	2,926,370	May 1905	.72
Dillon, g.	Colo	1,250,000	1,250,000	1	21,875	July 1905	.01
Doctor Jack Pot.	Colo	3,000,000	3,000,000	1	268,000	July 1906	.00½
Doe Run, l.	Mo	10,000,000	59,062	100	1,287,382	May 1907	.50
Elkton Con., g.	Colo	3,000,000	2,500,000	1	1,841,960	Feb. 1907	.01½
El Paso, g.	Colo	2,500,000	2,450,000	1	1,022,750	June 1906	.01
Fed. Sm., con.	Idaho	10,000,000	60,000	100	2,048,750	Mar. 1907	5.00
Federal Sm., pf.	Idaho	20,000,000	120,000	100	2,651,250	Mar. 1907	1.75
Findley, g.	Colo	1,250,000	1,250,000	1	325,000	Aug. 1906	.01
Frances-Mohawk,g	Nevada	1,000,000	1,000,000	1	141,000	Dec. 1906	1.10
Gemini-Keystone	Utah	500,000	5,000	100	1,850,000	July 1906	10.00
Gold King Con	Colo	5,750,370	5,750,370	1	1,407,504	May 1905	.01
Gold Sovereign	Colo	2,000,000	2,000,000	1	10,000	Jan. 1905	.00½
Grand Central, g.	Utah	250,000	250,000	1	1,196,000	 1907	.04
Gwin Mine, Dev., g.	Cal	1,000,000	100,000	10	35,000	Mar. 1906	.25
Hecla, s. l.	Idaho	250,000	1,000,000	0.25	870,000	Mar. 1907	.02
Homestake, g.	S. D.	21,840,000	218,400	100	22,244,040	Apr. 1907	.50
HornSilver,g.s.c.z.l	Utah	10,000,000	400,000	25	5,602,000	Mar. 1907	.05
Inter'l Nickel, pf.	N. Y.	12,000,000	87,415	100	655,613	May 1907	1.50
Iron Silver	Colo	10,000,000	500,000	20	4,000,000	Apr. 1907	.20
Jamison, g.	Cal	3,900,000	390,000	10	270,670	Apr. 1907	.03
Jerry Johnson	Cal	2,500,000	2,500,000	1	61,700	Apr. 1906	.03
Kendall, g.	Mont	2,500,000	500,000	5	1,095,000	Apr. 1907	.03
Liberty Bell,g.s.	Colo	700,000	130,551	5	110,857	Jan. 1906	.15
Lightner, g.	Cal	125,000	102,255	1	295,694	Aug. 1905	.05
Mammoth, g. s. l.	Utah	10,000,000	400,000	25	2,080,000	Oct. 1906	.05
Mary McKinney, g.	Colo	1,500,000	1,304,252	1	801,765	Apr. 1907	.03
Mohawk, c.	Mich	2,500,000	100,000	25	900,000	Jan. 1907	4.00
Mont. Ore Purch.	Mont	2,500,000	80,833	25	9,437,274	Jan. 1907	15.00
Monument, g.	Colo	300,000	300,000	1	27,124	Apr. 1905	.01
New Century, z., l.	Mo	300,000	300,000	1	211,500	Nov. 1906	.01
New Idria, q.	Cal	500,000	100,000	5	900,000	Apr. 1907	.20
New Jersey Zinc	U. S.	10,000,000	100,000	100	8,400,000	Feb. 1906	3.00
North Butte	Mont	6,000,000	400,000	15	5,000,000	June 1907	2.00
North Star, g.	Cal	2,500,000	250,000	10	1,336,989	Mar. 1907	.20
Northern Light,g.s.	Utah	2,000,000	400,000	5	20,000	Feb. 1904	.05
Old Dominion Cop.	Ariz	7,500,000	281,589	25	280,843	May 1906	.50
Old Gold	Colo	2,101,150	2,101,150	1	10,506	Mar. 1906	.05
Ophir, g. s.	Nevada	302,400	100,800	3	1,797,400	July 1904	.25
Osceola, c.	Mich	2,500,000	96,150	25	6,362,600	Jan. 1907	6.00
Parrot, c,s.	Mont	2,300,000	229,850	10	6,692,724	Mar. 1907	.25
Pennsylvania, g.	Cal	5,150,000	51,500	100	284,925	July 1905	.10
Platteville, l. z.	Wis	20,000	500	40	89,500	Oct. 1905	10.00
Portland, g.	Colo	3,000,000	3,000,000	1	7,387,080	Apr. 1907	.04
Quincy, c.	Mich	3,750,000	110,000	25	17,460,446	June 1907	4.50
Rob Roy, z.	Mo	15,000	15,000	1	9,600	May 1906	.03
Rocco Homest'k,l.s.	Nevada	300,000	300,000	1	112,000	Dec. 1905	.02
Sacramento, g, q.	Utah	5,000,000	1,000,000	1	245,000	Nov. 1906	.00½
Salvator, g. s. l.	Utah	200,000	200,000	1	6,500	Aug. 1904	.01
St. Joseph, l.	Mo	20,000,000	1,000,000	10	5,108,357	Mar. 1907	.15
Silver Hill, g. s.	Nevada	108,000	108,000	1	59,400	Feb. 1906	.05
Silver King, g. s. l.	Utah	3,000,000	150,000	20	10,675,000	Dec. 1906	33½
Shannon, c.	Ariz	3,000,000	300,000	10	300,000	Mar. 1907	.50
Snowstorm, s. l.	Ida	1,500,000	1,500,000	1	135,000	Jan. 1907	.03
Spearfish, g.	S. D.	1,500,000	1,500,000	1	165,500	Jan. 1905	.01½
Standard Con., g. s.	Cal	2,000,000	178,600	10	5,139,061	Mar. 1907	.10
Stratton'sIndepend	Colo	5,500,000	1,000,007	5	4,895,865	Apr. 1906	.12½
Tamarack, c.	Mich	1,500,000	60,000	25	9,180,000	Jan. 1907	3.00
Tennessee, c.	Tenn	5,000,000	175,000	25	1,093,750	Jan. 1907	1.25
Tomboy, g. s.	Colo	1,750,000	300,000	5	900,000	June 1906	.48
Tonopah of Nev.	Nevada	1,000,000	1,000,000	1	3,000,000	Apr. 1907	.35
Tonopah Belmont.	Nevada	2,000,000	1,295,007	1	518,003	Apr. 1907	.10
Tonopah Ext'nsion	Nevada	1,000,000	928,433	1	278,530	Apr. 1906	.15
Tonopah Midway.	Nevada	1,000,000	1,000,000	1	300,000	Jan. 1907	.05
Uncle Sam, g.s.l.	Utah	500,000	500,000	1	130,000	Oct. 1906	.01
United Cop. com.	Mont	75,000,000	450,000	100	5,175,000	Apr. 1907	1.75
United, c. pf.	Mont	5,000,000	50,000	100	1,500,000	May 1907	3.00
United, z. l., com.	Mo.-Kan.	500,000	92,400	5	27,450	Oct. 1906	.05
United, z. l., pf.	Mo.-Kan.	500,000	19,556	25	283,250	Apr. 1907	.50
United, (Crip'le C'k)	Colo	5,000,000	4,009,100	1	280,071	Apr. 1905	.00½
United Verde, c.	Ariz	3,000,000	300,000	10	18,585,322	May 1907	.75
Un.States,pf.g.s.c.l*	Utah	37,500,000	750,000	50	3,281,250	Apr. 1907	.87½
U.S. Red. & Ref. Pf.	Colo	4,000,000	39,458	100	946,317	July 1907	1.50
Utah, g.(Fish Sp'gs)	Utah	1,000,000	100,000	10	249,000	 1907	.03
Utah Con., c.	Utah	1,500,000	300,000	5	6,486,000	Apr. 1907	1.50
Victoria, Utah	Utah	250,000	250,000	1	87,000	Apr. 1907	.04
Vindicator Con., g.	Colo	1,500,000	1,500,000	1	1,605,000	Apr. 1907	.03
Wolverine, c.	Mich	1,500,000	60,000	25	4,050,000	Apr. 1907	10.00
Work, g.	Colo	1,500,000	1,500,000	1	90,000	Apr. 1907	.01
Yankee Con.	Utah	500,000	500,000	1	140,000	Jan. 1907	.03
Yellow Aster, g.	Cal	1,000,000	100,000	10	913,789	May 1907	.10

*Previous to consolidation $1,436,260 were divided.

Coal, Iron and Other Industrials—United States.

Name of Company and Location.		Author. ized Capital.	Shares. Issued.	Par Val. $	Dividends. Total to Date.	Latest. Date.	Amt.
Ala. Con., C. & I., pf.	Ala	$2,500,000	24,638	100	$905,265	May 1905	$1.75
Allis-Chalmers, pf.	U. S.	25,000,000	200,000	100	3,213,750	Feb. 1904	1.75
Amer. Ag. Chem., pf.	U. S.	20,000,000	181,530	100	7,375,870	Apr. 1907	3.00
American Cement.	Pa.	2,000,000	200,000	10	1,028,000	Jan. 1907	.40
American Coal.	Md.	1,500,000	50,000	25	2,195,000	Mar. 1907	7.50
Associated Oil.	Cal.	21,000,000	21,000,000	1	630,000	Aug. 1905	.01½
Bethlehem Steel, pf.	Pa.	15,000,000	150,000	100	900,000	Nov. 1906	.75
Cambria Steel.	Pa.	50,000,000	900,000	50	8,212,500	Feb. 1907	.62½
Caribou Oil.	Cal.	100,000	80,000	1	56,000	July 1905	.07
Central C. & C., com.	Mo.	5,125,000	51,250	100	1,921,875	Apr. 1907	1.50
Central C. & C., pf.	Mo.	1,875,000	18,750	100	1,265,626	Apr. 1907	1.25
Central Oil	W. Va.	1,500,000	60,000	25	182,500	May 1904	.25
Claremont Oil.	Cal.	500,000	450,000	1	58,500	June 1905	.01
Col. & Hock. C. & I.	Ohio	7,000,000	69,244	100	176,086	July 1907	1.50
Consolidated Coal	Ill.	5,000,000	50,000	100	350,000	July 1904	1.00
Consolidation Coal	Md.	10,250,000	102,500	100	8,955,400	Apr. 1907	1.50
Crucible Steel, pf.	Pa.	25,000,000	250,000	100	1,000,000	Sept. 1906	1.50
Empire S. & I., pf.	N. J.	5,000,000	25,000	100	637,500	Jan. 1907	3.00
Fairmont Coal.	W. Va.	12,000,000	120,000	100	1,384,000	Feb. 1907	3.00
Four Oil	Cal.	500,000	300,000	1	105,406	July 1905	.01
General Chem. Con.	U. S.	12,500,000	74,103	100	1,745,125	Mar. 1907	2.00
General Chem., pf.	U. S.	12,500,000	100,000	100	4,540,178	Apr. 1907	1.50
George's C'k Coal	Md.	2,500,000	22,000	100	1,188,000	July 1904	3.00
Imperial Oil	Cal.	1,000,000	100,000	100	880,000	July 1905	.20
International Salt.		30,000,000	182,280	100	927,060	Dec. 1906	1.00
Jeff. & Cl'f. C. & I., com	Pa.	1,500,000	15,000	100	330,000	Aug. 1905	5.00
Jeff. & Cl'f. C. & I., pf.	Pa.	1,500,000	15,000	100	825,500	Aug. 1906	2.50
Kern River Oil	Cal.	2,000,000	20,000	100	39,500	May 1905	.13
Lehigh Coal & Nav.	Pa.	17,378,500	346,901	50	25,614,693	May 1907	2.00
Maryland Coal,pf.	Md.	2,000,000	18,850	100	1,517,160	Dec. 1906	4.00
Monon R. Coal, pf.	Pa.	10,000,000	100,000	100	3,154,945	Jan. 1906	.97
Monte Cristo Oil.	Cal.	500,000	500 000	1	120,000	July 1905	.01
National Carbon, pf.	U. S.	4,500,000	45,000	100	2,047,500	May 1905	1.75
National Lead, com.	N. Y.	15,000,000	149,054	100	1,974,966	July 1907	1.25
National Lead, pf.	N. Y.	15,000,000	149,040	100	16,324,328	June 1907	1.75
Nat'l Steel & Wire,pf.	N. Y.	5,000,000	25,778	100	631,561	May 1906	1.75
New Central Coal	Md.	1,000,000	50,000	20	350,000	May 1907	.40
New River Coal, pfd.	W. Va.	4,000,000	37,617	100	112,851	May 1907	1.50
Pacific Coast Borax.	Cal.	2,000,000	19,000	100	2,086,500	Aug. 1905	1.00
Peerless Oil	Cal.	1,000,000	92,000	10	396,320	May 1905	.14
Penna. Salt.	Pa.	3,000,000	60,000	50	14,528,000	Apr. 1907	3.00
Penna. Steel, pfd.	Pa.	25,000,000	168,214	100	7,615,744	May 1907	3.50
Phila. Gas, com.	Pa.	28,953,029	579,061	50	7,118,438	May 1907	.75
Phila. Gas, pf.	Pa.	5,744,813	114,896	50	1,583,505	Mar. 1905	1.25
Pittsburg Coal, pf.	Pa.	32,000,000	297,010	100	11,434,962	Apr. 1905	1.75
Pocahontas Coll., pf.	W. Va.	1,500,000	15,000	100	460,000	May 1907	1.50
Republic I. & S., pfd.	Ill.	25,000,000	204,169	100	4,136,612	Apr. 1907	3.75
Sloss-Sheffield, com.	Ala.	7,500,000	75,000	100	9,480,250	 1907	1.25
Sloss-Sheffield, pf.	Ala.	20,000,000	67,000	100	3,177,250	Mar. 1907	1.25
Standard Oil.	U. S.	100,000,000	970,000	100	334,530,000	June 1907	9.00
Tenn. C. & I., com.	Tenn.	22,553,600	225,536	100	3,131,988	May 1907	1.00
Tenn. C. & I., pf.	Tenn.	248,000	2,480	100	385,080	May 1907	2.00
Texas & Pacific Coal.	Texas.	2,000,000	20,000	100	1,930,000	Mar. 1905	2.00
Thirty-three Oil.	Cal.	500,000	100,000	5	430,000	July 1905	.10
Union Oil	Cal.	10,000,000	100,000	100	1,118,766	May 1905	.50
U. S. SteelCorp.,cm.	U. S.	550,000,000	5,083,025	100	66,041,541	July 1907	.50
U. S. Steel Corp., pf.	U. S.	360,281,100	3,603,141	100	181,149,227	May 1907	1.75
Va. Carolina Ch., pf.	U. S.	20,000,000	180,000	100	11,820,869	Apr. 1907	2.00
Westmoreland Coal.	Pa.	3,000,000	60,000	50	8,580,000	Oct. 1905	2.50

Canada, Mexico, Central and South America.

Name of Company and Location.		Author-ized Capital.	Shares. Issued.	Par Val. $	Dividends. Total to Date.	Latest. Date.	Amt.
Amistad y Conc'rdia.	Mex	$480,000	9,600	50	$258,064	Jan. 1905	$1.71
Buffalo, c.	Ont.	1,000,000	900,000	100	81,000	Apr. 1907	.03
Butters' Salvador, g.	Salv.	750,000	150,000	5	600,000	Apr. 1905	.25
Cariboo McKin'y, g.	B. C.	1,250,000	1,250,000	1	546,837	Feb. 1904	.04
Consolidated M & S.	B. C.	5,500,000	48,338	100	594,100	May 1907	2.50
Copiapo, c.	Chile	1,125,000	112,500	10	3,000,900	Oct. 1904	1.20½
Crow's Nest Pass.	B. C.	3,500,000	140,000	25	1,581,148	Apr. 1906	.62½
Dominion Coal, com.	N. S.	15,000,000	150,000	100	2,100,000	Apr. 1907	1.00
Dominion Coal, pf.	N. S.	3,000,000	30,000	100	3,330,000	Jan. 1905	4.00
Dos Estrellas, g. s.	Mex.	150,000	3,000	50	1,020,555	July 1905	13.65
El Oro, g. s.	Mex.	5,750,000	1,080,000	5	2,708,800	July 1904	.15
Esperanza, s. g.	Mex.	2,275,000	455,000	5	6,121,049	Apr. 1907	1.32
Foster Cobalt, s.	Ont.	1,000,000	1,000,000	1	50,000	Jan. 1907	.05
Granby Con.	B. C.	15,000,000	1,350,000	10	2,158,630	Mar. 1907	.30
Greene Con. Copper.	Mex.	8,640,000	864,000	10	5,814,200	Mar. 1907	.40
Greene Con. Gold.	Mex.	5,000,000	500,000	10	300,000	July 1905	.20
GreenGold-Silv'r,pfd.	Mex.	3,000,000	300,000	10	120,000	Mar. 1907	.40
Guanajuato	Mex.	3,000,000	540,000	5	74,250	Oct. 1906	.07½
Guggenheim Exp.	Mex.	17,000,000	105,000	100	3,172,500	Apr. 1907	2.50
Kerr Lake, s.	Ont.	3,000,000	600,000	5	210,000	Oct. 1906	.10
LeRoi No. 2, g.	B. C.	3,000,000	120,000	25	716,400	Feb. 1907	.24
McKinley-Darragh, s.	Ont.	2,500,000	2,000,000	1	100,000	Mar. 1907	.02
Mexican Coal & Coke	Mex.	5,000,000	50,000	100	600,000	Dec. 1905	3.00
Mex. Con. M. & S. Co.	Mex.	2,500,000	240,000	10	480,000	May 1907	.50
Mines Co. of Am.	Mex.	2,000,000	2,000,000	1	2,585,000	Apr. 1907	.02
N. Y. & Hond. Ros.	C. A.	1,500,000	150,000	10	2,272,000	May 1907	.10
Nipissing, s.	Ont.	6,000,000	1,200,000	5	960,000	Apr. 1907	.15
North Star.	B. C.	1,500,000	1,300,000	1	351,000	Dec. 1904	1.00
N. S. St. & Coal, com.	N. S.	5,000,000	49,876	100	863,414	Apr. 1907	1.50
N. S. St. & Coal, pf.	N. S.	1,030,000	10,300	100	375,950	Apr. 1907	1.50
Penoles*	Mex.	250,000	2,500	100	8,213,375	Mar. 1907	20.00
Platanillo	Mex.	500,000	206,989	1	5,580	Sept. 1906	.00½
Reco, g. s. l.	B. C.	1,000,000	958,000	1	327,082	Apr. 1906	.02
Silver Queen, s.	Ont.	1,500,000	1,500,000	1	120,000	Jan. 1907	.08
Slocan Star.	B. C.	500,000	500,000	1	575,000	Dec. 1904	.08
St. Eugene Con.	B. C.	3,500,000	3,202,000	1	402,120	Oct. 1905	.02
Tezuitlan Copper.	Mex.	1,000,000	10,000	100	.....	Apr. 1907	2.00
Tilt Cove, c.	N. F.	1,000,000	89,000	2	21,360	Jan. 1905	.48
Tretheway, s.	Ont.	1,000,000	1,000,000	1	80,000	Mar. 1907	.04
Tyee, c.	B. C.	940,000	180,000	5	136,800	Dec. 1904	.24

*Mexican Currency.

THE MINING INDEX.

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

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

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

ALUMINUM

3371—ALUMINUM CASTINGS. E. F. Lake. (Foundry, May, 1907; 5½ pp.) Reviews the physical properties of aluminum and compares them with those of cast iron, and discusses the theory and practice of aluminum casting. 20c.

ASBESTOS

3372—ASBESTOS WOOD. C. L. Norton. (Elec. Wld., Apr. 27, 1907; 1 p.) Describes the construction of a non-inflammable and non-conducting wood from the very short fibered varieties of Canadian asbestos. 20c.

ASPHALT

3373—ASPHALT—Some Recent Asphalt Literature. S. F. Peckham. (Chem. Engr., Apr., 1907; 12 pp.) Abstracts several important papers dealing with asphalt and its products, which have recently appeared. 40c.

BISMUTH

3374—ALLOYS—Les Alliages Cadmium-Bismuth. A. Portevin. (Revue de Metallurgie, Apr., 1907; 5 pp.) Studies the properties of some of the alloys of these metals by means of cooling curves and microscopical investigation of polished sections. $1.00.

CEMENT

3375—FRENCH PORTLAND CEMENT INDUSTRY. E. Candlot. (Eng. and Min. Journ., May 11, 1907; ½ p.) Reviews briefly the present status of portland cement production in France. 20c.

3376—PORTLAND CEMENT—The Economy of the Long Kiln. E. C. Soper. (Trans. A. S. M. E., June, 1907; 6 pp.) Shows the economy of long kilns used in producing cement clinker by comparing tests made on 7x60 ft. kilns against 8x110 ft., both burning natural gas.

CLAY

3377—ONTARIO—Clay and the Clay Industry of Ontario. M. B. Baker. (Report, Bureau of Mines, Vol. XV, Part II, 1906; 127 pp.) A thorough review of the clay resources and industry of Ontario, dealing with the mode of occurrence of the clay, and the manufacture of clay products.

COAL AND COKE

3378—CLASSIFICATION OF COAL. A Review of Some Recent Schemes for. A. L. MacCallum. (Can. Min. Journ., May 1, 1907; 1 p.) Paper read before the Nova Scotia Min. Soc. States some of the most important schemes for classifying coal, and discusses their principal features and advantages. 20c.

3379—COAL ANALYSIS from the Commercial Point of View. J. T. Dunn. (Coll. Guardian, May 10, 1907; 1½ pp.) Lecture delivered to the Newcastle-upon-Tyne Commercial Institute. Outlines the principles of the various methods of coal analysis, showing what bearing each process of analysis has and to what extent the results obtained are useful in judging the value of the coal. 40c.

3380—COAL ANALYSIS—The Available Hydrogen of Coal. S. W. Parr. (Journ. Am. Chem. Soc., Apr., 1907; 7 pp.) Discusses the principles of various methods of determining hydrogen in coal, and endeavors to point out a new procedure which will have the added advantage of indicating other properties depending on the structure and composition of the coal. 80c.

3381—COAL CUTTING—Electricity Applied to Coal Cutting. George Farmer. (Sci. and Art of Min., May 4, 1907; 1½ pp.) Discusses the methods of controlling the roof, locating the position of the cut, and the economies of operation which are to be obtained by electric coal cutters. 20c.

3382—COAL HANDLING—Handling Cars with Rolling Device for Dumping. Erskine Ramsay. (Eng. and Min. Journ., May 11, 1907; 2 pp.) Gives details of the mechanism for handling and dumping cars by this device which is used in connection with the Robert Ramsay transfer and rams, and describes methods of adjustment and control. 20c.

3383—COAL MINING—The Technics of Coal Mining. G. H. Winstanley. (Min. Engineering, May, 1907; 3½ pp.) Continuation of article previously mentioned in the Mining Index, dealing in this instalment with applications of gearing in colliery engineering. 20c.

3384—COAL POCKETS of the Salem Mines. (Eng. Rec., May 4, 1907; 1 p.) Describes the design and construction of reinforced concrete coal pockets of this Pennsylvania mine, with plans, elevations and sections. 20c.

3385—COAL STORAGE PLANT at Shadyside, N. J. (Pract. Engr., May, 1907; 2 pp.) A description of the very large coal storage facilities of this plant which is designed to keep in reserve 100,000 tons of anthracite, and 50,000 tons of bituminous, and an account of the various handling devices, which are installed. 20c.

3386—COKE OVENS—By-Product Coke Ovens and Their Field. E. A. Moore. (Iron Trade Rev., Apr. 25, 1907; 1 p.) Brief summary of a paper read before the New England Fdymen's Assn., Apr. 10, in which are discussed the many improvements made in by-product coke-oven installations and the new uses for the gas and the ammonium sulphate which are obtained from the ovens. 20c.

3387—CONVEYER SYSTEM for Loading at the Coal-face. F. W. Parsons. (Eng. and Min. Journ., May 18, 1907; 2 pp.) Enumerates the advantages of machines in coal mining and discusses the operating methods and results obtained by using the conveyer system for loading at the coal-face, which results in the profitable working of certain thin and dirty seams. 20c.

3388—DEVELOPMENT of a Coal Mine. W. J. Sherman. (Cornell Civ. Engr., May, 1907; 8 pp.) An interesting account of the operations of renewing production from an abandoned mine, describing briefly some of the complicated problems encountered, and the methods of overcoming them.

3389—ELECTRIC POWER—Notes on the Electrical Installation at Swalwell Garesfield Colliery. J. Swindle. (Iron and Coal Tr. Rev., Apr. 26, 1907; 1 p.) Paper read before the No. of Eng. Branch of the Nat. Assn. of Coll. Mgrs., describing the electrical appliances at this British colliery. 40c.

3390—ELECTRIC POWER PLANT for the Collieries of Durham, England. A. H. Bridge. (Elec. Rev., May 11, 1907; 4½ pp.) A description of the works and system which furnish electric power to the various collieries of the Durham district. 20c.

3391—FUEL BURNING—Allgemeines über direkte Feuerungsanlagen. F. Janda. (Oest. Zeit. f. B. u. H., Apr. 20 and 27, 1907; 4 pp.) Gives an exposition of the principles of scientific firing, with notes on the best means of utilizing the heat of fuel and of testing its calorific power. To be continued. 60c.

3392—GAS POWER PLANTS—Economy of Gas Power Plants for Collieries. F. E. Junge. (Eng. and Min. Journ., Apr. 27, 1907; 3½ pp.) Discusses the value and use of gas power in coal mining, and its application to the production of electric energy from a central gas engine installation using waste gases. 20c.

3393—GAS PRODUCERS—The Utilization of Low Grade Fuel in Gas Producers—II. F. E. Junge. (Iron Trade Rev., May 2, 1907; 4½ pp.) Continuation of article previously mentioned in the Index, describing the construction of several standard types of producers and giving tests upon their efficiencies. 20c.

3394—GERMANY—Das Steinkohlengebiet nordöstlich der Roer nach den Ergebnissen der Tiefbohrungen und verglichen mit dem Cardiff-Distrikt. Krusch and Wunstorf (Glückauf, Apr. 13, 1907; 12 pp.) Records with great detail the results of prospecting the Aachen anthracite field by deep borings, and discusses the geological relations of the district as shown by petrographical examinations of the borings. Comparison is made between this region and the Cardiff field. 40c.

3395—HOISTING—Colliery Hoisting, Haulage and Power Systems. F. E. Junge. (Eng. and Min. Journ., May 11, 1907; 3 pp.) Compares the cost of indivldual steam-driven hoists and power units with the central electric power station system. 20c.

3396—KENTUCKY—Mining in the Cumberland Gap Coalfield. John L. Pultz. (Eng. and Min. Journ., Apr. 27, 1907; 33 pp.) Gives general descriptions of the different seams in the Cumberland Gas coalfield, and describes in a general way the methods of mining, ventilating, draining and hauling in use there. 20c.

3397—LOW GRADE FUEL—Burning Fine Anthracite Coal. R. T. Strohm. (Elec. World, May 4, 1907; 2 pp.) Mentions briefly some general principles of low-grade fuel combustion, and cites the experience of a large electric power plant in burning very small anthracite sizes. 20c.

3398—LOW GRADE FUELS. The Burning of. S. F. Walker. (Journ. Brit. Soc. of Min. Students, Apr., 1907; 6 pp.) Discusses some of the points of which account must be taken in the attempt to burn low grade coals for steam production.

3399—MINE FIRE—The Warrior Run Mine Disaster. C. Enzian. (Mines and Min., May, 1907; 5½ pp.) An elaborate account of the methods used in fighting this mine fire which was accompanied by a squeeze and large quantities of explosive gas. The chief agents used were air, water and steam. 20c.

3400—NEW MEXICO—Mescal Canyon Coalfield, New Mexico. Chas. R. Keyes. (Eng. and Min. Journ., May 18, 1907; ½ p.) A few notes on the extent and quality of the coal-bearing section in this district, and on the geology of the beds. 20c.

3401—RESCUE APPARATUS—Arrêté Concernat l'Emploi d'Appareils Respiratoires dans les Mines. L. Barthou. (L'Echo des Mines, Apr. 22, 1907; 1 p.) Detailed review of the present Europ-

ean situation in regard to the use of respiratory apparatus in mines, giving the reports of the French and German commissions appointed to investigate this type of apparatus, and also discussing the recommendations made in these reports. 20c.

3402—RESCUE APPARATUS—Neuerungen an Atmungsapparaten. Grahn. (Glückauf, Apr. 20, 1907; 3½ pp.) Describes and illustrates recent improvements in the construction of breathing apparatus. 40c.

3403—SAFETY LAMPS—New Patent Reflector for Safety Lamps. J. Galliford. (Iron and Coal Tr. Rev., Apr. 26, 1907; ½ p.) Paper read before the Nat. Assn. of Coll. Mgrs., briefly mentioning this aluminum reflector for mining lamps, with enumeration of its advantages. 20c.

3404—SHAFT SINKING—Sinking the Allan Shafts. H. E. Coll. (Can. Min. Journ., May 1, 1907; 5½ pp.) Paper read before the Nova Scotia Min. Soc., giving a very complete and detailed description of the sinking operation at this Nova Scotia colliery, with illustrations of timbering and methods of blasting. 20c.

3405—SPONTANEOUS COMBUSTION of Coal. A. Lakes. (Paper read before Apr. meeting of the Colo. Sci. Soc'y; 1 p.) Brief comments on the causes and effects of spontaneous combustion of coal in place, which is a characteristic feature of certain deposits of Colorado coal. 20c.

COPPER

3406—ASSAYING COPPER MATTE, The Use of Zinc in. D. M. Levy. (Paper read before the Instn. of Min. and Met., Apr. 16, 1907; 4 pp.) Gives a procedure for determining copper in matte, in which zinc is used to reduce the iron, and precipitate the copper from solution, and compares the efficiency of this process against other methods, by a list of tabulated assays.

3407—BRASS—The Effect of Cadmium on Rolled Brass. E. S. Sperry. (Brass Wld., Apr. 1907; 1 p.) Describes the effect of small percentages of cadmium in spelter which is to be used in brass production. 20c.

3408—BRASS FOUNDING—The Sheeler-Hemsher Improved Crucible Furnace. J. H. Sheeler. (Iron Age, May 9, 1907; 1 p.) Paper read before the Phila. Edymen's Assn., May 1, 1907, describing the construction of this furnace, with details of working and the blast pressure, the advantage of the latter being that the furnace is made independent of natural draft, and consequently, there is no delay of heats while waiting for favorable conditions. 20c.

3409—BRASS WORKS—The Langsenkamp-Wheeler Brass Works. (Foundry, June, 1907; 6½ pp.) Describes the construction of this brass foundry, which has unique features of design and operation, and in which large scale operations are to be carried out. 20c.

3410—BRITISH COLUMBIA—Copper Mining an Important Industry in British Columbia. E. Jacobs. (B. C. Min. Rec., Mar., 1907; 13 pp.) Reviews the general copper situation in this province and describes producing mines in all the principal districts. 20c.

3411—BRITISH COLUMBIA—Mining on Observatory Inlet, Skeena Mining Division. (B. C. Min. Rec., Mar., 1907; 2 pp.) A few brief notes on the local geology of some of the prominent mineral claims, comprising the Bonanza group and the Hidden Creek group. 20c.

3412—BRITISH COLUMBIA—The Boundary District, British Columbia. Forbes Rickard. (Min. and Sci. Press, Apr. 20, 1907; 2½ pp.) Describes the general mining situation in this district, with special reference to the equipment of the Granby smelter and its scope of operation. 20c.

3413—BRITISH COLUMBIA—The Marble Bay Copper Deposit. O. E. Le Roy. (Paper read before Can. Min. Inst., Mar., 1907: advance copy; 8 pp.) Brief notes on the geographical position, and general and economic geology of the region containing the Marble Bay copper mine, with a few facts on the value of the ore found there.

3414—CASTING COPPER—C. Vickers. (Foundry, June, 1907; 1½ pp.) Gives in condensed form data on the effects of the addition of various metals to copper which is to be used in casting. 20c.

3415—COLORADO—Copper Mines in Colorado. J. A. Snedaker. (Eng. and Min. Journ., Apr. 27, 1907; ½ p.) Gives some brief notes on the deposits of the Great Basin and other copper mines in the Red Mountain camp of San Juan County. 20c.

3416—COPPER SMELTING WORKS at Humboldt, Ariz. E. H. Hamilton. (Eng. and Min. Journ., May 11, 1907; 2½ pp.) Describes the concentrating, power and smelting plants of the Arizona Smelting Co., which are noteworthy as being electrically driven throughout, and using fuel-oil furnaces. 20c.

3417—DESULPHURIZING—The McMurtry-Rogers Process for Desulphurizing Copper Ores and Matte. T. C. Cloud. (Instn. of Min. and Met., Bull. 32, May 9, 1907; 5 pp.) Discussion by members of the Institution of the above paper, which was previously mentioned in the Mining Index.

3418—MATTE SMELTING—Magnetic Iron Oxide in Copper Matte Smelting. J. S. C. Wells. (Eng. and Min. Journ., Apr. 27, 1907; 1 p.) Records the result of a successful experiment made to produce copper matte from an ore mixture which contained 70 per cent. magnetite. 20c.

3419—MATTE SMELTING—Some Paradoxes of Matte Smelting. D. H. Browne. (Can. Min. Journ., May 1, 1907; 1½ pp.) Describes abnormal conditions which occur in matte smelting and gives reasons why the apparently absurd remedies applied are really the best. 20c.

3420—MEXICO—Cananea Copper Deposits. R. B. Brinsmade. (Mines and Minerals, May, 1907; 4 pp.) Describes the equipment of the concentrating, smelting, converting and power plants of the Greene Cons. Copper Co. 20c.

3421—NEVADA—The Genesis of the Copper Deposits of Yerington, Nev. E. P. Jennings. (Paper read before the 1907 meeting of the Can. Min. Inst.: 3½ pp.) Classifies the ore and rock occurrences of this copper district, and suggests a theory of their origin.

3422—PHOSPHORUS IN COPPER—Kupfer und Phosphor. E. Heyn and O. Bauer. (Metallurgie, Apr. 22 and May 8, 1907; 19 pp.) Records the results of a thorough investigation into the effect of phosphorus on copper and the properties of alloys of these two substances. 60c.

3423—PRODUCTION and Price of Copper for the Period 1889-1906. J. B. C. Kershaw, (Electrician, Apr. 19, 1907; 1½ pp.) Reviews various fluctuations in the prices of copper and discusses probable future prices of this metal. 40c.

3424—PYRITIC SMELTING—Notes and Comments on the Pyritic Process of Mount Lyell, Tasmania. R. Nicholls. (Chem., Met. and Min. Soc. of South Africa, Mar, 1907: 2 pp.) Reply of author to the discussion on his paper, which was read at the November, 1906, meeting of the Society. 40c.

3425—TASMANIAN COPPER COMPANY, Development of the. (Min. Journ., May 11, 1907; ½ p.) An abstract containing particulars of the work in progress and the future prospects of several of the principal mines of the Tasmanian Copper Company. 40c.

3426—UTAH—Mining at Bingham, Utah. J. W. Abbott. (Min. and Sci. Press, May 11, 1907; 2 pp.) Gives a general outline of mining conditions, as they now exist in this Utah copper camp. 20c.

DIAMONDS

3427—SOUTH AFRICA—On the Vaal Diamond Diggings. (So. African Min. Rev., Mar., 1907; 14 pp.) Outlines the present state of mining conditions in various sections of this new diamond field, with particulars as to operating companies and their production. 40c.

3428—SOUTH AFRICA—Paardeberg Mines and District—II. H. D. Griffiths. (So. African Mines, Mar. 30, 1907; 1 p.) Reviews briefly the prospecting and operating developments of this diamond district, and outlines its possibilities. 40c.

FULLERS EARTH

3429—FULLERS EARTH and Its Application to the Bleaching of Oils. C. L. Parsons. (Journ. Am. Chem. Soc., Apr., 1907: 7½ pp.) Reviews the sources of supply of fullers earth, discusses its properties, and its application to the bleaching of oils. 80c.

GOLD AND SILVER

3430—ASSAYING—Routine Assaying on a Free Milling W. A. Gold Ore. W. B. Blyth. (Ballarat Sch. of Mines Students' Mag., Vol. IX, No. 4, 1906; 2 pp.) Summary of the work connected with the assay office attached to a free gold mill, giving methods of sampling and fluxing the various products as practiced at an Australian mine. 20c.

3431—BLACK SAND. L. A. Maxwell. (Min. and Sci. Press, Apr. 27, 1907; ½ p.) Gives some brief figures as to the cost of collecting black sands in large lots for testing purposes, and describes the apparatus used. 20c.

3432—BLACK SAND—Collecting Black Sand. W. Brazenall. (Eng. and Min. Journ., May 11, 1907; ½ p.) Gives a few suggestions as to the use of the Hancock jig, the Martyn concentrator, and sodium amalgam in working black sands. 20c.

3433—BLACK SAND—Utilization of Black Sand. F. H. Hazard. (Eng. and Min. Journ., May 18, 1907; ½ p.) Discusses several aspects of the black sand situation, especially the problem in regard to the economical collecting of the sand. 20c.

3434—BLACK SANDS—La Recherche de l'Or par la Voie humide dans les sables aurifères. A. Fournier. (L'Echo des Mines, Apr. 29, 1907; 1 p.) A few remarks on wet methods of assaying gold-bearing sands, showing how a preliminary treatment with hydrochloric acid to remove iron is likely to result in premature solution of the gold due to a reaction between the acid and manganese mineral, which results in the formation of nascent chlorine. 20c.

3435—BLACK SANDS of New Zealand, the Pacific and Tierra del Fuego. C. C. Longridge. (Min. Journ., Apr. 20, 1907; 1 p.) Mentions some of the occurrences of gold-bearing black sands in these countries, with brief notes upon attempts at working them. 40c.

3436—BRITISH COLUMBIA—The Consolidated Mining and Smelting Co. of Canada, Limited, Rossland, B. C. (Can. Min. Journ., May 1, 1907; 1 p.) Gives an account of the development work accomplished by this company. 20c.

3437—BRITISH COLUMBIA PLACERS: Past and Present—I. H. F. Evans. (Min. Wld., May 4, 1907: 1 p.) Historical sketch, outlining the discovery and development of placers in this province. 20c.

3438—COBALT. (Mines and Minerals, May, 1907: 3 pp). Notes on the number and extent of development of the principal mines in this Canadian silver camp. 20c.

2439—COBALT MINING DISTRICT. Robt. Bell. (Paper read before the Mar., 1907, meeting of the Can. Min. Inst.; advance copy: 6 pp.) Gives a general description of the geological features of this silver district.

3440—COBALT ORES—Richness of Cobalt Ores. Albert R. Ledoux. (Paper read before Can. Min. Inst., Mar., 1907; advance copy: 2 pp.) Gives a number of assays of typical Cobalt ores.

3441—COLORADO—Lake Fork Extension of the Silverton Mining Area, Colorado. L. H. Woolsey. (U. S. Geol. Surv., Bull. 315, 1907: 5 pp.) Brief summary of the general geology and extent of mining operations in this district.

3442—CYANIDATION—Slime Filters. J. R. Blake. (Min. and Sci. Press, May 4, 1907: ½ p.) Sums up some of the unsettled points in the question as to the efficiency of operating the Butters and the Moore filters. 20c.

3443—CYANIDE PROCESS—The Adair-Usher Process. (So. African Mines, Apr. 20, 1907; 1½ pp.) Gives the reports of several metallurgists upon this new cyanide process which depends upon the use of umber to counteract the bad effect of ferrous salts in the solution, and which aims at a perfected method of washing the slimes and a shorter time of treatment. 20c.

3444—DRAINAGE TUNNEL—The Joker Drainage Tunnel. R. L. Herrick. (Mines and Min., May, 1907: 4 pp.) Outlines the revival of mining interest in the Red Mountain district of Colorado, and describes the secondary enriched ore deposits, and the unique prospecting conditions in the camp. 20c.

3445—DREDGING—Sluices and Riffles in Dredging. D. H. Stovall. (Min. and Sci. Press, May 4, 1907; 1 p.) Brief description of several standard types of riffles used in dredges and their requirements in the matter of feed and water supply. 20c.

3446—GOLD DREDGING. C. W. Purington. (Min. and Sci. Press, Apr. 27, 1907; 1½ pp.) A brief discussion of some of the geological principles which the author believes should be applied in the determination of valuable and easy working placer ground. 20c.

3447—GOLD DREDGING—Die Goldbaggerei in Europa. L. St. Rainer. (Oest. Zeit. f. B. u. H., Apr. 27 and May 4, 1907; 8 pp.) Gives a brief history of gold dredging in Europe from early Roman times to the present, with a short discussion of the characteristics of some alluvial deposits. To be continued. 60c.

3448—GOLD DREDGING in New Zealand. (N. Z. Mines Rec., Mar. 16, 1907; 3 pp.) Tabulated data on gold dredging operations in New Zealand to the end of 1905, showing the scope and costs of operation. 40c.

3449—GOLD DREDGING PRACTICE in Central Otago. H. R. Macdonald. (New Zealand Mines Rec., Mar. 16, 1907; 10 pp.) Conclusion of article previously indexed, discussing in this instalment sources of power, methods of gold-saving, restoration of dredged land, and enumerating several improved devices which have recently been applied in this field. 40c.

3450—GOLD MINES—The Great Gold Mines. T. A. Rickard (Min. and Sci. Press, May 4, 1907; 2½ pp.) Gives descriptions of the leading gold mines of the world, with tabulations of their output. 20c.

3451—HYDRAULIC MINING—Hydraulic Elevating and Sluicing in New Zealand. (N. Z. Mines Rec., Mar. 16, 1907; 2 pp.) Tabulated data on hydraulic mining in New Zealand, showing the scope and costs of operation, and giving details of washing equipment. 40c.

3452—MEXICO—History and Development of Batopilas Mine, Mexico. Stuart Tod. (Min. Wld., May 4, 1907; 2 pp.) Reviews briefly the history of this silver mine, and describes the present conditions of mining and milling. 20c.

3453—MEXICO—The Dolores Mine, Chihuahua, Mexico. J. B. Farish. (Eng. and Min. Journ., May 4, 1907; 1 p.) Describes briefly the country rocks of the Dolores district and mentions briefly the character of ore, and methods of treatment. 20c.

3454—MEXICO—The Geology of the Veta Madre. T. A. Rickard. (Min. and Sci. Press, Apr. 27, 1907; 3 pp.) Gives a general study of the geological features of the Veta Madre or Mother Lode vein of Guanajuato, Mexico. 20c.

3455—MONTANA—The Granite-Bimetallic and Cable Mines, Philipsburg Quadrangle, Montana. W. H. Emmons. (U. S. Geol. Surv., Bull. 315, 1907; 25 pp.) Treats of the topography, general geology, and distribution and character of the ore deposits of the district in which the above mines are located.

3456—NEVADA—The Seven Troughs District of Humboldt County. T. C. Parker. (S. L. Min. Rev., Apr. 30, 1907; 4½ pp.) Gives a general account of mining conditions in this gold district where operations are very limited, but promising. 20c.

3457—ORE TREATMENT—Metallurgy of Gold Fields' Mines. (So. African Mines, Apr. 13, 1907; 1 p.) Reviews the results accomplished during the last two years in the way of improving gold extraction of the Rand ores. 20c.

3458—PLACER GROUND—Examinations of Placer Ground. R. Chauvenet. (Min. Reporter, Apr. 25, 1907; 1½ pp.) Continuation of article, previously mentioned in this Index, dealing in this instalment with the relative advantages of pits and drills as means of obtaining samples of placer ground; also of panning and fire-assay as a means of determining the value of the samples. 20c.

3459—QUEENSLAND—Annual Mining Review of the Charters Towers Goldfield for the Year 1906. (Issued by E. D. Miles & Co., Charters Towers, North Queensland, 1907; 26 pp.) Reviews the progress of mining and the extension of mine development of the Charters Towers field for 1906.

3460—RUSSIA—A Visit to the Gold Fields of Orenburg, Russia. F. H. Hatch. (Instn. of Min. and Met., Bull. No. 32, May 9, 1907; 6 pp.) Discussion by members of the Institution of the above paper, which was previously mentioned in the Index.

3461—SAND RESIDUE DUMPS—A Proposed Method of Treating Sand Residue Dumps. S. J. Truscott and A. Yates. (Journ. Chem., Met. and Min. Soc. of South Africa, Mar., 1907; 1½ pp.) Reply by the authors to the discussion of their paper, which was read at the Jan., 1906, meeting of the Society. 40c.

3462—SCREEN ASSAY on the Meyer and Charlton G. M. under "The New Metallurgy". C. Toombs. (Journ. Chem., Met. and Min. Soc. of South Africa, Mar., 1907; 2 pp.) Describes the usual method of making screen assays of cyanide pulp as practiced on the Rand, and compares it with an original method which was developed to overcome the loss due to the amount of gold dissolved out of the sample between the time it was taken and when it was dried for assay. 60c.

3463—SILVER-LEAD SMELTING PRACTICE—III. T. S. Austin. (Min. and Sci. Press, Apr. 27, 1907; 1 p.) Deals in this instalment with furnace practice upon oxidized lead-silver ores at Chihuahua. 20c.

3464—STAMP MILL—Battery Foundations of the Kuk-San-Dong Mill, Korea. C. D. Kaeding. (Min. and Sci. Press, May 11, 1907; 2 pp.) Illustrates by many drawings the methods of constructing concrete foundations for a stamp battery in Korea, where distance from a place of supplies introduced some unusual features in the design. 20c.

3465—STAMP MILLING—Some Accessory Stamp Mill Appliances. G. O. Smart. (Journ. Chem., Met. and Min. Soc. of South Africa, Mar., 1907; 1 p.) Reply of author to the discussion of his paper, which was read at the Nov., 1906, meeting of the Society. 40c.

3466—STAMP MILL—Notes on a Modern Stamp Mill. G. E. Brown. (Paper read before the Instn. of Min. and Met., May 16, 1907, advance sheets; 19½ pp.) Gives a detailed description of the usual appliances in a stamp mill working on a free gold ore, with a few figures as to repairs, costs, etc.

3467—TUBE MILL—Feeder for a Tube Mill. N. C. Groch and F. J. Nagel. (Min. and Sci. Press, Apr. 27, 1907; 1 p.) Describes an improvement in vertical spiral feeders for trunnion-mounted tube mills; illustrated by sectional drawing. 20c.

3468—TUBE MILLS—The Computation of the Crushing Efficiency of Tube Mills. S. H. Pearce and W. A. Caldecott. (Journ. Chem., Met. and Min. Soc. of South Africa, Mar., 1907; 1 p.) Reply by the authors to the discussion of their paper, which was previously read before the Society. 40c.

3469—WASHINGTON—Gold-Bearing River Sands of Northeastern Washington. A. J. Collier. (U. S. Geol. Surv., Bull. No. 315, 1907; 15 pp.) Gives a general account of the geography, geology and placer workings along the Columbia and Okanogan rivers, and describes the usual mining methods which have been put in operation there.

3470—WESTERN AUSTRALIA—The Deep Leads and the Old Divide in the Ballarat District. W. H. Callister. (Ballarat Sch. of Mines Students' Mag., Vol. IX, No. 4, 1906; 3 pp.) General description of geological features of the region around the Ballarat district. 20c.

3471—WYOMING—Gold Developments in Central Uinta County, Wyo., and at Other Points on Snake River. A. R. Schultz. (U. S. Geol. Surv., Bull. 315; 20 pp.) Enumerates some of the placer deposits that are now worked along the Snake river in Wyoming, with general statements as to the extent of the operations, and discusses the occurrence of platinum in the sands.

GRAPHITE

3472—GRAPHITE: Its Occurrence and Uses. (Bull. Imp. Inst., Vol. V, No. 1, 1907; 14¼ pp.) Continuation of article previously mentioned in this Index, dealing with the distribution and occurrences of graphite in Europe, Australia, Canada and the United States. 40c.

IRON AND STEEL

3473—ANALYTICAL METHOD—Determination of Silica and Alumina in Iron Ores. G. W. Dean. (Min. World, May 11, 1907; 1 p.) Gives the procedure for analysing iron ores for silica alone, also when alumina is to be determined, and mentions some cautions to be observed. 20c.

3474—BLAST FURNACE—The Application of the Centrifugal Dust Collector to the Blast Furnace. F. C. Roberts (Iron Trade Rev., May 9, 1907; 1 p.) Reviews briefly the development of the art of removing dust from blast-furnace gases, and gives the results of tests on a centrifugal dust collector, which appears to be well suited for this purpose. 20c.

3475—BLAST FURNACE GASES—The Utilization of Blast Furnace Gases for Power Production. A. L. O. Genter (West. Chem. and Met., May, 1907; 12 pp.) Reviews the present condition of the art of utilizing blast furnace gases with analyses of typical gases and tabulations of their thermal values. 60c.

3476—BRAZING of Iron Surfaces. J. L. Bacon. (Engineer, May 1, 1907; 1½ pp.) Gives practical directions for carrying out the different steps of brazing iron and copper surfaces, notably, the preparation of the joint, the fluxing and heating. 20c.

3477—CAST STEEL—Etude sur la Fabrication des Pièces en Acier Coulé. G. Weyland. (Rev. Univ. des Mines, Mar., 1907; 6 pp.) A study of the principles relating to the design and location of tuyeres, and proper air pressure for the best and most economical results in the production of cast steel from pig iron. $1.

3478—ELECTRIC FURNACE—A 24-Ton Induction Furnace for Steel Manufacture. (Electrochem. and Met. Ind., May, 1907; 1½ pp.) Brief notes on the construction and installation of a large Kjellin furnace at the Roechling steel works of Voelklingen, Germany. 40c.

3479—ELECTRIC POWER in Iron and Steel Works. D. S. Bigge. (Paper read before the Iron and Steel Inst., May 9, 1907; 5 pp.) Deals with the development of electricity in iron and steel works, with especial reference to its latest application to reversing rolling mills of high power. Speed diagrams of the rolls when electrically driven are compared with those obtained with steam driven mills. 40c.

3480—ELECTRIC SMELTING—The Electrothermic Production of Steel from Iron Ore. Alfred Stansfield. (Paper read before Can. Min. Inst., March, 1907, advance copy; 4½ pp.) Sums up the results of laboratory experiments made to determine whether phosphorus and sulphur can be eliminated from steel during its production directly from ores by electricity.

3481—ELECTROMETALLURGY of Iron and Steel. J. W. Richards. (Electrochem. and Met. Ind., May, 1907; 6 pp.) Gives the solutions of a series of problems in which are included all the essential features attending the reduction of iron and steel by electric means. 40c.

3482—Die Hochofen-, Stahl- und Walzwerksanlage der "Societa Anonima degli Alti Forni e Fonderia de Piombino". F. Lurmann, Jr. (Stahl u. Eisen, May 1, 1907; 5 pp.) Describes the equipment of this modern Italian steel plant, also its advantageous location, which gives easy entrance for raw material and permits economic shipment of the product. 40c.

3483—FURNACE CHARGING—Machines a Charger les Fours Métallurgiques a demouler et a transporter les Lingots. C. Dantin. (Génie Civ., Apr. 20, 1907; 3 pp.) Describes the construction of new types of Wellman machines for charging Martin furnaces, and handling ingots and blooms in steel works. 40c.

3484—GERMAN IRON INDUSTRY—Die Eisenerzlagerstätten und die Eisenindustrie Württembergs. C. Geiger. (Stahl u. Eisen, Apr. 24, 1907; 4 pp.) Outlines present industrial and economic conditions in the iron industry of Württemberg and gives geological and geographical notes on the iron ore deposits of this region. 40c.

3485—HIGH-SPEED STEEL TOOLS. E. R. Norris. (Elec. Journ., May, 1907; 14 pp.) An abstract of various papers on this subject, giving in condensed form, the latest contributions on the subject of making these tools, their life,

proper shaping of them, and their application. 20c.

3486—IRON MINING—The Ironstone of Cleveland. A. E. Pratt. (Instn. of Min. and Met., Bull. No. 32, May 9, 1907; 3½ pp.) Discussion of the above paper, which was previously mentioned in the Index, together with the author's reply.

3487—MAGNETIC SEPARATION of Iron Ores in Sweden. G. Walfrid Petersson. Translated by N. V. Hanseli. (Eng. and Min. Journ., May 11, 1907; 7 pp.) Outlines the condition of magnetic ore treatment in Sweden, giving flow-sheets of various plants and describing the machines used in the Gröndal process of magnetic separation. 20c.

3488—MALLEABLE IRON—The Manufacture of Malleable Iron. G. A. Akerlind. (Foundry, May, 1907; 5 pp.) Paper read before the Scandinavian Tech. Soc. Reviews briefly the discovery of the process for making malleable iron, outlines methods of charging, melting and furnace construction, and gives suggestions for proper inspection. 20c.

3489—MANGANESE STEEL and Some of Its Uses. E. F. Lake. (Am. Machinist, May 16, 1907; 2 pp.) Discussion of the principal features and peculiarities of this special steel, and an enumeration of its advantages over carbon steel for rails and vaults. 20c.

3490—METALLOGRAPHY—Die mikrographische Untersuchung des Eisens und Stahls. H. Braune. (Eisen-Zeit., Apr. 13 and 20, 1907; 12½ pp.) Conclusion of article previously mentioned in the Mining Index, describing the process of etching the test pieces, and the microscopic examination of the specimens, with notes on the construction and use of the microscope. 40c.

3491—ONTARIO—Plant of the Atikokan Iron Co., Port Arthur, Ont. (Iron Trade Rev., May 2, 1907; 3 pp.) Gives a general description of the works of this Canadian iron company, where the roasting of magnetite ore is a feature. 20c.

3492—OPEN-HEARTH STEEL CASTING PLANT, A Modern. (Foundry, May, 1907; 9 pp.) General description of the important features of the acid open-hearth steel plant of the National Foundry Co., of Erie, Pa. 20c.

3493—OPEN HEARTH STEEL RAILS. B. Talbot. (Indus. Wld., May 4, 1907; 2 pp.) Reprint from Engineering Times Supplement, reviewing bessemer smelting practice in various countries of Europe, and pointing out how in the United States the scarcity of bessemer ores is leading to the adoption of the open-hearth process for making rails. 20c.

3494—SPECIAL STEELS—An Analysis of the Evolution of Modern Tool-Steel. H. C. H. Carpenter. (Engineering, May 3, 1907; 2½ pp.) Traces the evolution of modern tool steels, in the light of the most recent knowledge on the subject, and deals with the eras of carbon tool-steel, of self- or air-hardening steels. To be continued. 40c.

3495—STEEL MANUFACTURE— Diagram of the Processes and Products of Iron and Steel Manufacture. Albert Sauveur. (Iron Trade Rev., May 9, 1907; 2 pp.) Presents in graphical form the operations attending the smelting of iron ore, and the refining of the pig, with comments upon the various steps of the process. 20c.

3496—TEMPERING FURNACE—Furnace for Tempering High-Speed Steel. C. U. Scott. (Am. Machinist, May 9, 1907; 1½ pp.) Suggests various ways of constructing furnaces for hardening different sizes of high-speed steel. 20c.

3497—TUNGSTEN IN STEEL, Alkalimetric Method for the Determination of. S. C. Lind and B. C. Trueblood. (Journ. Am. Chem. Soc., Apr., 1907; 4 pp.) Investigates the possibility of determining tungsten volumetrically, and tabulates the results secured, when using a procedure modified from the experience of the authors. 80c.

3498—VANADIUM STEEL—Some Properties of Vanadium Steel. E. F. Lake. (Amer. Machinist, May 2, 1907; 2½ pp.) States some of the sources of vanadium, and describes the effects of small quantities on different mixtures of iron and steel, showing by tabulated data of tests the superiority of vanadium steels, over other special brands. 20c.

3499—CERUSSITE—A Curious Deposit or Cerussite in Colorado. R. B. Brinsmade. (Eng. and Min. Journ., May 4, 1907; 1½ pp.) Gives a few notes on the genesis of a deposit of lead ore in Colorado where the mineral is not associated with sulphides or other usual accessory minerals common to lead deposits. 20c.

3500—DESULPHURIZATION OF GALENA—Les nouveaux procedes de desulfuration de la Galene. M. Moslard. (L'Echo des Mines, Apr. 15, 18, 22, and 25, 1907; 4 pp.) Continuation of article previously mentioned in the Mining Index, reviewing the various modern roasting processes which are now used for desulphurizing galena. Discusses in these instalments the theory of the reactions, and the part played by the lime. $1.

3501—ELECTROLYTIC REFINING of Lead and Treatment of Slimes and By-Products. A. G. Wolf. (West. Chem. and Met., May, 1907; 18 pp.) Covers the theory and practice of electrolytic lead refining by the Betts process, and describes the refinery of the Cons. Mining and Smelting Co., of Canada, together with the processes used in testing the slimes and all the by-products of the lead refining. 60c.

3502—OKLAHOMA—Lead and Zinc Mining. W. R. Crane. (Mines and Min., May, 1907; 1½ pp.) A description of the ore occurrence in the Quapaw district of Oklahoma, and methods of mining and milling. 20c.

NICKEL

3503—NICKEL INDUSTRY—L'Industrie du Nickel. R. Pitaval. (L'Echo des Mines, Apr. 29, 1907; 1 p.) A few remarks on the nickel smelting situation, showing its analogy to conditions in the aluminum industry, and how reduction furnaces should be erected near the nickel deposits. 20c.

PETROLEUM

3504—BAKU REFINERIES—Operations of the Baku Petroleum Refineries in 1906. (Pet. Rev., Apr. 27, 1907; 1 p.) Gives the official statistics of the various oil refineries of Baku during 1906. 40c.

3505—CALIFORNIA—The Future of the Oil Industry in California. E. O'Neil. (Cal. Journ. of Technology, Apr., 1907; 2½ pp.) A brief summary of probable directions of future progress in the oil industry of this State. 20c.

3506—CANADA—Le Pétrole au Canada. (Journ. du Pétrole, Apr. 10, 1907; 1½ pp.) Gives a brief history of the discovery of petroleum in Canada, and the development of the oil industry there. 20c.

3507—PANAMA—The Union Oil Company's Panama Pipe Line. A. B. Thompson. (Pet Rev., Apr. 27, 1907; 1 p.) Gives details of the operations of the Union Oil Co.'s pipe-line at Panama. 40c.

PHOSPHATE ROCK

3508—FRANCE—Die Phosphatlagerstätten Frankreichs. O. Tietze. (Zeit. f. prak. Geol., Apr., 1907; 7 pp.) Considers the geological relations of the principal phosphate deposits in France, and gives statistics of production from 1886 to 1904. 40c.

3509—PHOSPHATE ROCK in Utah, Idaho and Wyoming. Chas. Coicock Jones. (Eng. and Min. Journ., May 18, 1907; 2½ pp.) Describes the occurrence and character of the phosphate rock deposits in these States where exploitation has only recently been undertaken. 20c.

PLATINUM

3510—MARKET CONDITIONS OF PLATINUM—E. De Haupick. (Min. Journ., May 4, 1907; ½ p.) A review of conditions which govern the platinum market for the Ural products, with a discussion of the fluctuations which the metal has undergone during recent years. 40c.

QUICKSILVER

3511—ANALYSIS—Electro - determination of Mercury and Its Separation from Silver. H. J. S. Sand. (Min. Reporter, Apr. 25, 1907; 1 p.) Abstract of a paper contributed to the Journ. Chem. Soc., London, giving the procedure used in a method of quantitatively determining quicksilver by electrolysis, and giving the results of three different experiments to test its accuracy. 20c.

RARE MINERALS, EARTHS, ETC.

3512—RARE EARTHS and the Incandescent Mantel. F. Bonnet, Jr. (Journ. Worcester Poly. Inst., May, 1907; 6 pp.) A brief general review of the chemistry of rare earths in their relation to the manufacture of incandescent mantels. 20c.

3513—URANIUM—Sur les Différents Procédés de Préparation de l'Uranium métallique pur ou a l'Etat de Fonte. J. Escard. (Rev. de Chim. Industrielle, Apr., 1907; 6 pp.) Discusses general methods of reducing uranium from ores by chemical means and by electrolysis, and treats of the properties of metallic uranium. 40c.

3514—YTTRIUM EARTHS—A New Method for the Separation of the Yttrium Earths. C. James. (Journ. Am. Chem. Soc., Apr., 1907; 3 pp.) Notes on a procedure for separating yttrium earths one from another; deals also with some of their properties. 80c.

SULPHUR AND PYRITES

3515—ANALYTICAL METHOD—Determination of Sulphur in Pyrite. H. Fay. (Technology Quar., Mar., 1907; 7 pp.) Gives the procedure for determining available sulphur by the Lunge method, and total sulphur by the Fresenius method, with critical comments upon the various steps of the processes. 80c.

3516—PYRITES—The Origin of Deposits of Pyrites. A. B. Willmott. (Paper read before Can. Min. Inst., Mar., 1907, advance copy; 11 pp.) Reviews several of the most important theories as to the formation of pyrites and discusses occurrences of this mineral in Ontario, and the application of the theories to them.

TIN

3517—ANALYSIS—The Estimation of Small Quantities of Foreign Elements in Metallic Tin. P. J. Thibault. (Aust. Min. Stand., Mar. 6, 1907; ½ p.) Gives a brief discussion of procedures used in determining traces of antimony, lead, phosphorus and sulphur in metallic tin. 20c.

3518—CONCENTRATOR—A Cornish Concentrator and a Spray for Rock Drills. Edward Walker. (Eng. and Min. Journ., May 11, 1907; 1 p.) Describes the principle of operation of the Acme slime table, which combines the advantages of convex and concave revolving tables, the combination effecting economy in construction, space and power used. 20c.

3519—METALLURGY — Fortschritte und Neuerungen in der Metallurgie des Zinns, Speziall in Elektrochemischer Hinsicht im Jahre 1906. (Elektrochem. Zeit., Apr., 1907; 3 pp.) Reviews the progress in the metallurgy of tin during 1906, with a few brief notes on electrochemical methods of producing tin. 40c.

3520—ORE DRESSING—Cornish Methods of Crushing and Ore Dressing. J. F. C. Abelspies. (Eng. and Min. Journ., May 11, 1907; 1 p.) Comments upon the causes and effects of the stagnation in Cornwall mining, and the revival in mining interest. 20c.

3521—TIN ORE DRESSING PLANT, East Pool, Cornwall. Edw. Walker. (Eng. and Min. Journ., May 18, 1907; 2 pp.) Describes the equipment and operation of this English concentrating plant, where tin oxide, wolframite, arsenical and copper pyrites, etc. are separated by stamps, concentrating tables, calciners and magnetic separators. 20c.

TUNGSTEN

3522—COLORADO—The Tungsten Deposits of Boulder Co., Colo. Wm. B. Greenawalt. (Eng. and Min. Journ., May 18, 1907; 1½ pp.) Gives notes on the geological formation of this tungsten district which now produces 80 per cent. of the United States output, and describes briefly the methods of concentration in use, and the present basis for purchasing tungsten ores. 20c.

3523—PORTUGAL—The Panasqueira Tungsten District, Portugal. W. Preus. (Eng. and Min. Journ., May 4, 1907; 1 p.) Brief general description of this Portugal tungsten district, with a few figures of production. 20c.

3524—RARE MINERALS: Their Present Industrial Status. E. C. Riebe. (Min.

Wld., May 4, 1907; 1 p.) Reviews the present condition of tungsten mining in the United States, and the uses of this metal in steels. 20c.

ZINC

3525 — GALVANIZING — Theory and Practice of Sherardizing. A. Sang. (Lead and Zinc News, May 6, 1907; 4 pp.) Discusses the principles of this new process of galvanizing, in which the article to be coated is enclosed in a retort with zinc dust, and heated to a high temperature, which causes the zinc to incorporate itself with the other metal, producing a better coating than the ordinary method yields. 20c.

3526—NEW SOUTH WALES—Broken Hill Zinc Field, New South Wales. R. Stokes. (Min. Wld., May 4 and 11, 1907; 2½ pp.) Outlines the conditions in this field, with special reference to the flotation processes of concentration. 40c.

3527—OKLAHOMA—Lead and Zinc Mining. W. R. Crane. (Mines and Min., May, 1907; 1½ pp.) A description of the ore occurrence in the Quapaw district of Oklahoma, and methods of mining and milling. 20c.

3528—PRODUCTION AND CONSUMPTION of Spelter in 1906. Walter Renton Ingalls. (Eng. and Min. Journ., May 18, 1907; 4 pp.) Gives statistics of production and consumption of zinc ore and spelter during 1906, and comments at length upon the interesting features which had bearing upon these factors. 20c.

3529 — SMELTING ZINC BLENDE — Gattierung von Zinkblende und Galmei. F. Juretzka. (Zeit. f. angew. Chem., May 3, 1907; 3½ pp.) Considers the smelting of blende and calamine from an economic point of view, and discusses the principles of smelter operation and administration which result in the highest efficiency. 40c.

3530 — ZINC BLENDE — Determination of Sulphur in Roasted Zinc Blende. V. Hassreidter. (Eng. and Min. Journ., May 11, 1907; 1 p.) Translated from *Zeit. f. angew. Chem.*, 1906, No. 4. Reviews various methods of estimating sulphur in roasted blende, with reference to the best means of getting at the sulphur present as sulphate and as sulphide. 20c.

ECONOMIC GEOLOGY—GENERAL

3531—BRAZIL—The Sedimentary Belt of the Coast of Brazil. O. A. Derby. (Journ. of Geol., Apr.-May, 1907; 18½ pp.) Discussion of the various fossiliferous districts of the sedimentary belt of the Brazilian coast. 60c.

3532 — CONNECTICUT — Preliminary Geological Map of Connecticut. H. E. Gregory and H. H. Robinson. (Conn. State Geol. and Nat. History Surv., Bulletin No. 7; 39 pp.) Sketches the history of Connecticut geology, and gives a summary of the geological formations in this State. 20c.

3533 — ECONOMIC GEOLOGY and Mineral Deposits—XI. F. C. Nicholas. (Min. World, May 18, 1907; 1 p.) Enumerates various minerals of economic importance, with a list of indications of their presence useful in prospecting. 20c.

3534—ILLINOIS—The State Geological Survey. H. Foster Bain. (Journ., West. Soc. of Eng., Apr., 1907; 18 pp.) Reviews the work accomplished by the State survey in regard to both geological and topographic investigations. 40c.

3535 — INCLINATION OF STRATA — Les Stratamètres. Appareils pour mesurer l'inclinasion des terrains. F. Hofer. (Génie Civ., Apr. 20, 1907; 2 pp.) Describes and illustrates the construction and methods of using various types of strata-meters, which are used to determine the inclination of strata at considerable depths. 40c.

3536—KANSAS—Economic Geology of the Independence Quadrangle, Kansas. F. C. Schrader and Erasmus Haworth. (U. S. Geol. Surv., Bull. No. 296; 74 pp.) Notes on the occurrence and development of economic minerals in this section of Kansas, including discussions on oil, gas, coal, clay and mineral water.

3537—Geology of Sierra Almoloya, Mexico. R. T. Hill. (Min. Wld., Apr. 27, 1907; 2½ pp.) Describes the geological material and structure of this Mexican district in Chihuahua, and discusses the fault and fracture systems, also the ore-bodies and their outcrops. 20c.

3538—NEVADA—The Renaissance of Nevada. (Min. and Sci. Press, May 4, 1907; 1½ pp.) Gives a general review of the revival of the mining industry in this State and forecasts the probable direction and extent of future prospecting. 20c.

3539—ORE DEPOSITION — Role of Metasomatism in the Deposition of Ore. E. A. Ritter. (Ores and Metals, May 5, 1907; 1 p.) Gives a few general statements as to the influence of metamorphism in developing ore deposits, with a few examples of such replacement. 20c.

3540—ORE DEPOSITION—H. W. Hixon. (Min. and Sci. Press, May 11, 1907; 1½ pp.) Gives a few arguments as to the likelihood that carbonaceous matter or hydro-carbon gases may be the reducing agent which has produced the formation of native metal ore deposits. 20c.

3541—ORE DEPOSITS of the Southwest. T. B. Comstock. (L. A. Min. Rev., Apr. 20 and 27, 1907; 2½ pp.) Conclusion of article previously mentioned in the Index. 40c.

3542—PODOLITE—Ueber Podolit, ein neues Mineral. W. Tschirwinsky. (Centralblatt f. Mineralogie, May 1, 1907; 3½ pp.) A brief account of the discovery and analysis of a new mineral podolite, which was found in South Russia in 1905, and which is a double carbonate and phosphate of calcium with the composition $3Ca_3(PO_4)_2CaCO_3$. 20c.

3543—TEXAS—The Geology and Water Resources of the Western Portion of the Panhandle of Texas. C. N. Gould. (U. S. Geol. Surv., W. S. and I. Paper No. 191; 70 pp.) Describes the occurrence and geological features of the water-bearing formations of this district, and the relation of springs and deep-seated waters to the irrigation problem.

3544 — WESTERN AUSTRALIA—The Prospects of Obtaining Artesian Water in the Kimberley District. R. L. Jack. (Geol. Surv. of W. A., Bull. No. 25, 1906; 46 pp.) Gives the itinerary of a prospecting trip in the Kimberley district made to determine the possibility of obtaining artesian water, and gives descriptions of the existing wells and bores.

MINING—GENERAL

3545—AIR MIXTURES—Note on the Adiabatic Volume Change on Mixing Two Gases. Alfred J. Lotka. (Eng. and Min. Journ., May 18, 1907; 1 p.) Gives a general investigation by mathematical means of the changes which occur in the total volume of two quantities of gases originally at different temperatures, when they are mixed without chemical action. 20c.

3546 — AUSTRALIA — Mineral Production of Eastern Australia. F. S. Mance. (Eng. and Min. Journ., May 18, 1907; 1 p.) Gives the official returns of the several states of Eastern Australia of the production of copper, tin, silver-lead and gold, and discusses the year's developments. 20c.

3547—CUBA—Mining in Cuba. R. E. Holaday. (Min. World, May 18, 1907; 1 p.) Abstract of a Consular Report dealing in a general way with the mining conditions in Cuba. 20c.

3548—DIAMOND DRILLING—The Deflection of Boreholes in Diamond Drilling on the Rand. A. Zboril. (Journ. So. African Assn. of Engrs., Mar., 1907; 7½ pp.) Considers briefly the advantages and disadvantages of various types of boring tools, and discusses the various factors which cause deflections in diamond drill holes. 80c.

3549—EXCAVATION—Municipal Excavation by Electric-Hydraulic Mining System. F. C. Perkins. (Western Electrician, Apr. 27, 1907; 1 p.) Brief account of the utilization of electric power to produce a head on a stream of water sufficient to allow it to be used for excavating purposes. 20c.

3550—EXPLOSIVES—Home-made Explosives. (Mines and Minerals, May, 1907; 1 p.) Points out the danger of making explosives by inexperienced persons, and discusses the unreliability of chlorate of potash explosives. 20c.

3551 — EXPLOSIVES — Some Points in Connection with Powder Manufacture. G. d'A. Belin. (Yale Sci. Monthly, Apr., 1907; 5½ pp.) Gives some interesting facts connected with the manufacture, storage and handling of powder. 40c.

3552—HONDURAS—Mining in Honduras. H. G. Nichols. (Min. and Sci. Press, May 11, 1907; 3 pp.) An outline of mining conditions in this country where reliance upon native methods has often led to the abandonment of development work at the appearance of the first fault in the vein, and where persistence and modern scientific methods will give excellent returns. 20c.

3553—LABOR IN MEXICO. (L. A. Min. Rev., Apr. 27, 1907; 1½ pp.) Describes the peculiar characteristics of Mexican native labor and points out the advantages of using a sliding scale of payment per unit of work accomplished as being the means of obtaining greatest efficiency from this class of workmen. 20c.

3554—LABOR—Italians as Mine Workers. R. B. Brinsmade. (Eng. and Min. Journ., May 4, 1907; ½ p.) Describes a few characteristics of Italian laborers in mining work. 20c.

3555—LABOR PENSIONS—Insurance of Labor in Germany. (Engineering, Apr. 19, 1907; 1½ pp.) Outlines the development of the present system of compulsory insurance of employees in Germany, and describes the operation of the old age pension system. 40c.

3556—MEXICO—Mines and Prospects of Sierra Almoloya. R. T. Hill. (Min. Wld., May 4, 1907; 1 p.) Very brief description of several of the principal mines in this district. 20c.

3557—MINE SUBSIDENCE. A. Richardson. (Journ. Chem., Met. and Min. Soc. of South Africa, Mar., 1907; 9 pp.) States several theories as to the factors which cause mine subsidence, and attempts to determine formulas whereby the amount of subsidence may be calculated, knowing the compressive strength of the rock composing the overlying strata. 60c.

3558 — MINE SUBSIDENCE. J. P. Johnson. (So. African Mines, Apr. 20, 1907; 1 p.) Deals with the cause and prevention of subsidences in mines, and shows how various careless practices in mining may result in bad accidents of this character. 20c.

3559—NEW SOUTH WALES, The Mineral Industry of. F. S. Mance. (Eng. and Min. Journ., May 11, 1907; 2 pp.) Gives statistics of production of the principal minerals and metals of this state, and comments upon the development which the industry has undergone since 1905. 20c.

3560—NEW ZEALAND—The Mineral Resources of New Zealand. J. McCombie. (N. Z. Mines Rec., Mar. 16, 1907; 12 pp.) Deals with the present condition and future prospects of the mineral resources of this island, and the best means of fostering their development. 40c.

3561—PHILIPPINES—Mines and Minerals in the Phillipines. T. Chase. (Eng. and Min. Journ., May 4, 1907; 1 p.) Describes the mining situation in the Philippines as regards coal, iron, copper, lead and gold. 20c.

3562—PROSPECTING in Ungava. J. C. Murray. (Can. Min. Journ., May 1, 1907; 3 pp.) Gives an account of a prospecting trip made by a party in this Canadian region, with descriptions of the rocks and minerals encountered. 20c.

3563—PROSPECTING with Keystone Drill for Copper Ore in the Ely, Nevada, District. C. E. Hart. (Eng. and Min. Journ., Apr. 27, 1907; 1 p.) Gives a general account of the use of churn drills in this copper district, with statement of drilling costs. 20c.

3564—ROCK EXCAVATION at the Northampton Quarries of the Atlas Portland Cement Co. W. R. Hulbert. (Eng. Rec., May 18, 1907; ½ p.) Contains a general account of the methods of blasting rock used by this company, which found it more economical to substitute well-drilling machines for rock drills. 20c.

3565—SHAFT—Die nachträgliche Betonierung alterer in Holzausbau stehender Schächte. (Bergbau, Apr. 11, 1907; 1 p.) Gives an example of preserving a wood-lined shaft which had started to decay, by lining on the inside with brick and concrete, with but small reduction of the area. Sections of the shaft before and after the operation are

3566—SIBERIAN MINES and Mining given. 20c.

Conditions. A. L. Simon. (Paper read before the Instn. of Min. and Met., May 16, 1907, advance sheets; 27½ pp.) Gives a brief general outline of conditions in Siberian mining districts, dealing more especially with the methods of traveling, and the supplies necessary to be taken on trips.

3567—SOUTH AFRICA—The Centralization of Power Production on the Rand. Edward Walker. (Eng. and Min. Journ., May 18, 1907; ½ p.) Outlines mining conditions on the Rand where the peculiar aspects of the mining situation make it essential to adopt trust methods in the interests of profitable exploitation. 20c.

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