

**THE ENGINEERING AND MINING JOURNAL**  
MINING AND METALLURGY ESTABLISHED 1866

VOL. LXXIX

No. 19.

PUBLISHED EVERY THURSDAY  
 505 PEARL STREET, NEW YORK.

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 CABLE ADDRESS. "ENGMINJOUR" NEW YORK.

BRANCH OFFICES.

CHICAGO ..... 520 Monadnock Block  
 DENVER ..... 206 Boston Building  
 SALT LAKE CITY ..... 1529 Second East St.  
 BUTTE, MONTANA ..... 19 & 20 Owsley Block  
 SAN FRANCISCO ..... 168 Crocker Building  
 LONDON, ENGLAND ..... 20 Bucklersbury, E. C.

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

To Foreign Countries, including postage, \$8.00 or its equivalent, 33 shillings; 32 marks; or 40 francs. Notice to discontinue should be written to the New York office in every instance.

Advertising copy should reach New York Office by Monday morning of issue week; changes of copy by the preceding Thursday.

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

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 THE ENGINEERING AND MINING JOURNAL.

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

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**EDITORIAL.**

OUR LONDON correspondent refers to West Australian affairs in a manner which will prove interesting. It is much to be regretted that the blunders made by the directors of one or two prominent companies are to be brought into court by reason of their quarrel with the engineers to whom, in a moment of self-illumination, they gave a free hand. Recent annual meetings of the companies operating the Boulder Perseverance and the Golden Horseshoe mines are calculated to make the judicious grieve and the cynic howl. A great deal of first-rate ability, not only on the directorates in London, but on the engineering staffs at Kalgoorlie, is robbed of its efficiency by reason of share speculation. Engineering and gambling must ever make uncomfortable bed-fellows.

THE STOCKS of iron ore on Lake Erie docks on May 1, the date accepted as the opening of the season, were the lightest in a number of years. The demand for ore at the furnaces has been heavy since the opening of the year, and shipments have been much larger than was expected last fall. It has even been reported that some furnaces would be forced to shut down, on account of short supplies; but this has not been the case. The first cargoes of ore have now reached the lower ports, and abundant supplies will soon be at hand. The mines in the Lake Superior region are generally preparing to make larger shipments, and a heavy tonnage will be carried down the Lakes this season, without doubt.

THE COMPLETION in this issue of the series of papers contributed by Mr. Dwight E. Woodbridge, and the paper on the 'Clinton Hematite' by Mr. Edwin C. Eckel, point an illustration to one side of the saying of Bismarck, quoted in the current number of *L'Echo des Mines et de la Metallurgie*, that "A nation without coal and iron is a nation half disarmed." When Bismarck took Alsace and Lorraine from France, he took also the rich iron mines which have helped to make Germany commercially independent. But France, stimulated by dire necessity, found the same beds within her borders near Briey, deeper but richer, and as permanent. This with the coal basins associated with, and under, the iron has contributed to make France less dependent in

respect of these two great metallurgical units of commerce; and so comes another illustration of the fundamental importance of metallurgy in the industrial growth of the nations.

THE LONGWALL method of coal mining is an example of the use of natural forces in assisting engineering. The development, the use, and the control of a roof pressure which concentrates its action directly at the face mined, while the débris is piled in long walls to afford security in the rear-approach, is a case of natural mechanics well worked out by the simple but toilsome method of experience. Many accidents, many failures, and many successes are epitomized in this old method of coal extraction. The paper by Mr. J. T. Beard on another page is a timely description of the utilization of practical geology and engineering in the cutting and breaking of coal.

THIS TIME it is argentiferous radium which bears the brunt of a presuming novelty. Our lively trans-Atlantic contemporary, *L'Echo des Mines et de la Metallurgie*, notes as a brilliant Italian invention an alloy composed of copper, iron, silver, phosphorus and radium. The result of this wild alloying of old comrades is a "metal harder than steel, as brilliant as gold, from which it cannot be distinguished, and as good a conductor as copper." But better than this, for it bears the stamp of the best medieval alchemy, this 'argentiferous radium' "weighs less than copper, and changes not its beautiful color with any physical or chemical agent." The name of the thrifty patent owner is coupled with the greatest of European bankers. It is interesting, if true. We will go further—it is interesting if only half true.

AN INTERESTING experiment was tried last year at the Ferreira mill, in the Transvaal. Concentration over Frue vanners was abandoned, amalgamating plates were attached to the old vanner frames and the pulp from the battery was passed over these improvised shaking plates. This is a development out of the old experience that gold is caught on the narrow strips of plated copper carried by the distributing box of the vanner. At the Langlaagte mill, more recently, the ordinary aprons have been replaced by a shaking amalga-

mated plate. It is erected immediately in front of the mortar and has a transverse reciprocating motion, the mechanism being placed underneath so as not to hinder either the dressing of the plates or the clean-up. During a month's trial it was found that the tailing from the ordinary plate averaged 4.42 dwt. fine gold, as against 3.27 dwt. in the case of the shaking plate, an identical ore being fed to both. Other millmen have made similar experiments from time to time, and the statement of their results would contribute toward an improvement in the process of milling gold ore.

THREE ACCIDENTS have occurred at collieries in the anthracite region within six months, from the breakage of hoisting ropes. The latest, at the Conyngham colliery, was especially fatal, as the car, which fell from near the top of the shaft to the bottom, carried a number of miners on their way into the mine, to work. At most anthracite collieries the hoisting ropes are closely watched; but this does not seem to have been sufficient. Possibly more investigation into the causes of the failure of hoisting ropes is needed.

THE ARTICLE on crushing machinery, by Mr. Philip Argall, appearing on another page, will command the attention of millmen. At the present time there is much discussion on the subject, both in the Lake Superior region and on the Rand. At the moment when the steam stamp has attained a duty of 715 tons per day, and the gravity stamp as much as six tons per day, it is being questioned whether either of them is the most economical machine. The only comment we venture on this occasion is to emphasize the fact that the stamp-mill is pre-eminent in gold mining because it permits of mechanical reduction concurrent with chemical treatment; it crushes the ore and amalgamates the gold. As a pulverizer, the stamp is a clumsy, but simple, device; as a method of extracting gold, the grinding and pulsating movements within the mortar afford anything but ideal conditions; but as a dual process, of crushing and extracting, stamp-milling is simple, cheap and effective. When, however, the stamp-battery ceases to be an amalgamating machine and is used for crushing, grinding or pulverization only, it has rivals better adapted for the purpose. Therefore, as the cyanide annex encroaches on the stamp-mill, and the amal-

gamating feature of the preliminary treatment in the mortar becomes less important, the tendency to hurry the crushing renders the mechanical features of stamp-milling more important than the chemical, until finally amalgamation is discarded and the battery merely reduces the ore preparatory to cyanidation or chlorination, as the case may be. Under such conditions the engineer will find it advisable to consider the use of the gyratory crusher in front of the Huntington and Chilean mills, the tube, ball-mill, and other pulverizers capable of delivering a product variously adapted to leaching and to concentration.

#### The Washington Meeting.

The recent meeting of the Institute was distinctly successful. All the auspices were favorable; there was the gracious beauty of the political capital, gay in the garments of spring and wearing the air of Paris in May; the scientific corps of the Survey, men of social experience and wide sympathies, gave a warm welcome; there was plenty of individual, as there was of collective hospitality; but what made the meeting successful in a more serious sense were the discussions which were started. They were only started; when people are on pleasure bent, when scientific debates are sandwiched between receptions and excursions, all encroaching on limited time, it is not likely that even those most interested will listen restfully or criticise philosophically. There is too much interruption from those who come and go; each speaker treads on the heels of another, or is afraid to claim an attention which too obviously is inclined to waver. But these conditions are typical; it is amid such social unrest that technical science is developed today. However, despite all distractions, three dominant notes were sounded with sufficient clearness to render the meeting memorable. The president, Mr. James Gayley, contributed further data on the application of dry air to the blast-furnace, and added valuable information concerning a development in iron metallurgy which has claimed the attention alike of academic metallurgists and practical ironmasters in Europe and America. Out of a suggestive paper by Mr. James P. Roe there grew a keen debate concerning the comparative value of wrought iron and steel for certain purposes. The liability to corrosion and the variation in tensile strength, as observed in the use of these two materials,

came up for animated discussion, and are likely to find echo in later papers. As Washington is, to the mining fraternity, the center of geologic thought, it was proper that an important paper should treat of geology in relation to ore deposits. Such was that of Mr. James F. Kemp, whose oral abstract of his paper, on the contact deposits of Tamaulipas, furnished one of the distinctive features of the meeting. In its assemblage of observed fact, chemical foundation and inductive reasoning, this paper afforded a model of efficient work; the professor of geology in Columbia University has set us an example of scientific investigation. The occasion afforded no opportunity to discuss this paper adequately, nor to ventilate the opinions of geologists on another wide subject, 'The Origin of Magmatic Waters,' which Mr. Arthur C. Spencer brought forward in a thoughtful essay. A satisfactory exchange of views on deep subjects is hardly practicable on such occasions; but they serve their main purpose, to stimulate thought and to give the added impulse which comes from contact of personality. In these respects the Washington meeting succeeded notably.

#### Reinforcement of Material.

The elasticity of invention, in sympathetic adjustment to uses far different from the original, is well illustrated in a casual bit of wrapping-paper from a well-known French publishing house. Reinforced concrete and cement, reinforced glass, even reinforced steel, as shown by such metal groupings as the sheets of chrome-steel interlocked with softer layers—all these are matters so well known that they need only be mentioned for illustration. The instances of the utilization of the idea are as old as the use of lath and plaster, which is perhaps one of the oldest cases of reinforcement. But the use of reinforced paper—a thin layer of common wrapping-paper, glued to a thin and coarse network of jute fiber—this is a distinct case of the cleverness of simple common sense; the result is a wrapper which combines the maximum of strength and lightness. This same principle finds almost countless illustrations in nature: from the fibro-vascular framework of trees with the more fragile load of lighter cell work, to the micaceous network of granite; from the spongy mineral sub-structure of bone, to the cords, tendons

and ligaments that carry and tie muscle to bone—the mechanical idea is as wide as the principles of mechanics.

The fibrous structure of wrought iron and mild steel is another case in point. But the illustrations are not found only in the material world; they stand forth in the mental world, and nowhere better than in the field of engineering. The executive ability of a superintendent of a mine, mill or smelter is the framework which unites and carries the filling of both labor and capital. This executive ability, and in whatever field of production or commerce, is an impressive illustration of reinforcement; but the woof needs the warp; executive ability needs, and is needed by, its filling material, or like the engineer of old, each will vainly cry, "Give me where I may stand." The principle of reinforcement is inwrought in nature.

#### The Chemistry of Flame.

According to recent experiments, the electrical conductivity of the luminous gas-flame is only two-thirds as great as that of the non-luminous part. In the acetylene flame, the conductivity of the luminous part is only one-fifth that of the non-luminous. The conductivity of the non-luminous part is also more highly increased by spraying with catalytics (such as common salt) than is the similar conductivity of the luminous part. These results are of the greatest significance. The fundamental difference between the oxidizing action of the outer or non-luminous, and the reducing action of the inner or luminous, part of the blowpipe flame is as old as metallurgy. It brings up tender memories of the days when we thought we knew it all, just because we could 'determine' almost any quizzical mineral with the aid of the blowpipe. But the problem of the furnace tuyere is as great as the widest possibility of modern science. We now learn that the relative inherent activities of flames are conditioned, not only by the chemical states and tendencies described by the words 'oxidation' and 'reduction,' but more than that, by the physical condition; and this means the degree of dissociation of molecules into those omnipotent ions—for this is the plain English of electric conductivity. The blue or colorless flame is not only relatively an oxidizer, but it is a more active agent, relatively, than the more sluggish luminous and reducing flame. That this all applies to the tech-

nique of the furnace foreman cannot be doubted; and it would be quite in keeping with the humor of history for the laboratory theorist with his ions and conductivities to develop a clean hypothesis, only to find that commercial practice had arrived there long before, though giving the result another name. But all the same, the activity of the non-luminous flame knocks at the door with its modest message. It may be that the ion has nothing to do with metallurgy, though it is hardly probable; and it may be that metallurgy in its overalls would repudiate this young academic enthusiast; but the most rational view is that the two can cordially unite their experience to a better understanding and practice of dry smelting.

#### The California Debris Act.

A suit has just been begun in California, which is exciting a great deal of interest, because it may end in a wide extension of the jurisdiction of the Débris Commission, appointed under the Caminetti Act. This act, as is well known, explicitly forbade hydraulic mining in the drainage basins of the Sacramento and San Joaquin rivers, except under the regulations for impounding tailing to be established by the Débris Commission. The Commission has, under that act, regulated mining of that class, and prohibited it in all cases except where special dams or other provisions were made for holding the tailing. In the act, it is specified that hydraulic mining should be governed by the definition prevailing in California. The State legislature has legally defined such work as "mining by means of a screened water under pressure thrown against a natural bank."

In the present case, warrants were sworn to by a member of the Commission, and issued by the district court against certain miners in Nevada county, two of whom, A. G. Jones and G. H. Alpers, were arrested and held for trial. The charge against them is that they allowed tailing from their gravel mine to enter Deer creek, which is a tributary of one of the streams named in the act. The men, however, were not carrying on hydraulic mining, but sluice mining; that is, the gravel was dug and shoveled into the sluices where it is washed out by water. These sluice operations are necessarily on a very much smaller scale than hydraulic mining; nevertheless the Commission claims that they are

against the law, because the tailing passes into the rivers. The inference is that the Débris Commission will take cognizance of all forms of mining where waste, or tailing, is deposited in any stream or place from which it will finally reach a navigable stream.

It is understood that the defence in this suit, which will be regarded as a test case, will be that the Caminetti law is unconstitutional. It is also probable that another line of defence will be that the sluice mining is not properly included under the act. In itself, this class of mining is not of such importance, nor is it likely to lead to any important increase in the débris carried into the rivers. Some of the quartz mines, which are situated on tributary streams, are really greater offenders in the matters of débris, and it is assumed that action will be brought against them also, should the Commission succeed in maintaining its indictment in the present case.

#### Market Conditions.

May 10.

The metal markets remain generally in a quiet condition, with no marked changes from last week. In copper, domestic buyers are still holding their waiting attitude, apparently hoping that large production and other features of the situation may bring about a somewhat lower range of prices. Abroad matters seem to be still hesitating, on account of the war situation.

In tin there have been only moderate fluctuations. The demand for lead continues steady, with no marked change. Spelter also shows little variation.

Silver has been quiet, under the effect of a moderate demand from the East, and shows only small variations in price.

In the iron and steel markets a period of waiting seems to be upon us. New orders continue moderate only, and there is a slight tendency to weakening in the price of raw material, although the prospects for consumption continue good. Buyers, however, seem to be convinced that they will not be benefited by haste.

In the Western coal markets business continues moderate for local demands, and there is still a surplus pressing on the market, especially of the lower grades of coal. The lake trade is not opening strongly, but there are hopes that it will improve. In the East the markets are quiet, both for bituminous and anthracite trade.

#### The Institute.

The thirty-fifth annual meeting of the American Institute of Mining Engineers was held at Washington during the past week. On Tuesday evening, of May 2, the opening session was convened at the Arlington Hotel. Mr. James Gayley presided. Mr. Macfarland, one of the commissioners for the District of Columbia, gave an address of welcome. Mr. Charles Kirchoff reported progress in connection with the Carnegie building for engineers, and the Secretary explained the recent incorporation of the Institute and the reason for it. Biographical notices of Lowthian Bell, prepared by Mr. Henry M. Howe, and of Thomas M. Drown, by Dr. R. W. Raymond, were read by the latter. Both were papers of unusual interest and stimulating to individual endeavor; the reading of them was followed closely. An informal reception followed. On Wednesday morning the members met again at the Arlington, but by reason of the noises, it was found desirable to migrate across the road to the Cosmos Club, the directors of which had kindly offered the use of an excellent lecture room. This session was devoted to papers on the metallurgy of iron, more especially blast-furnace practice, as affected by the application of dry air. Mr. Gayley, the originator of this method, replied to sundry criticisms of his paper, read last October, on 'The Application of Dry-air Blast to the Manufacture of Iron,' and contributed additional data. The discussion included contributions from such authorities as Richards, Saniter, Foster, Howe, Pendred, Thwaite and Purcel.

In the afternoon a session was held at the National Museum. The paper of Mr. James P. Roe, general superintendent of the Glasgow Iron Company, on 'The Production and Characteristics of Wrought Iron' started an animated discussion on the relative value of wrought iron as compared to steel; it was shown that wrought iron is preferable for many uses, notably for sheets, wire and piping. It seemed to be the opinion that wrought iron was less easily corroded. Dr. Charles D. Dudley maintained that in the case of car-axles wrought iron could be safely used of a tensile strength lower than that of steel. Mr. C. E. Stafford and Mr. Cushman of the Department of Agriculture took part in the discussion. Mr. Richard Rathbun, who is in charge of the Museum, gave an address of welcome, and Mr. George P. Merrill, the curator, explained the manner in which the mineral collections, in the department of applied geology, are arranged. An hour was spent under courteous guidance in examining the collections, the giant fossil of the new *tri-ceratops* winning special attention.

On Thursday morning the session was started with Mr. M. R. Campbell's paper upon 'A Classification of Coals and Lignites based upon Ultimate Analysis.' This led to some interested discussion. Then

Mr. James F. Kemp, of Columbia University, presented an oral abstract of his paper on 'The Copper Deposits of San Jose, Tamaulipas, Mexico.' He demonstrated by observations and by analyses that the garnets of this ore-bearing contact, between limestone and diorite, were derived not from the original limestone but through the agency of the mineralizing waters associated with the irruption of the diorite. Dr. Raymond referred to similar occurrences at Cananea, and Mr. Marcus White also contributed a few remarks. Mr. A. C. Spencer followed with two papers, one on 'The Origin of the Magmatic Vein Waters in Alaska' and the other on 'Gravity as a Direct Cause of Vein Fractures.' These were highly suggestive contributions, but the imminent departure of the members on a pleasure excursion prevented the commencement of any serious discussion. At noon the members and their friends took a steamer for a river excursion to the Ordnance Proving Grounds, at Indian Head. A planked-shad dinner was served at Marshall's Point and the return to Washington was timed so as to permit of attendance in the evening at a private view of the Corcoran Gallery of Art.

Mr. S. F. Emmons acted as chairman of the local committee and Mr. J. M. Boutwell served as secretary. To them and to other members of the Geological Survey the success of the meeting was largely due.

Dies made of sapphire or diamond are used for drawing fine wire. Steel is too soft, as the opening enlarges by wear.

The mineral monazite shows directly in bright sunlight the absorption spectrum of the rare earths of the didymium group. This is a good case of solid solution, the chemical salt in the mineral being solid and yet optically active as though ionized in water solution.

Radium compounds throw off gaseous emanations which themselves possess radiant properties. These exhalations can so infect a room (or a building) as to render it unfit for experimentation, by conferring on it a kind of secondary activity. Hence radium compounds should be kept sealed up as far as possible. This is on the recommendation of A. S. Eve in *Nature*.

Phosphorescence and radium, according to G. T. Bailby, seem to have some connection in the effects produced by the beta and gamma rays. A polished lens of rock crystal, after four days' exposure, showed a brown discoloration at the spot where the rays entered. This spot afterward faded, but was temporarily regenerated with bright phosphorescence by gentle heating.

## DISCUSSION.

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

### PYRITE SMELTING.

#### The Editor:

Sir—Having just read the favorable comments on pyrite smelting and the use of hot blast, by your Mr. Charles S. Palmer, in the JOURNAL of March 30, I thought it an opportune time to add a little more, through your valued columns, to this important subject. In regard to the amount of copper necessary to collect the gold and silver, this depends on the amount of zinc with which the metallurgist has to contend. I know from experience that, with considerable zinc, 5% Cu in the charge gives much cleaner slag than only 0.5% Cu, even when making a much richer matte in Au and Ag, and smelting the same character of ore.

Alumina, for convenience, can be classed as silica, and I prefer to limit its use to 12% in the slag. To be exact, when figuring a bi-silicate slag for copper smelting, the formula would be:  $2Al_2O_3 + 3FeO = 48.8\% Al_2O_3$ , that is, 2O in the acid to 1O in the base, classing the  $Al_2O_3$  as an acid, which corresponds to the formula:  $FeO + SiO_2$  slag = 45.6%  $SiO_2$ ; or  $CaO + SiO_2$  slag = 51.9%  $SiO_2$ ; as the proportion of  $Al_2O_3$  in the slag increases, the amount of  $SiO_2$  should be reduced. To allow the  $SiO_2$  and  $Al_2O_3$  together to get above the bi-silicate limit will eventually cause trouble.

A silicious slag for copper smelting seems to be the most suitable for concentration and clean work. Of course, with plenty of Cu and good matte-fall, the danger of loss is lessened; first, by having plenty of Cu and matte to gather value; and, second, by the fact that there is a smaller proportion of slag to act as a means to carry off value.

An acid slag, especially when low in Fe, requires more heat than a basic slag, and for this reason; it is necessary to use 4 or 5% coke in the charge in hot-blast smelting, to avoid accidents, especially when there is danger of trouble with belting, pulleys, etc., as in the case of a new, small plant attempting to do all its work with one engine and machinery generally poorly arranged.

The heat applied to the furnace from the outside, by means of hot blast, is more effective for economy, rapid smelting, and other advantages; but the furnace cannot be banked for any great length of time without preparing for it by first adding several charges with extra coke. These extra charges should consist mostly of slag or oxidized ore, on account of the extra coke (reducing agent) added.

The metallurgist of a custom copper-smelter often finds himself 'between the devil and the deep sea'; he has no iron,

except as a sulphide, and that in limited amount, which compels him to make a silicious slag, high in lime. To avoid trouble with this character of slag (and, perhaps, accidents with poor machinery) he should use 5 or 6% coke on the charge—nearly one-half the normal amount used with cold blast. On the other hand, the use of too much coke prevents the necessary concentration to force the Fe (which he must have) into the slag, and the elimination of impurities, such as Zn, Pb, As, etc., which should not be allowed to enter the matte.

The metallurgist can be saved much trouble and worry by having the capital necessary to enable him to wait for proper ore mixtures, and to repair or set up proper machinery so as to avoid accidents; indeed, important parts should be duplicated.

S. E. BRETHERTON.

Val Verde, Ariz., April 10, 1905.

### GOLD IN SEA WATER.

#### The Editor:

Sir—I note the article on 'Gold in Sea Water,' by "Alchemist," in the JOURNAL of April 20, 1905. He states, according to his reasoning, that "the gold atom in sea water is in the free ionic uncombined state." If I understand him, I take a somewhat different view of the matter and would object to the term 'uncombined.'

In a solution of auric chloride we have both gold and chlorine ions. By adding silver nitrate, we precipitate the chlorine, leaving gold ions and ions of  $NO_3$ . These ions may be considered either in combination or as free and uncombined.

We will now consider a solution of auric chloride, and will concede that the gold and chlorine ions are entirely independent. Now add stannous chloride and the gold is precipitated as metallic gold. The stannous chloride absorbs the chlorine ions and the gold comes down, seemingly because it can not exist in the ionic condition without the presence of its corresponding chlorine ions carrying an opposite electrical charge. The stannic chloride formed also dissociates, forming ions of tin and chlorine; proof of this is that stannic chloride gives a precipitate with silver nitrate; but these chlorine ions apparently are taken care of by the tin ions of the stannic chloride molecule. The solution of auric chloride contained gold and chlorine ions; and that of the stannous chloride tin and chlorine ions. When the two solutions are mixed there is evidently some reaction between the tin ions and chlorine ions of the auric chloride, even though all the chlorine present remains in the solution in the ionic condition. There is evidently some change of electrical charge of the tin ion as its valence is increased. The chlorine ions, which were formerly part of the auric chloride, have become a part of the stannic chloride, although they still exist as ions and possess the same electrical

charge, as their valence has not been changed. If no change takes place among the chlorine ions of the auric chloride, and if there is no connection between gold and chlorine ions in this solution, there should be no precipitation of gold on mixing the two solutions. It would seem to me that no ion of gold, or any other ion, can exist in a solution unless there is a corresponding ion of an opposite electrical charge in the same solution.

If we have, say, one thousand each of sodium and chlorine ions in a solution, the thousand of the one can not exist as ions without the presence of the other thousand, no matter how many ions of the same element there are present which belong to other compounds.

L. K.

Mapimi, Durango, Mex., April 20, 1905.

### THE COST OF MINING.

#### The Editor:

Sir—Mr. Ingalls' very pertinent article, 'Cost of Mining in America,' brings up a subject meriting the broadest discussion. There are few of us who have managed mining properties who cannot add something to the general fund of knowledge in this department. My own custom has been always to keep a monthly record, and at the end of the year to make a full general report in the form of a statement of cost and production. I happen to have retained a copy of one of these reports made several years ago, and no harm can be done now by making it public.

The results may not be 'standard,' but when it is taken into account that we were 60 miles from even a wagon road, and that the lode was only from  $2\frac{1}{2}$  to  $3\frac{1}{3}$  ft. wide, and the orebodies small and scattered over three-fourths of a mile on the strike, it will be seen that worse might have been done. Of course, in a report of this nature, only the general headings are required, and these sift down to:

#### Cost per ton:

- Prospecting and dead work.
- Ore extraction.
- Ore reduction.
- General expenses and sundries.

To determine these a more or less detailed series of accounts must be kept. In my own work, I have considered a few general subdivisions only as necessary, although strict account is kept of everything in detail. For instance: In my 'statement of costs,' etc., ore extraction is what is usually classed as 'mining,' and this I consider as made up, for the purpose of this report, about as follows:

#### Mining:

##### Assay department:

- Labor.
- Materials.
- Sundries.

##### Ore breaking:

- Labor } Including same for tim-
- Materials } bering, etc.



of some well informed co-workers who, because it all seems so simple to them, refrain from giving valuable experience to the profession at large.

E. A. H. TAYS.

Fuerte, Sinaloa, Mex., Feb. 16, 1905.

### Testing Mine Cages.

SPECIAL CORRESPONDENCE.

The failure of safety appliances on mine cages to act at the critical moment, culminating in the catastrophe at the Conyngham colliery in the anthracite region, in which men were dashed to death, caused something approaching consternation among mine inspectors, operators and miners. In no less than three instances within the last twelve months the dogs attached to the cages refused to act when the rope broke, involving the loss of over 30 lives in all. Such a fatal coincidence was so alarming that Chief Inspector James Roderick of the Bureau of Mines issued a drastic order that every mining cage in the anthracite region should be immediately inspected, and a specific test made of the ability of the automatic appliances to perform effectively the functions that were expected from them.

The dogs, or semi-circular clamps, made of brass, are attached under the floor of the cage and are connected with the cable to which the cage is attached. While the cable is taut and holds the cage in its normal position, the dogs remain in their place; but should the cable break, or slacken, the dogs are released, fly out and catch the timbers. The mechanism, when successfully acting, is simple, effective, and scientific. The weight of the cages drives the dogs the deeper into the guide grooves the greater the weight of the cage itself. When acting effectively, the dogs will hold a car filled with coal, approximately four tons in weight.

There are many theories as to the failure of this device to act in the recent mine disasters. It is necessary to allow a certain space between the cage and the guide timber for the play of the cage in traveling up and down, so not to interfere with its action. This space is a little more than one inch. What is known as a flange is attached to the cage and travels on the guide. Under the flange the dogs are attached. It is therefore evident that when the dogs are released there should be no hindrance in that small space to their catching immediately to the guides and promptly holding the cage in the shaft.

Sometimes the guides become so worn by constant use, especially when the same shaft is used for the men and the coal cars, that they cannot reach the guides and cannot, consequently, stop a released car. It is also asserted that, in some cases at least, the dogs have been allowed to rust, and would not work at the moment when men's lives were depending upon

their instantaneous action. Theories in the face of accomplished fact have not much weight with the miners whose lives depend upon the infallible and automatic ability of the dogs to catch in the guides, and the guides to hold up the dogs. It was little wonder, therefore, that they became considerably alarmed after the Conyngham disaster.

Leaving theories aside, Mr. Roderick determined that the only feasible method of testing the availability of the safety appliances was to withdraw the pin that connects the cage with the cable and let it fall toward the bottom. If the dogs did not act, the cage would fall to the sump, and if they did, it might be assumed that the cage was safe.

The mine inspectors were also instructed to examine the cables. The examination of the rope, in the nature of things, could only be conventional and unscientific. The cables are frequently and thoroughly examined by the mine officials, but flaws and defects that at any moment may lead to disaster are not superficial as a rule. The strength of a cable is only that of its weakest part. In this matter, however, no precautions were deemed to be superfluous by the Bureau of Mines.

The examination of the cages has gone on during the week in a thoroughly practical and efficient manner. All the mines are under inspection, and the engineering staff of each mine is not merely giving the inspectors every facility in their work, but is assiduously co-operating with them in their examining tests. Strange to say, at the very first mine examined the dogs did not act, and the cage was dashed to pieces at the bottom of the shaft. On Monday, Mine Inspector P. J. Moore visited the Peck shaft of the Mount Jessup Coal Company. The circumstances at the mine seemed highly favorable. The cage was practically new; the guide timbers were believed to be the truest in Mr. Moore's district, and generally speaking the shaft was regarded as the best that could be selected for a circumspect and rigid examination. The shaft is 426 ft. deep. At a point about 157 ft. from the bottom a portion was found wet, which made the timbers oily and slippery, so that the dogs would be less likely to act at this spot than at any other. Here, of course, the danger was greatest. Miners in the cage would have little chance of escape from death from a fall from this point in the shaft. Mr. Moore planned the details of the test with the utmost care. As the test made at this shaft was followed practically at all the other mines, a description of the *modus operandi* of the examination made here will practically do for all, although the details have varied more or less at each colliery.

In the first place, a piece of hemp rope was attached to the cage and the cable. It was intended that the hemp rope should

hold the cage in the event of the dogs refusing to act. In case they did not act, Mr. Moore intended another test should follow by cutting the hemp rope and letting the car fall once more. As soon as the pin attaching the cage to the cable was withdrawn in this instance the car shot down the shaft and was hurled to the sump at the bottom and shattered into fragments.

The same dogs refused to act at the mine on Wednesday with a new cage, and the cage would have been dashed to pieces like its predecessor were it not that timbering had been purposely adjusted to hold it in such a case. Inspector Moore then ordered the shaft to be shut down until new dogs were placed in position. This was done and next day the test repeated. The new dogs acted satisfactorily, and Inspector Moore expressed himself satisfied with the mechanism.

A large number of mines have been inspected throughout the Lackawanna valley during the week, and it is gratifying to have the record that in each instance the dogs acted instantaneously and effectively, an empty coal car being placed in the cage as being equivalent, for the test purposes, to 12 or 14 men.

The tests are carried out by the mine inspectors with the utmost care. It must not, however, be supposed that these tests have been made only on this occasion. All the companies have repeatedly tested the safety apparatus for their own protection, as well as to satisfy the inspectors.

### Carborundum in a Meteorite.

The discovery of carborundum in a meteorite is opportune. It marks another of those independent coincidences where artificial production anticipated the knowledge of natural occurrence. The event and the fact are accompanied by many parallels in the history of pure and applied chemistry; but, incidentally, it gives us a chance to use the word artificial in its good old classical sense. 'Artificial' means that the substance so named is made by art; but the schemes of men have often cast over the word the unfortunate association of something spurious, imitative, false. This is not necessarily connected with the real meaning of the word. The physical and chemical laws controlling the formation of any compound—in beaker, retort or furnace—are just as natural as those obtaining in the subterranean magma or matrix. In this sense, no crystal is false—all are natural, whether made by nature alone, or assisted by the art of man, from Wöhler's urea to Moissan's products of electric heat; for artificial, in the right sense, means art used by, and using, natural laws.

That thorium may disintegrate into uranium and helium is a suggestion of R. J. Strutt.

## Mining Stocks.

(See quotations on pages 919 and 920.)

New York. May 10.

Smaller sales and lower prices intimate that public investments are on a narrow margin. Insiders are understood to have made heavy purchases of Amalgamated copper recently; this week the stock receded in price from \$80.625 to \$77.50. Anaconda was quietly dealt in at \$27.875@ \$26.75. Some attention has been called to the weakness shown in the curb coppers. Tennessee dropped to \$24.25, United common to \$21.75, and preferred to \$70, and British Columbia to \$5.875.

Of late there has not been much doing in the miscellaneous gold and silver shares, primarily because of the attention attracted by the copper and industrial securities. The Comstocks, which at one time were the main attraction on the local exchange, are now only of secondary importance. The regularity with which assessments are called rather discourage investment in the Comstock stocks; their only bright spot seems to be the hope entertained by holders that the unwatering of the lower levels, now pushed energetically, will open up a productive area. Whether or not the new production will amount to the assessments already collected remains to be seen. At any rate, speculation in Ophir has resulted in surprisingly high prices recently. Consolidated California and Virginia is worth only \$1.65, as against \$10.50 for Ophir. The other Comstocks fluctuate within narrow margins. Interest in the Utah stocks is comparatively small, because such shares as Horn Silver, paying quarterly dividends of 5c., quoted at about \$1.80, are seldom offered. In the Cripple Creek section momentary speculation is not interesting, although the improvement in the Western market rather encourages Eastern purchases. Portland, which pays good dividends, sold up to \$2.10, but the transactions are limited. Isabella, an old-time speculative favorite, is selling today at about 28c. without attracting unusual attention. Elkton Consolidated, paying monthly dividends, sells above the half-dollar mark. The Leadville stocks are quietly dealt in, Iron Silver bringing \$3.65.

The industrial shares were sympathetically weak. American Smelting & Refining common stock sold down from \$113 to \$109.25, and the preferred from \$120.50 to \$119. Federal Mining & Smelting preferred found buyers at \$95.25@ \$96.625.

The annual election of the New York Stock Exchange, on May 8, resulted as follows: President, H. K. Pomroy; treasurer, F. W. Gilley; members of governing committee, to serve four years, J. T. Atterbury, E. V. D. Cox, W. W. Heaton, William H. Hollister, W. Strother Jones, Austin P. Kelley, J. B. Mabon, William Robinson, H. C. Swords and Blair S. Williams; trustee of gratuity fund, to serve five years, S. H. Kissam; members of nominating committee for 1906, Ira A. Kip, Jr., H. T. B. Jacquelin, R. M. Stuart-Wortley, James B. Tailer, and C. W. Turner. The appointive offices of secretary and chairman will probably be filled at this week's meeting of the governing committee.

In appraising the estate of the late Henry W. Oliver, of Pittsburg, the executors valued 21,794 shares of the Oliver Iron & Steel Co. at \$5,448,500, equal to \$250 per share; while the Chemung Iron Co. ore lands, leased to the Oliver Iron Mining Co., are valued at \$4,000,000.

Boston. May 9.

It has been a rather uneventful week, and the tone has been heavy. Offerings have not been large, but the demand is limited and, as a result, prices have sagged somewhat. Amalgamated closes about the same as a week ago at \$81.12½, although it has been off to \$77.87½. Osceola fell \$3.50 to \$91, recovering \$1. It is now expected that Osceola's next dividend will be \$3, against \$2 previously. Parrot fell \$2 to \$23.50, but rallied to \$25. It may be that two 500-share lots—traded in to-day at \$25@ \$25.25—have some significance in connection with the Heinze suit, but nothing definite is known. United Copper ran off \$2.87½, to \$22, in light dealings, recovering part of a dollar. The report that Heinze has started East to sell out to the Amalgamated precedes him. Mohawk, which is always susceptible to slight buying or selling, fell \$1.75 to \$48.75 on small selling orders. Allouez is off \$1.25 to \$19.75, notwithstanding continued favorable reports, and Atlantic is off \$1.12½ to \$12.87½.

Copper Range, which broke \$2.75 to \$69.25, is back to \$71.25, but considerable disappointment is manifested among people who were advised to buy it at much higher prices. Greene is off to \$26, and Isle Royale broke \$2 to \$20.50, recovering to \$21. Mass is \$1 lower for the week at \$8, Michigan \$1 to \$12, Old Dominion fell \$1 to \$24, Utah Consolidated is still begged, although it is off \$2 from the high price of the week to \$42.75, which is about the beg price. United States continues fairly active, although it is off \$1.25 to \$30.75, and Bingham has lost \$1.75 to \$30.75. Calumet & Hecla broke \$15 to \$635, although it is back to \$643, and Quincy is \$5 lower at \$95. Tamarack at \$114, is off \$4, and Wolverine settled \$2 to \$106. There is no significance in any of these changes. About the only stock to record an improvement is Consolidated Mercur, which is up 50% for the week, or from 40 to 60, on reports that dividend payments will be resumed next month.

The Keweenaw Copper Co., which has lately been exploited, has elected these directors: J. N. Wright, of the Calumet & Hecla, Detroit; C. A. Wright, president, Houghton, Mich.; Jas. H. Bailey, treasurer, New York, and Spencer R. Hill, of Boston. Another New York gentleman will be added to the board.

Colorado Springs. May 6.

The local exchange has been unusually quiet for the past week, but was more active today. The Cripple Creek shares which have been the most active traders were Finley and Gold Sovereign. The production for the Cripple Creek District for the month of April exceeded that of March by \$50,000, although the heavy snows for the month have greatly interfered with the smaller lessees. The total production for the month amounted to \$1,863,300. The total tonnage was 57,900, which exceeded March by 200 tons.

Elkton has declined to 49, El Paso to \$2.07 and Portland has sold down to \$2.01. Gold Sovereign dropped during the week from 13½ to 9¾, but recovered on today's market to 10¾c. Finley has advanced, selling today for 77½c. Isabella is selling at 29@30c. C. K. & N., which has been inactive for some time, has been selling at 10 and 12c. per share.

San Francisco. May 4.

The Comstock shares were rather strong at the opening of the week, but gradually subsided into dullness. There was no pres-

sure to sell, however, and prices remained fairly strong. Ophir closed at \$10.75@ \$11; Mexican, \$2.45; Hale & Norcross, \$2.35; Best & Belcher, \$2; Consolidated California & Virginia, \$1.95; Sierra Nevada, 46c.; Gould & Curry, 33c. per share.

On the San Francisco & Tonopah exchange business was fairly active, and stocks sold well. Montana Tonopah brought \$3.35; Tonopah Midway, \$1.65; Tonopah North Star 62c.; McNamara, 49c.; Red Top, 39c.; Kendall, 28c.; Paymaster, 4c. per share.

On the California exchange business in oil stocks continued very quiet. Transactions were only of a moderate extent. Stirling brought \$2.50; Coalinga & Pacific, 75c.; Claremont, 70c.; Reed Crude, 18c. per share.

## Coal Trade Review.

New York, May 10.

## ANTHRACITE.

The hard coal market shows absolutely no features of interest. Trade is somewhat more brisk than it was during the last of April, and dealers are still busy in delivering orders received during the previous month. Much of the delay in shipping old orders has been due to car supply insufficient for the heavy demands on the transportation capacity of the railroads. The advance of 10c. at the beginning of this month, appears to have had no effect in reducing the demand for domestic coal, for the reason that the retailers do not at once follow advances in the circular prices. In the West, trade is more dull owing to the fact that very little April business was carried over into May, as was the case last year. The Lake trade also does not show the activity that it experienced during the first week of its opening season, because of the heavy demand for all-rail anthracite, much of the output being diverted in this direction.

Anthracite production in April is reported at 5,278,041 tons. This compares with 5,407,786 tons in April, 1904; showing a decrease of 129,745 tons or 2.4% only. For the four months ending April 30, the shipments are reported as follows:

	1904.	1905.
Reading . . . . .	3,565,652	3,763,867
Lehigh Valley . . . . .	3,053,079	3,106,295
N. J. Central . . . . .	2,317,545	2,465,176
Del, Lacka. & W. . . . .	2,943,030	2,965,873
Del. & Hudson . . . . .	1,868,839	1,861,074
Pennsylvania . . . . .	1,473,222	1,548,649
Erie . . . . .	1,693,448	1,764,736
N. Y., Ont. & Western. . . . .	848,290	898,696
Del., Sus. & Schuylkill. . . . .	480,228	493,421
Totals . . . . .	18,243,333	18,867,787

This shows an increase of 624,454 tons, or 3.4%, this year. All the companies show gains, except the Delaware & Hudson, and its decrease was very small.

The circular prices for this month remain as follows, f. o. b. New York harbor shipping points: Domestic sizes, \$4.35 for broken and \$4.60 for egg, stove and chestnut. Steam sizes: \$3 for pea, \$2.25@ \$2.50 for buckwheat; \$1.45@ \$1.50 for rice and \$1.30@ \$1.35 for barley.

## BITUMINOUS.

The Atlantic seaboard soft coal trade has a stronger tone and prices are somewhat improved. Current quotations are \$2.35 @ \$2.45 f. o. b. New York harbor shipping points, only the lower grades selling at a less figure. This strengthening of the market is due to the absorption of the speculative coal that has been hampering the trade for the last month. This surplus is now well disposed of, although, in



the process of placing it, other regular current shipments to the parties in control of the speculative market have stagnated somewhat. Shipments from mine to tide have been slightly curtailed recently for the following reason: The railroads have been giving most excellent transportation to tidewater, but at the same time their traffic offices have been keeping a close watch over the discharging of cars at the terminals, in order to eliminate any accumulation of loads. Any indication of such an accumulation is immediately followed by a shutting down of the car supply at the mines. A large proportion of contracts are closed, although the remainder of them will hang over through the next six weeks showing a constantly diminishing activity. The low schedule price of anthracite still affects the soft coal trade.

Trade in the far East is slow, owing to the congested condition at some of the discharging ports and consumers in this territory are inclined to delay the placing of their orders so as to escape demurrage charges. Trade along the Sound is extremely quiet, the entire attention being given to hard coal. The New York harbor trade shows improved conditions, with the removal of the speculative surplus. All-rail trade is fairly active, although an effort seems to be made by the consumers to force down prices.

Vessels in the coast-wise market are in poor supply. It is reported that the lumber trade has advanced its rates and is attracting many coasting vessels ordinarily given up to the coal trade. Anthracite, taking advantage of its rush season, is also diverting many vessels from the soft coal business. Philadelphia quotes on large vessels as follows: To Boston, Salem and Portland, 75c.; to the Sound, 65c.; to Lynn, 85@90c.; to Newburyport and Gardner, 90c.; to Portsmouth and Bath, 80c.; to Saco, \$1 and towages; to Bangor, 90@95c. per ton.

**Birmingham.** May 8.

The coal operations in Alabama continue steady, production being strong and the demand requiring about all that is being mined. Half a dozen mines at least are being opened, and before the end of summer will be ready to produce coal. There is a shortage of labor in some sections. The furnace companies are still brining in laborers to take up work in the mines.

The Southern Railway and the Louisville & Nashville are both considering the construction of the branch lines into Walker county. Much coal land is changing hands there, and preparations are being made for active work in the future.

During the past week the Tennessee Coal, Iron & Railroad Co. and the Sloss-Sheffield Steel & Iron Co. submitted bids again to the State for the hire of convicts under the contract system. These companies, having stockades and other facilities to care for the convicts, will get the men again for a period of from one to three years at practically the same wage as during the past year.

**Chicago.** May 8.

There has been little change in the local wholesale market for coal in the last week. The business in bituminous is suffering from the chronic condition of over-supply, causing congestion of shipments on the tracks and low prices to escape demurrage charges. Fine coals are strong; all other sizes of bituminous are weak, especially coal from Indiana and Illinois mines.

Eastern coals are affected a little by the teamsters' strike, but newspaper reports of the difficulty in moving wagons in the city have been exaggerated. Deliveries of coal continue under police protection and the total volume of the coal trade is not seriously diminished.

Contract business continues to be hard to get and obtainable in most cases only at low prices. Consumers of coal see no advantage in conditions that are favorable to them and promise to continue indefinitely.

Sales of anthracite are reported good and prospects for the month are excellent. The April business in anthracite was large and well distributed, and May promises to be, compared with last year's record, fully as good a month.

Quotations generally are unchanged from last month.

**Cleveland.** May 9.

The coal situation is still rather weak, and it appears now that the mines are keeping the supply and demand equal only by strong efforts to keep down over-production. There is an equal struggle to keep the prices up to a paying basis. The demand for steam coal has suffered no curtailment, but the tremendous production is constantly endangering values. Run-of-mine steam coal is selling at 95c. at mines, for both Ohio and Pennsylvania, with some sales reported as low as 90c. There is however, a good demand for slack, which is bringing 65c. at mine, for Pittsburg, and 75c. at mine for Ohio; rather unusual prices at this time of the year.

The lake coal movement is still slow. Shipments have been light because upper lake consumers have been expecting lower prices due to the contest between two large firms. The ending of that contest may bring about better buying and heavier shipments, but it will be June before the coal movement up the lakes is what it ought to be. Tonnage is almost superabundant, and rates are weak. Shippers can get all the boats they want at 45c. to Milwaukee and 35c. to the head of the lakes.

The coke market is still weak. The high-grade ovens are asking \$2.75@3 for 72-hour foundry coke, while some of the other furnaces are selling as low as \$2.50. Furnace coke is bringing between \$2 and \$2.25 per ton.

**Pittsburg.** May 9.

**Coal.**—The car supply is very satisfactory and some large shipments are being made to lake ports for the northwestern markets. Most of the railroad coal mines are operating and the river mines are running steadily. Prices remain unchanged on a basis of \$1@1.10 for run-of-mine at the mine. The United Mine Workers of America are keeping a large force of organizers in the Irwin field and favorable reports are being received at the Pittsburg headquarters of the organization. The leaders are determined to establish the Pittsburg district mining scale at all the mines along the Pennsylvania Railroad between Pittsburg and Irwin. It is proposed to order a strike, as soon as the men are organized, that will close every mine in the field and involve fully 10,000 miners. A suspension of operation in the Irwin field would benefit Pittsburg operators.

**Connellsville Coke.**—Production has fallen off slightly and shipments for the week included about 15,000 tons of stock coke. Prices are somewhat weaker, furnace coke being quoted at \$1.85@2 and foundry at \$2.65@2.80 a ton. The produc-

tion for the week amounted to 260,600 tons and the shipments aggregated 12,237 cars distributed as follows: To Pittsburg and river points, 4,639 cars; to points west of Pittsburg, 6,363 cars; to points east of Everson, 1,237 cars.

**San Francisco.** May 4.

Mr. J. W. Harrison's latest circular says: "There has not been a coal arrival from Newcastle, N. S. W. The total deliveries of Colonial coal here since the beginning of the year amounts to 13,248 tons; the total arrivals for the same period last year were 34,172 tons. There are three vessels due to arrive here prior to June 1. This clearly demonstrates that the quantity of Colonial coal now on hand must be exceedingly light; still no change of price has taken place. There are 24 vessels listed to carry coal from Newcastle, N. S. W., to San Francisco; their carrying capacity is about 65,000 tons; only six of these have yet left their loading port. The coal deliveries here from British Columbia in April amount to 24,479 tons. The wholesale dealers are complaining of very light sales of fuel for domestic purposes; this is the natural consequence of the near approach of spring. Fuel oil controls the market for fully three-quarters of the consumption of fuel for steam purposes, prices remain unchanged, and the oil output remains undiminished. The last cabled freight quotations on coal show a softening of rates; this may serve to increase Australian shipments later on. The continuous seasonable weather up to date for our cereal products should make this port a seductive one for grain carriers to seek the latter months of this year."

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

**Foreign Coal Trade.** May 10.

There is nothing new here as to exports. The usual trade to the West Indies and South America is going on, but very little beyond that.

The coal production of Germany for the three months ending March 31 was as follows, in metric tons:

	1904.	1905.	Changes.
Coal . . . . .	30,327,834	26,417,052	D. 3,910,782
Brown coal . . . . .	12,348,211	13,148,380	I. 800,169
Total mined . . . . .	42,676,045	39,565,432	D. 3,110,613
Coke made . . . . .	2,979,583	2,587,619	D. 391,964
Briquettes] made . . . . .	2,828,148	3,037,671	I. 209,423

The reduction in output this year was due to the miners' strike, in several important districts. This strike did not affect the brown coal (lignite) mines.

Imports of coal into Russia for the full year were 2,937,637 long tons in 1903, and 3,106,901 tons in 1904; an increase of 169,264 tons. Imports of coke were 487,104 tons in 1903, and 574,147 tons in 1904; an increase of 87,043 tons.

London *Engineerings* says: "Following upon an importation of German coke at

Cardiff by Messrs. Guest, Keen & Nettlefolds, Ltd., it is now reported that Messrs. Cammell, Laird & Co., Ltd., have entered into a contract with German coke-makers to supply coke for their works in West Cumberland. This step has been taken in consequence of a threatened withdrawal by the railway companies of a 10% rebate on the carriage of coke from the East Coast, while the rebate is being continued to Staffordshire and the Midlands."

### Iron Trade Review.

NEW YORK, May 10.

While many purchasers are still holding a waiting attitude, some large transactions have come to light this week. In raw material the most notable is the purchase of bessemer iron by the Cambria Steel Co., details of which are given in our Pittsburg letter. The United States Steel Corporation has arranged for no outside iron thus far this month. In the outlying districts, especially in the West, business is reported rather dull, and buyers of pig iron are rather hesitating about taking material beyond the second quarter.

In finished material, the notable point is in some heavy orders for steel cars and locomotives, which will require a great deal of material, especially plates and shapes. Structural business is also active, and a number of orders are on the market, both large and small. Bridge-builders report many orders, and there is also a prospect of a good deal of building being done in the Eastern cities.

Probably the most favorable feature in the situation is the fact that mills are receiving specifications on contracts freely, and there is a considerable pressure to keep them up to deliveries agreed upon.

Notwithstanding this, it can hardly be said that prices are keeping quite up to the mark on future contracts. Both in raw and finished material, there is a tendency to shade prices on third and fourth-quarter deliveries; but it is doubtful how far this will extend.

Birmingham. May 8.

Despite reports to the contrary, Southern pig-iron manufacturers assert that there has been no decline in iron prices. It is admitted that the demand is quite right now, but reports from agents and the trade in general would indicate that the consumers have not a very great quantity of iron on hand. The question was asked in more than one place Saturday whether iron was selling at \$13 per ton, and the reply was emphatic, that so far no orders had been accepted at that figure. The sales made during the past week were few and in small lots. Three furnaces are being made ready to go into blast this month, the new furnace of the Woodward Co. and Williamson furnace in the city proper. The Coosa Iron Co.'s small charcoal furnace at Gadsden will also be started up this month. Shipments of pig iron from the Southern territory are strong and promise to be heavy for some time to come.

The following quotations are given out here: No. 1 foundry, \$13.50@14; No. 2 foundry, \$13.50; No. 3 foundry, \$13; No. 4 foundry, \$12.50; gray forge, \$11.75@12; No. 1 soft, \$13.50@14; No. 2 soft, \$13.50.

The resignation of Charles McCreery as vice-president and general manager of the Tennessee Coal, Iron & Railroad Co. to accept the position of chairman of the

board of directors of the Woodward Iron Co., is said to mean another steel plant for the Birmingham district. Mr. McCreery is an expert steel man.

Chicago. May 8.

Quietness, if not weakness, characterize the local iron market. It is undeniable that sales have fallen off, and reports are current that prices on ordinary sales are 25@50c. lower than the quotations that have been standard for several weeks—\$13.50 Birmingham, or \$17.15 Chicago, for Southern, and \$17.50 for Northern. These reports are probably correct, but publicity is not being given to the transactions. Selling agents are trying to hold up the standard of prices, but it is doubtful whether they can do so in the face of the facts that the demand is normally light for early summer melting and that buyers are not inclined to order heavily, or generally, for the third and fourth quarters of 1905.

With quotations almost the same for Northern and Southern, Northern fares best and prices probably are being cut less on this than on Southern iron. The strike conditions in Chicago are holding back some shipments, but foundries are generally well supplied, and no apprehensions are expressed about shortage by either buyers or sellers.

Coke is plentiful, and Connellsville 72-hour has sold at \$5@5.15, against the former price of \$5.65. Too much shipped rather than a falling off in consumption is the explanation.

Cleveland. May 9.

*Iron Ore.*—The movement of ore down the lakes has begun to improve. Shippers are taking care of all their contract boats but have not begun to use wild tonnage. The total shipment for April was 1,100,000 tons, the greater part of which was moved during the last week of the month. Wild rates are rather weak at the old figures of 75c. from the head of the lakes; 70c. from Marquette, and 60c. from Escanaba. There is little, if any, ore being sold. Prices, which are almost nominal, are \$3.75 for bessemer Old Range; \$3.50 for bessemer Mesabi; \$3.25 for non-bessemer Old Range; \$3 for non-bessemer Mesabi.

*Pig Iron.*—There is a weaker tone to the foundry trade than for several months. Some No. 2 has been sold at \$15.75 in the Valleys, and a good order could be placed at a lower figure. The larger furnaces, while taking no orders, are holding for \$16 in the Valleys for both present and future delivery. Southern furnaces are trying to invade this territory, offering their material at \$13 Birmingham for No. 2.

*Finished Material.*—The market is weaker for sheets, some of the smaller mills being in need of orders. Cuts ranging from \$2 to \$3 a ton are being reported. Jobbers are doing a good business still out of stock. New orders in plates and shapes are not coming in rapidly. Many of the smaller buyers are taking what they need from jobbers, or are buying of the small mills at prices ranging \$2 to \$4 a ton above the association price.

New York. May 10.

The market has continued rather quiet, and comparatively little business is reported on new contracts. New England has been doing very little in this market.

*Pig Iron.*—The scarcity of orders, on small buying, with the apparent intention of consumers to hold off, have had an effect in the general lowering of prices, and furnaces are accepting a reduction on any new orders which are going. For Northern iron, in large lots, we quote as follows: No. 1 X foundry, \$17.25@17.75; No. 2 X, \$16.75@17.25; No. 2 plain, \$16.50@16.75; gray forge, \$15.25@15.75. Virginia foundry is firmly held, and there has been no considerable decrease, although sales have been small. We quote \$17.65@18.15 tide-water. Southern iron is still quite firmly held, although the range is a little lower than it has been. There are reports that No. 2 foundry has been sold at \$13 at Birmingham, but this is denied by the leading companies. For large lots on dock, New York, we quote as follows: No. 1 foundry, \$17.25@17.75; No. 2, \$16.75@17.25; No. 3, \$16.25@16.75; No. 4, \$15.75@16.25; No. 1 soft, \$17.25@17.75; No. 2 soft, \$16.75@17.25; gray forge, \$15.50@15.75.

The warrant market on the Produce Exchange continues quiet, with sales small. Latest quotations range around \$15.80 bid and \$16 asked, for June and July delivery, regular warrants; \$16.20 bid and \$16.40 asked, June and July delivery, for foundry warrants.

*Bars.*—Bar iron is in moderate demand only, and the chief business is in small lots. Quotations are slightly lower, say \$1.595c. @1.645c., large lots. Steel bars are held at 1.645c. Store trade is about as usual, with quotations 1.75@2c., delivered.

*Plates.*—Plates are fairly steady, though it is said some concessions are being made on good orders. Tank plates are \$1.745@1.825c.; flange and boiler, 1.845@1.945c. Universal and sheared plates are 1.645c. up, according to size.

*Structural Material.*—Talk of some large contracts continues, and quite a number of small orders have been placed in this market. Prices continue about the same. Beams under 15 in. are 1.745c. for large lots; over 15 in., 1.845c.; angles are 1.745c., tidewater delivery.

*Steel Rails.*—The regular quotation continues \$28 per ton at mill for standard sections. Very little business is done in this market. Light rails are quiet. Sales have been made as low as \$24 for 12-lb. rails, while 25-lb. to 35-lb. can be had at \$21, for large orders. There is a good deal of inquiry for rails for electric roads.

*Old Material.*—Light demand has caused prices to give way. Railroad wrought can be had for \$18.25@18.75; yard wrought is in large supply at \$15@15.50; machinery cast, \$13.50@14; heavy steel melting scrap, \$15@15.50. These prices are on cars, Jersey City and other terminal delivery.

Philadelphia. May 10.

*Pig Iron.*—After a little quiet breathing spell, a heavy demand has again set in for basic and bessemer iron. It is believed by makers of foundry and forge iron that these products will also profit by the improvement. The greatest activity is for bessemer, but there are inquiries, some of which arrived to-day, for forge and foundry iron of both Virginia and Alabama make. Our local furnace people are not seeking orders and are very cautious how they accept business. The tone of the market has rather suddenly improved, and it is probable that some large orders will be placed before Saturday. Quotations are, for No. 1X foundry,

\$18.50; No. 2X foundry, \$18; No. 2 plain, \$17.50; standard gray forge, \$16.25; basic, \$17; low phosphorus, \$21.

**Steel**—Business has been booked for \$28, and there is a dividing interest which it is believed will result in early business.

**Bars**—The oversold condition of the bar mills may explain the quietness in the market at present, but for all that, a fair amount of business is being presented, most of it from small buyers. Quotations continue unchanged.

**Sheets**—The sheet market is spoken of as dull, but this is simply because there has been so much buying lately that very few are in need. Prices are strong.

**Pipes and Tubes**—Boiler tubes are very active. There is also an increased demand for merchant pipe in small lots for delivery within 60 days.

**Plates**—Great activity prevails in steel plates. The heavy car building orders and the large amount of work in bridge building arranged for has already sent inquiries into the market, one of which amounts to 35,000 tons for the Pennsylvania railroad.

**Structural Material**—The tone of the market has improved, if that be possible, under the demand that is coming for bridge material, and also for construction material for office buildings.

**Steel Rails**—The Pennsylvania Railroad Co. is credited with the purpose of ordering an additional lot of 35,000 tons, and a number of other railways have within the past week contracted for rails.

**Scrap**—The cheapening of scrap has resulted in the purchase of a great deal of material. Steel scrap is quoted at \$17, but buyers will not take it at that figure. It is believed there will be a further drop; \$16.50 is offered for the very best. Railroad scrap is held at \$20, and No. 1 yard at \$18 per ton.

**Pittsburg. May 9.**

Some life has been put into the iron and steel markets by the placing of orders by the Baltimore & Ohio Railroad Co., for 10,000 freight cars and the purchase of 30,000 tons of bessemer pig iron by the Cambria Steel Co. for May, June and July delivery. The price for the iron was the prevailing rate of \$15.50, Valley furnaces. Besides the Cambria contract, sales of pig iron aggregating 6,000 tons were closed during the week. Foundry iron is weaker and but little has been sold lately. The Bessemer Pig Iron Association met in Cleveland, on Saturday and re-affirmed prices. Reports showed that members are well sold up for the quarter and, while some expected to run short of ore, all are said to be supplied. The United States Steel Corporation is operating 89 of its 91 blast furnaces, and has not yet bought iron for May delivery. Despite reports to the contrary, all of the April iron bought from the Bessemer Pig Iron Association and independent interests was delivered before the first of this month. Although the first week has passed, furnace interests seem to be confident that the Steel Corporation will come into the market with a large order for bessemer iron at any time before the end of the month. Reports that the Jones & Laughlin Steel Co. and the Lackawanna Steel Co. will open negotiations in a short time for large tonnages of bessemer iron are not confirmed. The reports are evidently due to the fact that the consumption of these interests lately has been enormous, and their stocks of iron are rapidly going down. This condition of affairs has strengthened the bes-

semer iron market and there is now no fear of a decline. A number of speculative lots of bessemer pig have been in the market at concessions, but the sale to the Cambria firmly establishes the minimum price of \$15.50, Valley furnaces.

The estimated cost of the orders for freight cars placed late last week by the Baltimore & Ohio Railroad Co. is \$12,000,000. Over 100,000 tons of steel plates and structural material will be required. The contract was divided as follows: Pressed Steel Car Co., Pittsburg, 1,000 steel twin gondolas and 1,000 steel hoppers; Standard Steel Car Co., Pittsburg, 1,500 steel gondolas; Cambria Steel Co., Johnstown, 2,000 steel twin gondolas; American Car & Foundry Co., Berwick, Pa., 2,000 steel hoppers, and Chicago plant, 250 refrigerator cars; Western Steel Car & Foundry Co., Chicago, 1,000 box cars; South Baltimore Steel Car & Foundry Co., 1,000 box cars and Rodgers Ballast Car Co., Detroit, 250 ballast cars. The order follows closely the contract placed for locomotives on April 25, which calls for 250 locomotives, 210 of which will be large and powerful consolidation type of freight engines, while the others are for passenger and switching service. The expenditure for motive power will reach \$4,000,000. In rails the new business is somewhat disappointing, but the mills are not idle as most of them are on billets, for which there is a heavy demand. It is now estimated that the American railroads will take about 2,000,000 tons this year, but a large export business is expected. Russian agents are reported to be on the way to this country to buy 40,000 tons of standard steel rails for early delivery to be used in double-tracking the Trans-Siberian railway. There are reports that the Crucible Steel Co. of America, has taken a large merchant bar contract from the International Harvester Co., for the coming season. While the officials of the company will make no denial, they decline to discuss the affairs of the company in any way. The market in finished lines continues quiet, except in plates and structural material. The tin-plate mills are sold up for this quarter and it is reported that one or two independent interests are offering inducements for desirable orders for third quarter shipment. Common iron bars are said to be somewhat weaker, and are quoted at 1.60@1.65c. Pittsburg. The bi-monthly adjustment of the Amalgamated Association wage scale will be held this week in Detroit, where the annual convention is in session, instead of Youngstown. The puddlers' and finishers' wages are based on the selling price of bar iron and an advance is assured. According to reports the average sales for March and April will be about 1.5c. which will increase the rate for puddling from \$5.12½ a ton to \$5.37½ a ton for May and June, and the rate for the finishers will be increased in proportion. There will be no change in the wages of sheet workers but an advance in tinplate workers' wages is expected.

**Pig Iron**—The total sales of pig iron for the week are estimated at about 40,000 tons, including the 30,000 tons of bessemer iron bought by the Cambria Steel Co. No important transactions were made in foundry or forge iron. Quotations are as follows: Bessemer, \$15.50, Valley furnace; foundry No. 2, \$16.40@16.60, Pittsburg; gray forge, \$15.40@15.85, Pittsburg.

**Steel**—Deliveries on billets and sheet-bars are more satisfactory and premiums have declined a trifle. Bessemer and open-hearth billets still command premiums of from \$2 to \$3 above the pool price of \$21, and sheet-bars can be had at about \$3 a

ton above the pool price of \$23. Plates are firm at 1.60c. and merchant steel bars at 1.50c.

**Sheets**—The sheet market is somewhat easier and on desirable orders it is said concessions may be obtained. Black sheets No. 28 gauge are quoted at 2.40c. and galvanized at 3.45c.

**Ferro-Manganese**—The market is about the same as a week ago, domestic 80% being quoted at \$50@51 a ton.

**Cartagena, Spain. April 22.**

**Iron and Manganiferous Ores**—Messrs. Barrington & Holt report that the market has continued firm, though there has been some depression owing to continued drought. Freight rates are still favorable and vessels plentiful. Shipments for the week were two cargoes, 5,500 tons dry ore, and one cargo, 3,900 tons manganiferous ore, to Great Britain; one cargo, 5,850 tons manganiferous ore, to Rotterdam; one cargo, 4,600 tons dry ore, to Philadelphia.

Prices are as follows, all f. o. b. shipping port: Ordinary 50% ore, 6s. 4d.@6s. 7d.; special low phosphorus, 7s@7s. 8d.; specular ore, 58% iron, 9s. 4d. For manganiferous ores quotations vary from 10s. per ton for 35% iron and 12% manganese up to 14s. 7d. for 20% iron and 20% manganese.

**Pyrites**—Iron pyrites, 40% iron and 43% sulphur, are quoted at 10s. per ton. No shipments for the week.

**Chemicals and Minerals.**

**NEW YORK, May 10.**

There has been some improvement in deliveries, and prices are generally firm.

**Copper Sulphate**—Quiet at \$4.75@5 per 100 pounds.

**Acids**—Prices are stronger, and shipments better. Inquiries are in the market for 50,000 to 100,000 kg. (110,000 to 220,000 lb.), carbolic acid for export to Japan, where it will be used in the manufacture of smokeless powder.

Nitric acid, 36°, 100 lb. ....	\$5.00
38°, 100 lb. ....	5.25
40°, 100 lb. ....	5.50
42°, 100 lb. ....	5.75
Oxalic acid, com'l, 100 lb. ....	\$5.00@ 5.25
Sulphuric acid, 50°, bulk, ton ....	13.50@14.50
60°, 100 lb. in carboys .....	1.05
60°, bulk, ton .....	18.00@20.00
66°, 100 lb. in carboys .....	1.20
66° bulk, ton .....	21.00@23.00

**Sulphur and Pyrite**—Trade as far as new orders are concerned is quiet, but contract deliveries of domestic sulphur show expansion. Prime domestic sulphur is quoted at \$21 per ton at New York, Philadelphia and Baltimore; \$21.25 at Boston, and \$21.50 at Portland, Maine. Pyrite is quiet at unchanged prices. It is learned that Mason & Barry, Ltd., of Portugal, shipped last year 370,511 tons sulphur ore, which compares with 341,631 tons in 1903; showing an increase of 28,880 tons, or nearly 9 per cent. Lump pyrite varies from 9@11c. per unit of sulphur, and fines from 8.5@10c., as to grade, f. o. b. Atlantic ports.

**Nitrate of Soda**—There is a better inquiry for future shipments and the strength of the coast market suggests that prices will continue high. At New York refined quality, nearby arrival, is quoted at \$2.50 per 100 lb.; July to December, \$2.25@ \$2.75; 1906, \$2.20; and 1907, \$2.15.

Messrs. Mortimer & Wisner's monthly statement of nitrate of soda, dated New York, May 1, gives the following interesting statistics, in long tons:

	1904.	1905
Imported into Atlantic Ports from		
West Coast S. A. from Jan. 1,		
1905, to date . . . . .	94,114.	77,600
Stock in store and afloat May 1,		
1905, in New York . . . . .	3,400	
Philadelphia . . . . .	2,700	
Norfolk, Va. . . . .		
To arrive, due Aug. 15, 1905 . . . . .	62,500	71,700
Visible supply to Aug. 15, . . . . .	68,600	71,800
Stock on hand Jan. 1 . . . . .	8,100	8,389
Deliveries past month . . . . .	16,453	30,900
Deliveries since Jan. 1 to date. . . . .	96,114	85,880
Total yearly deliveries. . . . .	239,684	
Prices current, May 1, per lb. . . . .	2.25c	2.50c

Quotations are for 96%; 95% can be had at 2.5@5c. per 100 lb. cheaper.

**Chilean Nitrate of Soda Market.**—Messrs. Jackson Bros, of Valparaiso, write under date of April 1 that the market shows a strong demand aided by speculation; prices for near deliveries have been driven up 3½d. The demand has not only been for this year's production, but also for 1906 and 1907. We presume the better feeling in the market has been caused by the increased consumption in March. The market opened with sales for March-April delivery of 95% at 7s. 2d., and has advanced gradually to 7s. 6d. at which price several transactions have been reported. July-December has been done at 7s. 3½d. @7s. 6d.; several monthly parcels for 1906 have changed hands at 7s., and for 1907 at 6s. 8d. In the refined, transactions have been few, 7s. 9d. was paid for April-July, and 7s. 9½d. for May-December. Transactions amount to almost 3,000,000 quintals. We quote 95% April-May 7s. 6½d., July-December, 7s. 6½d.; January-March, 1906, 7s. 4d., all alongside. The price of 7s. 6½d. alongside, with an all-round freight of 20s. stands in 9s. 4¼d. per cwt., net, cost of freight without purchasing commission.

**Sulphate of Ammonia.**—Sales are reported of good gas liquor at \$3.10@3.15 per 100 lb., according to holder and time of delivery.

**Saltpeter.**—The consumption in this country during the four months ending April 30 is estimated at 19,287 bags. This is 18.3% less than last year, but as the visible supply on May 1 amounts to only 10,381 bags (being 2,011 bags less than a year ago) the market is not disturbed. Crude saltpeter is quoted at \$4@4.25 per 100 lb., and domestic refined at \$4.375@5.

**Phosphates.**—Evidence is sufficient to prove that this year's shipments will be large, and that prices will rise. A favorable feature is the small stock at domestic mines. Export trade shows expansion, some benefit being realized from the limited supply of unsold foreign phosphates. The Polynesian island mineral is sold far ahead and in Africa the miners are in an equally good position. European super-phosphate manufacturers, realizing better prices, are increasing their purchases of raw material.

Phosphates.	F. o. b.	C. I. F. Gt. Britain or Europe.
*Fla., hard rock . . . . .	\$7.25@7.50	\$10.67@11.85
land pebble. . . . .	3.75@4.00	7.70@ 8.40
†Tenn., 78% 80% . . . . .	4.35@4.40	10.27@10.67
78% . . . . .	3.75@4.00	
75% . . . . .	3.40@3.50	
68@72% . . . . .	3.00@3.25	
‡So. Car. land rock . . . . .	3.75@4.00	
river rock . . . . .	3.50@3.75	6.33@ 6.61
Algerian, 63@70% . . . . .		7.04@ 7.71
58@63% . . . . .		6.15@ 6.60
Tunis (Gafsa) . . . . .		6.00@ 6.60
Christmas Isle . . . . .		13.28@14.11
Ocean Isle . . . . .		13.60@14.45
Somme, Fr. . . . .		11.39

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

**Metal Market.**

New York, May 10.

**Gold and Silver Exports and Imports.**

At all United States Ports in March and Year.

Metal.	March.		Year.	
	1904.	1905.	1904.	1905.
G'ld Exp	\$3,063,458	\$2,391,884	\$4,387,639	\$34,014,364
Imp	8,855,162	5,133,592	22,115,042	9,222,202
Exc I.	\$5,791,704	\$2,741,708	\$17,727,403	\$24,792,162
Silv Exp	4,098,823	4,191,632	13,026,294	12,592,452
Imp	2,108,356	2,631,796	6,824,403	6,515,356
Exc E.	\$1,990,467	\$1,659,836	\$6,201,891	\$6,077,096

These exports and imports cover the totals at all United States ports. The figures are furnished by the Bureau of Statistics of the Department of Commerce and Labor.

**Gold and Silver Exports and Imports, N.Y.**

For the week ending May 6 and for years from January 1.

Period	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week . . . . .	\$6,318	\$18,133	\$331,627	\$36,406
1905. . . . .	32,881,125	4,950,256	11,137,981	1,212,281
1904. . . . .	30,484,556	1,731,980	15,128,135	274,464
1903. . . . .	2,381,450	2,784,502	6,222,100	699,901

The gold movement this week was chiefly with Central and South America; the silver, with London.

It is hardly fair to say that there has been a lull in business, but matters continue rather quiet. The speculative markets are also in a somewhat uncertain state.

The statement of the New York banks—including the 53 banks represented in the Clearing House—for the week ending May 6, gives the following totals, comparison being made with the corresponding week of 1904:

	1904.	1905.
Loans and discount. . . . .	\$1,071,030,000	\$1,092,121,900
Deposits. . . . .	1,131,712,800	1,143,897,900
Circulation . . . . .	35,774,600	44,537,600
Specie. . . . .	230,610,900	220,303,700
Legal tenders . . . . .	75,041,500	84,400,200
Total reserve. . . . .	\$305,652,400	\$304,703,900
Legal requirements. . . . .	282,928,200	285,974,475
Balance surplus . . . . .	\$22,724,200	\$18,729,425

The following table shows the specie holdings of the leading banks of the world. The amounts are reduced to dollars:

	Gold.	Silver.
New York . . . . .	\$220,303,700	
England. . . . .	177,898,405	
France . . . . .	559,803,575	\$220,613,700
Germany. . . . .	197,600,000	65,865,000
Spain . . . . .	73,900,000	106,110,000
Netherlands . . . . .	32,144,000	31,464,000
Belgian . . . . .	15,606,665	7,803,335
Italy. . . . .	113,585,000	17,718,500
Russia . . . . .	525,070,000	34,340,000
Austria. . . . .	238,040,000	65,045,000

The returns of the Associated Banks of New York are of date May 6, and the others May 4, as reported by the *Commercial and Financial Chronicle* cable. The New York banks do not report silver separately, but specie carried is chiefly gold. The Bank of England reports gold only.

The silver market has been well maintained at slightly improving prices. The China exchanges have stimulated an inquiry for that direction, as rates have somewhat advanced in that quarter.

The United States Assay Office in New York reports receipts of 78,000 oz. of silver for the week.

Shipments of silver from London to the East for the year up to April 27, are reported by Messrs. Pixley & Abell's circular as follows:

	1904.	1905.	Changes.
India . . . . .	£3,945,789	£2,514,190	D. £1,431,599
China. . . . .	71,000	23,070	D. 47,930
Straits . . . . .	58,103	2,800	D. 55,303

Totals . . . . . £4,074,892 £2,540,060 D. £1,534,832

Receipts for the week this year were £208,000 in bar silver from New York, and £23,000 from the West Indies; total, £231,000. Shipments were £51,300 in bar silver to Bombay, £60,000 to Calcutta, and £2,500 to Colombo; total, £113,800.

Indian exchange is somewhat weaker, and the supply of money is reported abundant. The Council bills offered in London were placed at an average of 15.945d. per rupee, and the amount offered will be reduced next week. Buying of silver for India has been very light, but there have been purchases for Chinese account to a moderate extent.

The movement of gold in Russia for the full year is reported as follows, in rubles, which are worth 51.5c. in United States currency:

	1903.	1904.
Imports. . . . .	R.20,919,000	R.6,924,000
Exports. . . . .	2,821,000	4,010,000

Excess, imports . . . . . 18,098,000 2,914,000

It is rather remarkable that the imports should have exceeded the exports last year, notwithstanding the war. The entire movement was light.

The movement of silver in Russia for the year was as follows, also in rubles:

	1903.	1905.
Imports. . . . .	R. 6,996,000	R. 19,152,000
Exports. . . . .	1,756,000	32,227,000

Excess . . . . . Imp. 5,240,000 Exp. 13,075,000

There was a large increase, both in imports and exports, last year.

**Prices of Foreign Coins.**

	Bid.	Asked
Mexican dollars. . . . .	\$0.44½	\$0.47½
Peruvian soles and Chilean pesos. . . . .	.41½	.44½
Victoria sovereigns. . . . .	4.86	4.87
Twenty francs. . . . .	3.87	3.90
Spanish 25 pesetas. . . . .	4.78	4.82

**Other Metals.**

Daily Prices of Metals in New York.

May	Copper.		Tin.	Lead.	Spelter.		
	Lake, Cts. per lb.	Electrolytic Cts. per lb.			New York, Cts. per lb.	St. Louis, Cts. per lb.	
4	14½	14½	65½	30	4.50	5.55 @ 5.60	5.40 @ 5.45
5	14½	14½	64½	30	4.50	5.55 @ 5.60	5.40 @ 5.45
6	14½	14½	65	30	4.50	5.55 @ 5.60	5.40 @ 5.45
8	14½	14½	65½	29.90	4.50	5.55 @ 5.60	5.40 @ 5.45
9	14½	14½	65½	30	4.50	5.55 @ 5.60	5.40 @ 5.45
10	14½	14½	65½	30	4.50	5.55 @ 5.60	5.40 @ 5.45

London quotations are per long ton (2,240 lbs.) standard copper, which is now the equivalent of the former g. m. b. s. The New York quotations for electrolytic copper are for cakes, ingots or wirebars. The quotation for cathodes is usually 0.25c. below that for electrolytic copper.

SILVER AND STERLING EXCHANGE.

May	Sterling Exchange.	Silver.		May.	Sterling Exchange.	Silver.	
		New York. Cents.	London. Pence.			New York. Cents.	London. Pence.
4	4.8635	56½	26½	8	4.8655	57½	26½
5	4.86½	56½	26½	9	4.8660	57½	26½
6	4.8660	57	26½	10	4.8665	57½	26½

New York quotations are for fine silver, per ounce Troy. London prices are for sterling silver, .925 fine.

**Copper.**—Since we last went to press, a little more inquiry has developed on the part of both domestic and foreign consumers. The business which offered itself was, however, taken at slightly lower prices. The closing quotations are 14¾@14⅞ for Lake Copper; 14⅝@14¾ for electrolytic in ingots, cakes and wirebars, 14⅝@14½ in cathodes; 14¼@14⅜ for casting copper.

The standard market was again very much depressed during the early part of the week, quotations at one time being below £65; however, at the close a recovery has taken place to £65 10s. for spot, £65 15s. for three months.

Refined and manufactured sorts we quote: English tough, £70@£70 10s.; best selected, £71 5s.@£71 15s.; strong sheets, £79; India sheets, £75; yellow metal, 6½d.

Exports of copper from New York and Baltimore for the week ending May 9 were 1,762 long tons; also \$1,300 worth of matte. Imports for the week of May 5 were 251 tons copper and \$13,265 worth of ore (quantity not given).

**Tin.**—There is a good volume of business being done at the current market, which is 30c. for spot, 29½c. for futures.

The spot position in London has receded somewhat further. However, the market is steady and firm at the closing quotations, which are £136 10s. for spot, £134 10s. for three months.

**Lead.**—The large consumption in this metal keeps up, and a good business is doing at 4.42½ St. Louis, 4.50 New York.

The market abroad has shown a very strong tone, and the closing quotations are higher at £12 16s. 3d. for Spanish lead, £12 18s. 9d. for English lead.

**St. Louis Lead Market.**—The John Wahl Commission Co. telegraphs us as follows: Lead is slightly easier. The latest sales here are on a basis of 4.475c. for Missouri brands. The demand is rather light.

**Spanish Lead Market.**—Messrs. Barrington & Holt report from Cartagena, Spain, under date of April 22, that silver has been 14 reales per oz. Exchange is 33.26 pesetas to £1. Current quotation for lead is 69.75 reales per quintal, which, on current exchange, is equal to £11 15s. 8d. per long ton, f. o. b. Cartagena. Shipments were 1,350 tons desilverized lead to Great Britain, 543 tons argentiferous and 131 tons desilverized lead to Marseilles.

**Spelter.**—The market is still rather weak, although more interest has been shown by consumers at the reduced prices. The closing quotations are reported as 5.40@5.45 St. Louis, 5.55@5.60 New York.

The foreign market has been rather listless, and the closing quotations are unchanged at £23 10s. for good ordinaries, £23 15s. for specials.

Exports and imports of spelter in Germany for the three months ending March 31 were as follows, in metric tons:

	1904.	1905.	Changes.
Spelter.....	16,381	16,778	I. 397
Zinc sheets.....	3,723	4,075	I. 352
Total exports.....	20,104	20,853	I. 749
Imports.....	4,750	5,886	I. 1,136
Net exports.....	15,354	14,967	D. 387

Exports of zinc white were 3,572 tons in 1904 and 3,760 tons in 1905; an increase of 208 tons. Exports of zinc ore were 10,001 tons in 1904, and 9,144 tons in 1905; a decrease of 857 tons. On the other hand imports of zinc ore were 16,975 tons in 1904, and 31,013 tons in 1905, showing the large increase of 14,038 tons.

**St. Louis Spelter Market.**—The John Wahl Commission Co. telegraphs us as follows: Spelter is unsettled and demoralized. The latest sales here are on a basis of 5.45@5.50c. East St. Louis.

**Silesian Spelter Market.**—Herr Paul Speier reports from Breslau, Germany, that the market shows somewhat better condition. Quotations for ordinary brands are 24@24.25 marks per 50 kg., f. o. b. cars, at Breslau, which is equivalent to 5.20c. per lb.; special brands are quoted at 24.75@25.25 marks per 50 kg. This is an advance during the month. The Hohenlohe-Oehringen works have been incorporated in a company under the name of Hohenlohewerke-Aktiengesellschaft. The new company owns zinc mines and coal mines, and produced last year 30,136 tons of spelter. Zinc dust is quiet at unchanged prices, though more demand from the United States is reported.

**Spanish Zinc Ore Market.**—Messrs. Barrington & Holt report from Cartagena, Spain, under date of April 22, that prices are a little weaker, buyers considering that they have been too high in proportion to the value of spelter. Quotations, however, are unchanged at 74 fr. per ton for blende, 35% zinc, and 54 fr. for calamine, 30% zinc. Shipments were 2,020 tons of blende and 175 tons calamine to Antwerp.

**Antimony.**—There is no change. Common brands are salable at 8¼@8½c. f. o. b. New York.

**Nickel.**—Producers quote 40@47c. per lb. for large quantities down to ton lots, according to size and terms of order. For smaller quantities as high as 60c. is asked.

**Platinum.**—Quotations are firm at \$20.50 per oz. Gas engine sparking points vary from 87c. each for "A," to \$1.80 for "B."

Platinum in manufactured forms is strong. Messrs. Eimer & Amend, of New York, quote for different forms as follows: Heavy sheet and rod, 75c. per gram; foil and wire, 80c.; crucibles and dishes, 85c.; perforated ware, 90c., and cones, \$1 per gram.

**Quicksilver.**—Quicksilver is easy, at \$38 @ \$38.50 per flask in large lots, while \$40 is the price for smaller orders. San Francisco prices are \$37.50@ \$39 per flask for domestic orders, with some discount for export. The London price is £7 12s. 6d., with the same figures quoted by second hands.

**Cadmium.**—Metallic cadmium, guaranteed 99.5%, is selling in quantities of 100 kgs. or over at 710 marks per 100 kgs., packing included, f. o. b. Hamburg. This is equivalent to 76.6c. per lb. Prices are for net cash.

**Minor Metals and Alloys.**—Prices for manganese alloys in Germany are given by Herr Paul Speier as below. The prices are for orders of not less than 500 kgs., delivered in Bremen, and are as follows, per 100 kgs.: Manganese copper, No. 1, guaranteed 30% manganese, 265 marks;

No. 2, 28 to 30% manganese, for bronze, etc., 175 marks; No. 3, 25 to 20% manganese, with 2 to 4% iron, 165 marks. Manganese tin, No. 1, free of iron and guaranteed 55% manganese, 365 marks; No. 2, 55% manganese with some iron, 225 marks. Manganese nickel, No. 1, free of iron, 450 marks; No. 2, carrying some iron, 270 marks.

Thalium is quoted at 60@65 marks per kg. at Breslau, Germany. Manganese metal is quoted at 360 marks per 100 kg., f. o. b. Bremen, Germany.

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

Aluminum.	Per lb.
No. 1, 99% ingots.....	33@37c.
No. 2, 99% ingots.....	31@34c.
Rolled Sheets.....	4c. up.
Aluminum-Bronze.....	20@23c.
Nickel-alum.....	33@39c.
Bismuth.....	\$2.10
Chromium, pure (N. Y.).....	80c.
Copper, red oxide.....	50c.
Ferro-Molybdenum (50%).....	\$1.00
Ferro-Titanium (20@25% N. Y.).....	75c.
Ferro-Chrom. (74%).....	12½c.
Ferro-Tungsten (37%).....	45c.
Magnesium, pure (N. Y.).....	\$1.60
Manganese (98@99% N. Y.).....	75c.
Manganese Cu. (30@70% N. Y.).....	40c.
Molybdenum (98@99% N. Y.).....	\$2.75
Tantallic acid (N. Y.).....	50c.
Phosphorus, foreign.....	45c.
Phosphorus, American.....	70c.
Tungsten (best).....	\$1.25

Variations in prices depend chiefly upon the size and conditions of orders.

Missouri Ore Market.

JOPLIN, May 6.

The highest price paid for zinc ore was \$48 per ton and the assay basis price ranged from \$43 to \$45 per ton of 60% zinc. An effort on the part of some of the purchasing agents, to effect a bear movement in ore prices, met with a rebuff by the organized producers, and by the end of the week there was very little left of the bear movement; but it resulted in decreasing the shipment 194 tons, and increasing the reserve stock approximately 240 tons. As this places the estimate of reserve stock at less than 3,000 tons, the bulk of which is sold, it would appear apparent that no bear movement could exist for any length of time without the consent and co-operation of all or very nearly all of the smelters. As all of the smelters are operating independently, and as every effort at concerted action by them has in the past proved of no avail, the evidence points to a wider division in view of the supply of the Joplin district being limited and aggregating several hundred tons per week less than the smelting companies would like to draw from this district.

The talk a very few years ago that the output of zinc ore in Colorado would prove disastrous to ore prices in the Joplin district, never bore fruit, and now that the Colorado output is being augmented by shipments from British Columbia, Mexico and New Mexico, and an increased Wisconsin product, it is still evident that the shipments from all of these fields have in no way indicated a bearing disastrous to the Joplin district, nor has all this increased zinc product caused prices here to waver or lessen in the least. The high prices of last winter, when zinc ore did reach practically a prohibitive point, forced the smelter at Altoona, Kansas, to per week from this district, the latter half

of last year, that is this year obtaining practically no ore from this district; but other smelters are taking the slightly increased output and none of them are overstocked with the ore of the Joplin district. Two new smelters are being erected in Illinois, and even if they do not come into the Joplin market for a pound of zinc ore—if they obtain all their ore from other fields—they will create a greater demand for zinc ore, a demand that exceeds the supply in almost every country on the surface of the globe. The zinc mining industry is just now certainly most promising. If the zinc smelting industry is not so healthy, no more blame can be attached to the Joplin district than to any of the other districts where zinc ore is being produced, and where it is being competed for by domestic and foreign smelters.

One bin of lead in Webb City sold at \$61.50 and another bin at \$61 per ton. Ordinary grades continued to sell at \$58 per ton.

Following are the shipments of zinc and lead from the camps of the district for the week:

	Zinc, lb.	Lead, lb.	Value.
Carterville and Webb City.....	2,299,240	504,000	\$64,050
Joplin.....	2,485,770	245,050	63,040
Duenweg.....	1,198,510	117,890	29,790
Galena-Empire.....	956,120	126,240	23,840
Prosperity.....	386,220	129,040	12,240
Aurora.....	838,470	.....	10,780
Alba.....	444,890	.....	9,790
Badger.....	425,620	.....	9,360
Granby.....	486,000	37,000	7,400
Neck City.....	228,090	.....	5,130
Carthage.....	190,340	.....	4,280
Oronogo.....	175,940	4,750	3,720
Spurgeon.....	142,950	14,090	3,210
Wentworth.....	201,970	.....	3,190
Stott City.....	131,240	.....	2,760
Sherwood.....	69,670	23,610	2,210
Central City.....	63,710	.....	1,340
Cincife.....	68,000	4,100	1,620
Beef Branch.....	69,640	6,180	850
eed's.....	39,570	.....	830
Totals.....	10,901,960	1,211,950	\$159,430
total, 18 weeks.....	169,925,490	18,826,030	\$51,725,300
Zinc value, the week.....	\$224,350;	18 weeks, \$3,931.92	
Lead value, the week.....	35,080;	18 weeks, 581,805	

Monthly Average Prices of Metals.

COPPER IN NEW YORK.

Month.	Electrolytic.		Lake.	
	1904.	1905.	1904.	1905.
January.....	12.410	15.008	12.553	15.128
February.....	12.062	15.011	12.245	15.136
March.....	12.299	15.125	12.551	15.250
April.....	12.923	14.920	13.120	15.045
May.....	12.758	.....	13.000	.....
June.....	12.269	.....	12.399	.....
July.....	12.380	.....	12.505	.....
August.....	12.343	.....	12.468	.....
September.....	12.495	.....	12.620	.....
October.....	12.993	.....	13.118	.....
November.....	14.284	.....	14.456	.....
December.....	14.661	.....	14.849	.....
Year.....	12.823	.....	12.990	.....

Prices are in cents per pound. Electrolytic quotations are for cakes, ingots or wire bars; cathodes are usually 0.25c lower.

COPPER IN LONDON.

Month.	1904.	1905.	Month.	1904.	1905.
Jan.....	57.500	68.262	July.....	57.256	.....
Feb.....	56.500	67.963	August.....	56.952	.....
March.....	57.321	68.174	Sept.....	57.645	.....
April.....	58.247	67.017	Oct.....	60.012	.....
May.....	57.321	.....	Nov.....	65.085	.....
June.....	56.398	.....	Dec.....	66.384	.....
			Av., year.....	58.857	.....

Prices are in pounds sterling, per long ton of 2,240 lb., standard copper.

SILVER.

Month.	New York.		London.	
	1904.	1905.	1904.	1905.
January.....	57.055	60.690	26.423	27.930
February.....	57.592	61.023	26.665	28.047
March.....	56.741	58.046	26.164	26.794
April.....	54.202	56.600	24.974	26.108
May.....	55.430	.....	25.578	.....
June.....	55.673	.....	25.644	.....
July.....	58.095	.....	26.760	.....
August.....	57.806	.....	26.591	.....
September.....	57.120	.....	26.349	.....
October.....	57.923	.....	26.760	.....
November.....	58.453	.....	26.952	.....
December.....	60.563	.....	27.930	.....
Year.....	57.221	.....	26.399	.....

The New York prices are per fine ounce; the London quotation is per standard ounce, .925 fine.

TIN IN NEW YORK.

Month.	1904.	1905.	Month.	1904.	1905.
Jan.....	28.845	29.325	July.....	26.573	.....
Feb.....	28.087	29.262	August.....	27.012	.....
March.....	28.317	29.523	Sept.....	27.780	.....
April.....	28.132	30.525	Oct.....	28.596	.....
May.....	27.718	.....	Nov.....	29.185	.....
June.....	26.325	.....	Dec.....	29.286	.....
			Av., year.....	27.986	.....

LEAD IN NEW YORK.

Month.	1904.	1905.	Month.	1904.	1905.
Jan.....	4.347	4.552	July.....	4.192	.....
Feb.....	4.375	4.450	August.....	4.111	.....
March.....	4.475	4.470	Sept.....	4.200	.....
April.....	4.475	4.500	Oct.....	4.200	.....
May.....	4.423	.....	Nov.....	4.200	.....
June.....	4.496	.....	Dec.....	4.200	.....
			Av., year.....	4.309	.....

SPELTER.

Month.	New York.		St. Louis.	
	1904.	1905.	1904.	1905.
January.....	4.863	6.190	4.673	6.032
February.....	4.916	6.139	4.717	5.989
March.....	5.057	6.067	4.841	5.917
April.....	5.219	5.817	5.038	5.667
May.....	5.031	.....	4.853	.....
June.....	4.760	.....	4.596	.....
July.....	4.873	.....	4.723	.....
August.....	4.866	.....	4.716	.....
September.....	5.046	.....	4.896	.....
October.....	5.181	.....	5.033	.....
November.....	5.513	.....	5.363	.....
December.....	5.872	.....	5.720	.....
Year.....	5.100	.....	4.931	.....

Assessments.

Company.	Delinq.	Sale.	Armt.
Alpha Con., Nev.....	May 4	May 25	.05
Alta, Nev.....	May 17	June 5	.05
Alta Sierra, Cal.....	Apr. 26	May 17	.30
Bullion, Nev.....	May 23	June 12	.05
Canfield, Cal.....	May 16	June 14	.10
Centennial Copper, Mich.....	Aug. 10	.....	2.00
Chollar, Nev.....	May 10	June 7	.10
Con. Cal. & Va., Nev.....	May 18	June 8	.25
Con. Imperial, Nev.....	May 24	June 20	.01
Crown Point, Nev.....	May 17	June 7	.10
Diamond Creek, Cal.....	May 13	.....	.01½
Emerald, Utah.....	May 14	June 10	.01½
Fairview, Cal.....	May 29	.....	.25
Golden West, Cal.....	Apr. 17	May 13	.01
Gould & Curry, Nev.....	May 31	June 19	.10
Joe Bowers, Utah.....	Apr. 29	May 30	.00½
Juno, Utah.....	May 10	May 31	.00½
Lady Washington Con., Nev.....	May 8	May 25	.05
Jenny Lind, Cal.....	May 22	.....	.01
Loon Creek, Utah.....	Apr. 12	May 12	.00½
Lower Mammoth, Utah.....	May 6	May 22	.05
Potosi, Nev.....	June 5	June 26	.10
Sierra Nevada, Nev.....	May 16	June 5	.15
Trinity, Cal.....	May 25	.....	.05
Union Con., Nev.....	May 19	June 8	.15
Yellow Jacket, Nev.....	Apr. 11	May 16	.10

Dividends.

Company.	Payable.	Rate.	Amount.
Alaska-Treadwell.....	Apr. 28	\$0.50	\$100,000
†Amalgamated Copper.....	May 29	1.00	1,530,879
†Anaconda Copper.....	May 18	.75	900,000
*Annie Laurie.....	Apr. 15	.50	12,500
*Bunker Hill & Sull.....	May 4	.50	150,000
*Claremont Oil, Cal.....	May 1	.01	4,500
Camp Bird, Colo.....	May 6	.18	147,600
*Central Eureka, Cal.....	May 8	.07	5,000
De Lamar, Idaho.....	May 16	.72	129,600
†Doe Run Lead, Mo.....	Apr. 15	1.50	22,500
El Paso, Colo.....	Apr. 25	.02	50,000
Esperanza, Mex.....	May 15	.12	54,600
†Gold King Con., Colo.....	May 15	.01	57,505
Grand Central, Utah.....	Apr. 15	.05	12,500
§Greene Con. Gold, Mex.....	May 20	.20	100,000
§Greene Con. Copper.....	Apr. 21	.40	345,600
*Hecla, Ida.....	Apr. 20	.01	10,000
*Homestake, S. D.....	Apr. 25	.50	109,200
*Imperial Oil, Cal.....	May 6	.20	20,000
Iron Silver, Colo.....	May 1	.10	50,000
†Jamison, Cal.....	Apr. 18	.03	11,700
*Kendall, Mont.....	Apr. 20	.05	25,000
La Belle Iron Works, O.....	May 1	1.50	105,000
*Lightner, Cal.....	Apr. 20	.05	5,113
†Lehigh Coal & Nav.....	May 27	2.00	693,794
*Mines Co. of Am.....	Apr. 20	.01½	30,000
†National Carbon, pf.....	May 15	1.75	78,750
*New Century Zinc & L.....	May 1	.01	1,500
New Central Coal, Md.....	May 1	.40	20,000
*N. Y. & Hond. Rosario.....	May 27	.10	15,000
*Oil City Petroleum.....	Apr. 15	.00½	2,500
*Pacific Coast Borax.....	Apr. 29	1.00	19,000
*Penna. Con., Cal.....	Apr. 15	.10	5,150
Penna. Salt.....	Apr. 15	3.00	118,000
Pennsylvania Steel, pf.....	May 1	3.50	588,749
*Peerless Oil, Cal.....	May 1	.14	12,880
†Phila. Gas, com.....	May 1	.75	434,288
†Pittsburg Coal, pf.....	Apr. 25	1.75	519,771
†Pocahontas Coll'r's, pf.....	May 1	1.50	22,500
†Portland, Colo.....	Apr. 15	.10	300,000
Providence, Mex.....	May 1	.89	5,340
†Rock Run Fuel Gas, Pa.....	May 1	1.75	.....
*San Rafael, aviador.....	Apr. 19	12.18	14,616
*San Rafael, aviado.....	Apr. 19	3.48	4,176
Santa Maria de la Paz.....	Apr. 30	2.23	5,340
*Silver King, Utah.....	Apr. 10	.66½	100,000
Sheiby Iron.....	June 1	5.00	50,000
†Spearfish, S. D.....	Apr. 15	.01½	22,500
Stratton's Independence.....	May 22	.12	125,001
†Tenn. Coal & Iron, pf.....	May 1	2.00	4,960
†Tenn. C. & I., com.....	May 1	1.00	225,536
*Thirty-three Oil, Cal.....	May 6	.10	10,000
Tonopah, Nev.....	Apr. 22	.25	250,000
†United Copper, pf.....	May 15	3.00	150,007
†United Gas Imp.....	Apr. 15	2.00	180,000
†U. S. Steel, pf.....	May 8	1.75	6,305,497
†United Zinc, pf.....	Apr. 15	.75	14,667
†Va.-Carolina Chem., pf.....	Apr. 15	2.00	360,000
Victoria y An., Mex.....	Apr. 29	2.23	5,563
†Vindicator Con., Colo.....	Apr. 25	.03	33,000
Work, Colo.....	May 15	.00½	7,500

\*Monthly. †Bi-monthly. ‡Quarterly. §Semi-Annually.

Salt Lake City. April 29.

Company.	Par Val.	High.	Low.	Shares.
Ajax.....	16½	15	8,700	
Beck Tunnel.....	8½	8½	500	
Butler-Liberal.....	\$1 14½	13½	3,700	
Carisa.....	1	20	74,000	
Con. Mercur.....	40	39	3,600	
Daly-Judge.....	5.15	5.00	50	
Daly-West.....	14.75	14.50	75	
Ingot.....	1½	1½	785	
Little Chief.....	1	3½	36,200	
Little Bell.....	40	40	200	
Lo. Mammoth.....	25	33	21,500	
Mammoth.....	1.10	1.10	100	
May Day.....	24½	21½	58,600	
Naldriver.....	55	55	600	
New York Bonanza.....	1	93	38,100	
Sacramento.....	7½	7½	1,500	
Silver Shield.....	32½	30	3,500	
So. Swansea.....	8	8	1,000	
Star Con.....	1	9½	1,000	
Tetro.....	1	18½	3,000	
Uncle Sam Con.....	1	37	6,000	
Victor Con.....	4	4	2,000	
Wabash.....	1.79	1.78	300	
Yankee Con.....	35½	35	1,300	

STOCK QUOTATIONS.

Colorado Springs (By Telegraph.) Table with columns for Company, May 8 (H, L), and May 9 (H, L). Includes companies like Anaconda, C. K. & N., Cripple Creek Con., etc.

St. Louis, Mo.\* May 6. Table with columns for Company, Par Val., Bid., and Ask. Includes companies like Am. Nettie, Colo., Center Creek, etc.

Montreal.\* Table with columns for Company, Par Val., High., and Low. Includes companies like Dominion Coal, Dom. I. & St., etc.

San Francisco.\* April 28. Table with columns for Company, Location, Opening (H, L), Closing (H, L), and Sales. Includes companies like MacNamara, Mont. Tonopah, etc.

San Francisco (By Telegraph.) Table with columns for Company and May (8, 9). Includes companies like Belcher, Best & Belcher, Caledonia, etc.

New York. Table with columns for Company, May 3-9 (H, L), and Sales. Includes companies like Alice, Amalgamated, Anaconda, Best & Belcher, etc.

Boston. Table with columns for Company, Par Val., May 3-9 (H, L), and Sales. Includes companies like Adventure Con., Allouez, Amalgamated, Am. Z. L. & Sm., etc.

STOCK QUOTATIONS.

London (By Cable\*).

Company.	May 9			Company.	May 9		
	£	s.	d.		£	s.	d.
Camp Bird	1	15	0	Esperanza	1	4	0
Con. Gold Fields	7	11	3	Modderfontein	10	5	0
De Beers	17	7	6	Rand Mines	10	6	3
Dolores	1	9	0	Rio Tinto	60	7	6
East Rand	8	0	0	Simmer & Jack	1	18	9
El Oro	1	1	3	Tomboy	1	0	7 1/2

\* Furnished by Wm. P. Bonbright & Co., 24 Broad St., New York. † Ex-dividend.

Coal, Iron and Industrial Shares.

Company.	Par Val.	May 3		May 4		May 5		May 6		May 8		May 9		Sales.
		H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Allis-Chalmers	\$100	14 1/2	14 1/2	14 1/2	13	14 1/2	13 1/2	14 1/2	14 1/2					
Preferred	100	52 1/2	51 1/2	51	46 1/2	51	49 1/2							
Am. Agri. Chem.	100													
Preferred	100													
Am. Sm. & Ref.	100	114 1/2	112 1/2	113	109 1/2	112 1/2	110 1/2	112 1/2	111 1/2					
Preferred	100	121 1/2	121	120 1/2	119	120	119							
Cambria Iron	50	48 1/2	48											
Cambria Steel	50	26 1/2	26	26	25 1/2	26	25 1/2	26	25 1/2					
Col. Fuel & Iron	100	45 1/2	44	44	41 1/2	44 1/2	42 1/2	44 1/2	43 1/2					
Preferred	100	14 1/2						95	43 1/2					
Col. & H. C. & I.	100	14 1/2	14	14 1/2	13 1/2	14 1/2	14 1/2	14						
General Chem.	100													
Preferred	100													
Lehigh Nav.	50	107 1/2		108										
Mong. R. Coal	100			9 1/2		10		10						
Preferred	100													
National Lead	100	46 1/2	45 1/2	45 1/2	43 1/2	45 1/2	43 1/2	45 1/2	45 1/2					
Preferred	100	107 1/2	106 1/2	106 1/2	104 1/2	106 1/2	106 1/2	106 1/2	106 1/2					
Phila. Nat. Gas	50	44 1/2	44 1/2	44 1/2	43 1/2	43 1/2	43 1/2	44 1/2	43 1/2					
Preferred	50	48 1/2	48		48									
Pittsburg Coal	100	17 1/2		17 1/2	17 1/2	17 1/2								
Preferred	100	73 1/2	73	72 1/2	73	72 1/2	72 1/2	72 1/2	72 1/2					
Republic I. & S.	100	18 1/2	18 1/2	18 1/2	18	17 1/2	18	17 1/2	17 1/2					
Preferred	100	74 1/2	73 1/2	73	71 1/2	72 1/2	71 1/2	74 1/2	73 1/2					
Sloss; Shef. S. & I.	100	82	80 1/2	80	76	78 1/2	77 1/2							
Preferred	100													
Standard Oil	100	62 1/2	62 1/2	62 1/2	61 1/2	61 1/2	61 1/2	61 1/2	61 1/2					
Tenn. C. I. & R. R.	100	35 1/2	32 1/2	31 1/2	28 1/2	30	28 1/2	30	31 1/2					
U. S. Steel	100	82 1/2	81 1/2	81 1/2	80 1/2	80 1/2	80 1/2	81 1/2	81 1/2					
Preferred	100	101 1/2	100 1/2	100 1/2	98 1/2	101 1/2	99 1/2	101 1/2	100 1/2					
Va. Car. Chem.	100	85 1/2	85	84 1/2	84	84 1/2	84	84 1/2	84 1/2					
Preferred	100	105				106 1/2								

Total sales, 1,885,737.

Mexico.

April 28.

Company.	Shares Issued.	Prices, Mex.		Company.	Shares Issued.	Prices, Mex.	
		Bid.	Ask.			Bid.	Ask.
DURANGO:				San Rafael y An.			
Penoles	2,500	\$2,600	\$3,000	aviada	1,200	\$600	\$620
San Andres de la Sierra	200	10,000		Soledad, aviada	670	930	970
GUANAJUATO:				Sorpresa, aviada	960	240	275
Cinco Senores y An.	2,000	11	15	MEXICO:			
aviadoras				Aldebarren	2,000	35	42
Cinco Senores y An.	400	32	40	Buen Despacho	3,000	42	50
aviada				Dos Estrellas	3,000	3,580	3,620
Providencia, San Juan	6,000	120	135	La Esperanza (El Oro)	3,000	1,500	1,500
de la Luz				Santa Ana, Esperanza	2,400	30	60
GUERRERO:				NUEVO LEON:			
Garduno y Anexas	7,200	31	35	La Fraternal	1,000	580	620
HIDALGO:				Norias de Bajan	1,000	700	750
Amistad y Concordia	9,600	61	63	SAN LUIS POTOSI:			
Carmen aviada	1,100	160	175	Concepcion y An	3,000	20	30
Guadalupe Fresnillo	1,000	170	200	El Barreno, aviadora	2,000	97	105
Mill				Sta. Maria de la Paz	9,600	275	276
Guadalupe Fresnillo	1,400	70	80	ZACATECAS:			
Mine				Asturiana y An	2,500	8	12
Maravillas y An., aviador	1,680	70	100	Candelaria y Pinos	2,500	65	100
Maravillas el Lobo	1,000	130	180	San Carlos y Annexas	2,500	15	20
Refugia, aviada	12,800	5	7	Sta. Maria de Gaud	2,500	75	80
MISCELLANEOUS:				MISCCELLANEOUS:			
Sta. Gertrudis y An., aviadas	9,600	8	12	Bartolome de Medina	2,000	75	83
Sta. Gertrudis y An., aviadora	28,800	66	69	Naica (Chihuahua)	100	11,000	13,000
San Rafael y An., Trompillo	1,200	1,890	1,940	Natividad (Oaxaca)	1,800	700	750
				aviadora	6,000	68	75
				San Francisco Hac	3,000	280	315
				Union Hacienda			

Paris.

April 20

Company.	Location.	Par value.	Latest dividend.	April 20	
				Opening.	Closing.
Acieries de Creusot	France	Fr. 2,000	Fr. 75.00	Fr. 1,995.00	Fr. 1,984.00
Anzin, Coal	France		290.00	5,875.00	5,780.00
Biache-St. Vaast	France	1,000	160.00	3,605.00	3,605.00
Boleo, c.	Lower California	500	104.17	2,678.00	2,665.00
Bruay, Coal	France	400	27.50	781.00	785.00
Courrieres, Coal	France	500	110.00	3,085.00	3,090.00
Ecombrera-Bleyberg, z.l.	France	350	35.00	712.00	722.00
Huanchaca, s.	Bolivia	125	2.50	85.75	86.50
Laurium, z. l.	Greece	500	25.00	321.00	320.00
Malfidano, z.	Italy	500	50.00	680.00	667.00
Metaux, Cie. Fran. de.	France	500	22.50	555.00	550.00
Mokta-el-Hadid, i. l.	Algeria	500	40.00	1,075.00	1,055.00
Nickel, n.	N. Caledonia	250	22.50	718.00	720.00
Penarroya, Coal	Spain	500	45.00	1,180.00	1,180.00
Vielle Montagne, z.	Belgium	30	30.00	837.00	840.00

London.

Company.	Par Val.	Latest dividend.		April 28.		
		Amt.	Date.	Buyers.	Sellers.	
American:	£	s.	d.	£	s.	d.
*Alaska Treadwell	5	0	2	0	7	1
Anaconda	5	0	2	0	5	15
Camp Bird	1	0	9	0	1	13
Copiapo	2	0	5	0	1	8
De Lamar	1	0	3	0	1	18
El Oro	1	0	9	0	1	0
Frontino & Bolivia	1	0	0	0	17	0
Le Roi	5	0	5	0	17	6
Le Roi No. 2	5	0	2	0	17	6
Montana	1	0	6	0	9	1
Stratton's Indep'd	1	0	6	0	8	9
St. John del Rey	1	0	6	0	12	6
Tomboy	1	0	1	0	1	0
Tyce	1	0	2	0	1	7
Utah Con.	1	0	6	0	8	15
Ymir	1	0	1	0	1	3
European:						
Libiola	5	0	2	6	1	15
Linases	3	0	5	0	4	5
Mason & Barry	1	0	7	0	3	0
Rio Tinto	5	0	37	6	6	10
Rio Tinto, pf.	5	0	2	6	6	2
Tharsis	2	0	7	0	5	2
West Australian:						
Associated	1	0	2	6	2	0
Cosmopolitan	1	0	1	0	9	9
*Golden Horseshoe	5	0	6	0	7	8
Great Boulder	1	0	2	9	1	10
Gt. Boulder Perse	1	0	9	0	12	0
Great Fingall	1	0	7	6	7	13
*Ivanhoe	5	0	9	0	7	16
Kalguri	1	0	2	6	7	5
Lake View	1	0	1	6	1	0
Oroya-Brownhill	1	0	4	0	3	6
Miscellaneous:						
*Brilliant Central	1	0	6	0	12	6
*Brilliant & St. Geo.	10	6	0	0	15	0
Briseis Tin	1	0	0	0	12	6
Broken Hill	8	1	6	0	2	2
Mt. Lyell	3	0	1	3	19	0
*Mt. Morgan	1	0	3	0	2	15
Wahi	1	0	2	6	1	11
Indian:						
*Champion Reef	10	1	3	0	1	13
Mysore	10	5	6	0	6	16
Nundydroog	10	1	6	0	1	10
*Ooregum	10	9	0	0	1	3
*Ooregum, pf.	10	9	0	0	1	10
South African:						
Angelo	1	0	5	0	6	7
Bonanza	1	0	7	0	18	9
British So. Africa	1	0	0	0	1	15
Cape Copper	2	0	6	0	4	1
Cape Copper, pf.	2	0	6	0	3	17
City & Suburban	4	0	6	0	5	7
Consol. Gold-Flds.	1	0	2	6	7	13
*Crown Reef	1	0	20	0	15	15



### Questions and Answers.

Queries should relate to matters within our special province, such as mining, metallurgy, chemistry, geology, etc. Preference will be given to topics which seem to be of interest to others beside the inquirer. We cannot give professional advice, which should be obtained from a consulting expert, nor can we give advice about mining companies or mining stock. Brief replies to questions will be welcomed from correspondents. While names will not be published, all inquirers must send their names and addresses. Preference will, of course, always be given to questions submitted by subscribers.

**Elaterite.**—What is the chemical composition of this? Where is it found in quantity sufficient for commercial purposes?—C. P.

**Answer.**—Elaterite (or mineral india-rubber) is a soft, elastic, brown variety of native bitumen. It is chemically a hydrocarbon, with about 85% of carbon and 13% of hydrogen. It is found in the western parts of Colorado and the eastern part of Utah, in the Uintah reservation, for example. It is reported that a Chicago firm has recently taken hold of elaterite in the projected manufacture of varnish and waterproof paint. A résumé of the asphaltic and bituminous deposits of the United States is found in the twenty-second annual report of the United States Geological Survey, part 1, page 219. The subject is one that is now under investigation, and we may reasonably expect to learn more of the specific qualities and uses of this mineral gum.

**Apatite.**—I would like to know something about this mineral; its nature and where it is found; also its value.—G. C. C.

**Answer.**—The following statement, which will answer your question, is from Merrill's 'Non-Metallic Minerals,' page 260: "Under the name of apatite is included a mineral composed essentially of phosphate of lime, though nearly always carrying small amounts of fluorine or chlorine, thereby giving rise to the varieties fluor-apatite and chlor-apatite. The mineral crystallizes in the hexagonal system, forming well-defined six-sided elongated prisms of a green, yellow, rose, or reddish color, or sometimes quite colorless. It also occurs as a crystalline granular rock mass. The hardness is 4.5 to 5; specific gravity, 3.23; luster, vitreous. Apatite in the form of minute crystals is an almost universal constituent of eruptive rocks of all kinds and all ages. It is also found in sedimentary and metamorphic rocks as a constituent of veins of various kinds, and is a common accompaniment of beds of magnetic iron ore. It is only when occurring segregated in veins and pockets, either in distinct crystals or as massive crystalline aggregates, as in Canada and Norway, that the material has any great economic value."

New Zealand has a State coal mine, the object of which is to regulate the coal trade and prevent oppressive combinations and high prices.

### Recent Legal Decisions.

SPECIALLY REPORTED.

**CONSTRUCTION OF COAL CONTRACT.**—In this case, the suit was based on a contract made by Jones & Adams to furnish the Consolidated Coal Company for nine months, beginning July 1, 1902, a minimum of 125 tons of coal a day and a maximum of 200 tons a day, at 95c. per ton for lump and 85c. per ton for run-of-mine, f. o. b. at the mines. According to the evidence the amount furnished fell far short of the amount ordered, and coal sold much higher during the scarcity caused by the great anthracite strike of 1902. The appellant offered the contract as evidence, and also introduced evidence to show a breach of contract and the market prices of coal during the period the defaults in delivery were alleged to have occurred. The lower court construed the contract as an option contract and void as to all in excess of 125 tons. This holding is pronounced an error by the Appellate Court. In response to the insistence by appellee that its failure to deliver the coal according to contract was due to the lack of cars, and that it was the duty of appellant under the contract to furnish cars upon which to load the coal, the Appellate Court decides that the claim is not well founded. The contract is silent as to who is to furnish the cars.

The written opinion concludes with the statement: "We are of opinion that the evidence adduced by appellant establishes a *prima facie* case and that the trial court erred in directing a verdict for the defendant. It follows that the judgment predicated thereon must be reversed and the cause remanded for another trial."—Consolidated Coal Company vs. Jones & Adams; Appellate Court of Illinois.

**RIGHTS AND OBLIGATIONS IN MINING PARTNERSHIP.**—The case of Cameron against Burnham and others has been finally decided in an appeal from the Superior Court, and settles a question of much interest to those who mutually agree to provide funds to open and prospect mines. In 1901 certain Oakland men agreed to lease mining privileges on land in the Blue Ravine section, above Folsom, Sacramento county, and each agreed to subscribe \$500 to obtain the lease and do the prospecting. They were to pay the money to A. T. Eastland, at such times and in such amounts as he designated. It was provided that if anyone failed to pay within 10 days after the time fixed, he would forfeit all interest in the lease and all money previously paid. Soon after all interested had signed the agreements, each of the subscribing parties was called upon to pay \$100 and they were duly notified. All of them paid except P. A. Cameron, and he neglected or refused to do so, and it is found in the decision that he repeatedly said he was "out of it" and would have nothing to do with the matter. In the meantime the others went ahead with

the subscriptions and the work, and in October of the same year struck rich gravel in the Gray Wing drift mine, which they worked for some years at good profit. Cameron had done nothing, and contributed nothing toward the discovery, development or working of the property, but sued for the interest and profits which would have been his had he paid up as the others did. He was defeated in the first suit, but contended that he was a party to the original contract and his rights could not be taken away from him except by due process of law, and appealed the case.

In the decision the Supreme Court says: "On the foregoing facts we are of opinion that plaintiff was not entitled to the relief prayed for. The plaintiff is, or was, a party to the contracts, and as they were both intended for the accomplishment of one purpose, so far as plaintiff is concerned, they should be construed together as one contract. The plaintiff, after having neglected and refused to perform any part of his agreement, after standing by for five months watching the other parties spending their money in search of this gold that no one knew existed, all the time declaring that he was 'out of it' and would have nothing to do with it, doing what he could to discourage the enterprise, now seeks in this equitable action to compel the defendants to share with him the profits of their industry and expenditure of moneys. This he cannot do in a court of equity. He who asks equity must do equity. He who seeks to enforce a contract must show that he has complied with the conditions and agreements of the contract on his part to be performed. (Civil Code, sec. 1439.) Plaintiff failed and refused to pay any part of the amounts he agreed to pay, and thereby, by the very terms of the contract, forfeited any right that he may ever have had in the property, and the statute of frauds has nothing to do with the case. Plaintiff could have no rights in equity and no right to be heard in a court of equity until he did the equitable thing by his associates and performed his part of the agreement. To give him an interest in this mine and the proceeds thereof now would be the grossest injustice to his co-contractors. A court of equity will not countenance such an injustice. On the most familiar principles of equity it is clear that the trial court sitting as a court of equity was fully warranted in denying the plaintiff all relief."—Cameron vs. Burnham and Others; Supreme Court of California.

When a rare-earth filament has once been used as a glower with a direct current, the poles cannot be reversed without instant disruption of the glower. This must mean something in the theory of the mode of electric conduction, which may be partially electrolytic in its action.

**Abstracts of Official Reports.***Calumet & Pittsburg Mining Company.*

This company is developing an extensive copper property in the Bisbee district in Arizona. Its report for the year 1904 shows a balance of \$343, and receipts of \$1,000,000 from stock sales and \$114,000 from loans; a total of \$1,114,343. The expenditures on the mine were \$1,113,429, leaving a balance of \$914 on hand.

During the year 2,690 ft. of development work was completed, with encouraging results. The great difficulty encountered was the large inflow of water; it was necessary to handle as much as 2,700 gal. per minute. This required a large outfit of boilers and pumps. The main shaft was remodeled into a five-compartment shaft. Other preparations were made for active working.

*Lake Superior & Pittsburg Mining Company.*

This company is engaged in developing a copper property in the Bisbee district in Arizona. Its report for the year 1904 shows a balance of \$11, while receipts from stock sales were \$1,495,520; interest, \$5,743; total, \$1,501,274. Expenditures for mine work and development were \$1,354,588, leaving a balance of \$146,686 on hand.

The total development work done was 5,667 ft., and ore has been found in several places. One of the shafts is being enlarged to a four-compartment shaft, down to the 1,100-ft. level, with a view to hoisting ore. This shaft will be connected, by a railroad track on the surface, with other shafts and work on the surface. The mine will begin very soon to send ore to a 300-ton furnace; the ore will be smelted in connection with that from the neighboring Pittsburg & Duluth mine. With the completion of the shaft above mentioned, work can be carried on more extensively and to better advantage than formerly.

*Mason & Barry, Ltd.*

This English company owns the San Domingo mine in Portugal, a large deposit of copper-bearing pyrites. The report for the year 1904 says: "The total quantity of ore broken and raised at the mine during the year 1904 was 209,458 tons, as against 217,207 tons in 1903, and the shipments during the same period (inclusive of ore from the cementation works) amounted to 380,943 tons, as against 349,380 tons in the previous year. The quantity of ore sold and invoiced for its sulphur value during 1904 amounted to 370,511 tons, as against 341,631 tons in 1903. After writing off for depreciation of works, plant, etc., the sum of £20,000 (the value of new works and plant added to capital account amounted to £8,229), and allowing for the variation in the estimated value of the stocks on hand on Dec. 31, 1904, and after deducting management expenses and income tax, the net profits on working account have amounted to the sum of

£63,567, to which has to be added the sum of £8,573 received as dividend on La Sabina shares, and the sum of £2,792 from sundries, making together a total profit for the year of £74,932.

The stocks of ore and copper precipitate broken, raised and on hand, Dec. 31, 1904, are valued at £75,238. Compared with the previous year the figures stand as follows:

	1903.	1904.
Stocks in England and on the Continent	£37,502	£15,009
Stocks in Portugal, balance of cost of ore at cementation works	29,737	28,823
Ore ready for shipment	24,924	20,990
Copper precipitate	3,936	10,416
Total	£96,099	£75,238

The mine assets in Portugal (after writing off for depreciation) stood on Dec. 31, 1904, at £102,857. The profit realized on the year's working amounts to £74,932, to which has to be added the balance, £23,078, brought forward from the year 1903, making together the sum of £98,010, and the directors having written the sum of £1,000 off La Sabina shares, there remains a balance for appropriation of £97,010. From this balance the directors recommend the payment of a dividend of 35%, or 7s. per share, the appropriation of £1,000 to the staff pension fund, and to carry forward the sum of £31,200 to the next account.

"The fumes from the fire in the west end of the 150-meter floor (which from Dec. 19 caused the total stoppage of all work underground) were, on Jan. 16, sufficiently walled off and isolated to enable work to be resumed in the east end of that level. During the month of March the 180-meter level, which in consequence of the fire had become full of water, was pumped dry, and work resumed. The fire, however, still continues."

*Calumet & Arizona Mining Company.*

This company operates a large copper property in the Bisbee district in Arizona. It was the pioneer in that district, and has been successful, as shown by its report for the year 1904. During that year the ore statement shows: Mined, 206,432 tons; smelted, 205,807 tons; on hand at close of year, 26,598 tons. The total product was 15,819 tons refined copper, an average yield of 7.68 per cent. The product in gold and silver was \$195,926, or \$12.38 per ton of copper. The average price received for copper was 12.562c. per pound. There were four dividends paid during the year, the total amount being \$1,300,000. The surplus was \$1,823,998 at the close of the year.

Development work was actively carried on, the total being 4,218 ft. for the year. The result was the opening of several new orebodies. Extensive additions were made to the mine and smelter plant, the latter including two new blowing engines and storage tanks for fuel oil.

The report says: "The average number of men employed for the year was 884;

of this number 583 were employed at the mine and 301 at the smelter.

"Developments tributary to the Oliver shaft during the year and up to the present time have shown the existence of large orebodies in our Senator claims. These developments, together with favorable ground in the Lake Superior & Pittsburg near the line of our Buckeye claim, and developments in Pittsburg & Duluth near our Gibraltar claim, make it quite certain that our Buckeye and Gibraltar claims are well mineralized.

"On the completion of No. 4 furnace, probably in May, it is intended to use one furnace mainly on ores from Lake Superior & Pittsburg and Pittsburg & Duluth mines. The ores from these mines will furnish a good smelting mixture.

"There has been some informal discussion relative to consolidation with affiliated companies. No action has been taken by the board either as to advisability, time or basis. Nor will there be until practically a full meeting. There has been apprehension expressed by some stockholders regarding this matter. All can rest assured that no recommendation of consolidation will be made until full and careful consideration by the board has been given, and the conclusion reached that it will be for your best interest."

*Michigan Copper Company.*

This company is developing a mine in the copper country of Michigan. It became a producer last year. The report covers the year ending Dec. 31, 1904. The total rock stamped for the year was 125,055 tons, which yielded 2,394,770 lb. mineral and 1,304,465 lb. mass copper, the total giving 2,746,127 lb. refined copper. This was 22 lb. per ton stamped, or 1.1 per cent. The development work included 2,865 ft. drifting and 229 ft. raising. Stopping done was 10,426 fathoms. Drifting cost \$4.81 and upraising \$5.34 per ft.; stopping, by contract, \$9 per fathom.

The financial statement is as follows for the year:

Balance on hand, Jan. 1	\$43,946
Assessments paid	59,424
Interest received	1,205
Copper sold	358,539
Total receipts	\$463,114
Expended at mine	\$319,727
Smelting, freight and copper charges	28,256
General expenses, Boston	7,111
Total expenses	\$355,094
Surplus, Dec. 31	\$108,020

The average price received for copper was 13.056c. So much of the work done was in developing the mine, that it is not possible to give the average cost of copper.

The president's report says: "As production only began in the latter part of 1903, it was not until May that the head of stamps employed on our rock began to work on full time. The results of the year's work indicate the necessity of increasing the output, and arrangements are making to enlarge our operations on the Branch vein as rapidly as dwellings can be provid-

ed for an increased force. We are now working as large a force as can find homes either on our own location or in its vicinity. The Branch vein promises to be our chief producer, although the quantity of stamp material coming in connection with its 'mass' and 'barrel' work would not of itself keep the mill at work. In the light of what is now known of this vein and its present production, the belief seems warranted that in our large extent of territory east of B shaft we shall find long stretches of ground carrying copper in paying quantities. The results of our own explorations seem to indicate that the character of the deposits of copper in this hill is not yet fully understood. We have not yet met with the success that was expected in the old Minnesota conglomerate, but on the other hand the old company does not seem to have known of the existence of the Branch vein, although it may prove to be a continuation of the vein worked by the Rockland Mining Company, whose lands are now owned by this company. The prospects for a profitable mine at this point are now brighter than at any time since we began operations, and it is to be hoped that the development proposed during the current year will bring results that will place the mine in a strong position."

#### Stellar Evolution.

The Magellanic Clouds are two nebula-like patches of 'star-dust' in the southern half of the celestial sphere. They much resemble parts of the Milky Way in casual appearance, but are brighter and also entirely distinct in position, being isolated from the *Via Lactea* and unique in this respect. They are named after the great Portuguese discoverer, who noted them in his log-book, though they were mentioned by Arabian astronomers many centuries earlier. Under telescopic enlargement, they present a rich and bewildering complexity of cluster and nebula, as though comprising universes of their own. One of these clouds is larger than the other; and both have been the object of much study and observation.

Recent scrutiny of photographs of the smaller cloud (taken in the elevated observatory in Peru, supported by Harvard University) shows that this group contains over 900 'variable' stars. There are 280,000 stars photographed, which gives 1 in 308 as variable. In the surrounding region, which is not so densely studded, there are only 40,000 stars and with 1 variable in 3,300. Whatever this may mean is not yet certain; but at all events, it suggests that that part of the celestial cosmos is very much alive, and that it grows more alive with condensation. It looks as though Lockyer's hypothesis of stellar evolution by meteoric bombardment and cometary collision might find in such conditions as those of the *nebulula minor* variables, an illustration and a proof. Meanwhile we wait the returns of careful spectroscopic study of this lesser Magellanic Cloud.

#### The Hancock Jig.

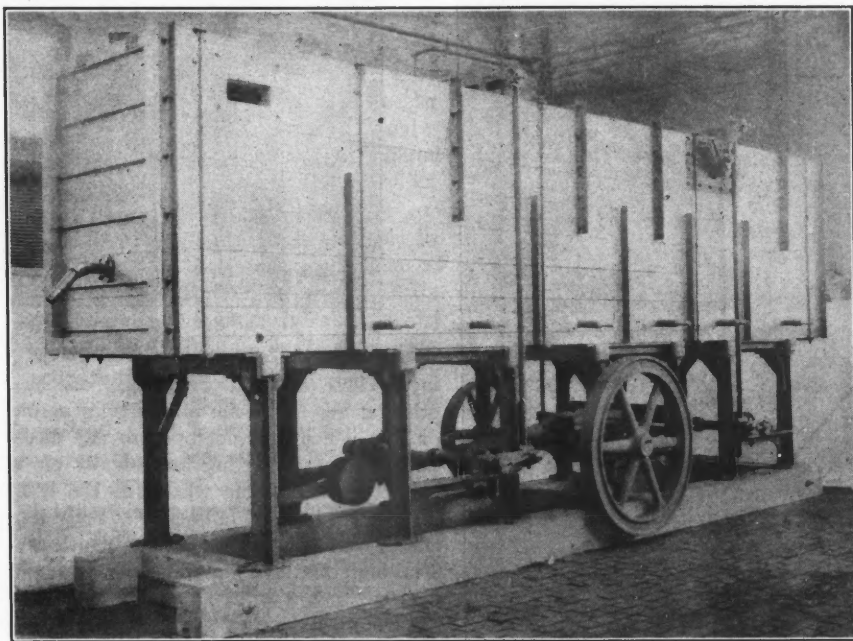
The superintendents of stamp-mills will be interested to know that Allis-Chalmers Company, manufacturers of the well-known Hartz jig, are now making a new and improved machine known as the Hancock jig, as illustrated herewith. The principal feature of this machine is the reciprocating motion of the sieve, and it also possesses the following advantages:

1. Sizing trommels and their attendant repairs are avoided, thus insuring simplification of installation and attendance. This jig will handle an unsized product ranging from  $\frac{5}{8}$  in. to 3 mm. in the same machine. The fine jig is handling a pulp ranging from 3 mm. to the finest size profitably jiggled.

2. This machine has a larger capacity than the Hartz jig. On the coarser size it

above, which does not reach the bottom. On one side of the partition is affixed a horizontal screen, on which the sized ore is fed; on the other side a loosely working plunger operated vertically by a crank or other reciprocating device. The action of this plunger is to cause a regular pulsation of water through the screen, so affecting the particles of ore resting thereon that the heavier particles settle down through the latter, and either discharge through the screen itself or by an appropriate gate above screen level, while the lighter particles of rock move on, horizontally discharging over the side or end of screen frame.

Jigs are usually provided with long wooden tanks with pointed bottoms, divided longitudinally by a partition (part way down, as described) and also laterally into



HANCOCK JIG.

will handle economically and easily 600 to 700 tons of ore in 24 hours; on the finer, 400 tons of pulp in 24 hours, but 100 tons may be treated in 24 hours as readily as these large amounts.

3. The consumption of water in jiggling is reduced 50% or more in the Hancock as compared with the Hartz jig.

There are many other interesting points in connection with this machine, but the above are the most important. The jig is designed to handle all kinds of concentrating ore, and has made a wonderful record on chalcopryite ore in one of the largest concentrating mills in Arizona.

The principle on which all the well-known forms of jigs work is the tendency of the mixture of ore particles of approximately similar size, but varying specific gravity, to arrange itself into layers according to gravity when given a motion of adjustment by means of a pulsating column of water. The ordinary jig consists of the water-tank divided by a partition

two or more screen spaces, discharging one upon another, and with equal corresponding plunger compartments on the opposite side of the longitudinal partition. They have usually one, two, three or four compartments, the last being generally used when more than two products are required, as, for instance, a mixture of galena and zinc, blend in rock or galena with iron or copper pyrites.

In the case of three- or four-compartment jigs, the plungers are regulated as to stroke and speed independently of each other, and with reference to the work to be done respectively on the screen-beds they govern. Several designs are used for the operation of the plungers, the most common being adjustable eccentrics or cranks and lever-tappets, which depress the plunger by a downward stroke, a spring raised the plunger when the tappet is removed. This latter form is much used in the Lake Superior region for dressing native copper ore.

All jigs are dependent for proper work on correct sizing based on the character of ore, and the proper adjustment of speed and stroke of plunger to size of material worked. Given these conditions, perfect work can be done by jigs, and as they are cheap to make and economical to operate, they cannot be bettered for the work they are adapted to do.

#### Traveling Trough Conveyor.

The illustrations given herewith show the Jeffrey endless traveling trough conveyor used for lowering coal from one elevation to another. The installation in question was made for the Big Sandy Coal & Coke Company, at Marytown, W.

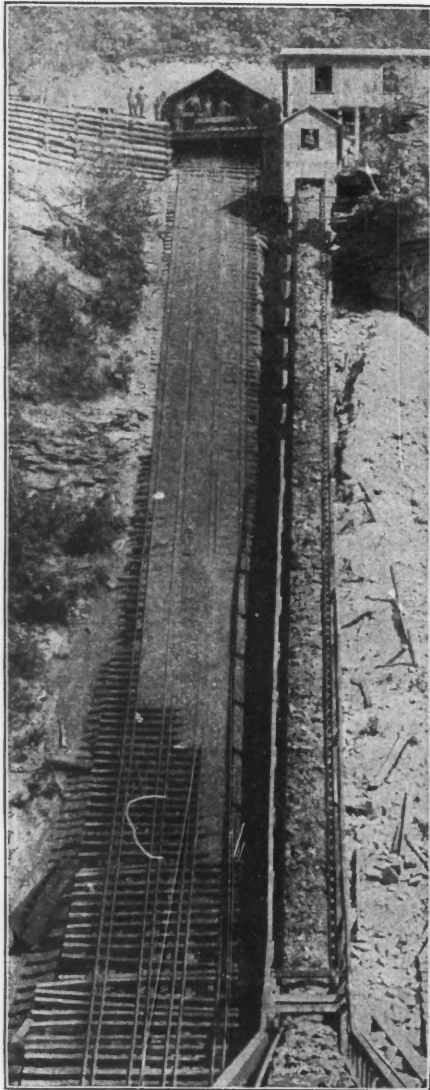


FIG. 1.—CONVEYOR, FROM BELOW.

Va. As will be seen by the two views, a portion of the conveyor is on a steep incline and the remainder runs horizontally. The conveyor travels for a distance of 155 ft. at an angle of  $37.5^\circ$ ; for 87 ft., at an angle of  $32^\circ$ , and 176 ft. horizontally, describing a curve when it runs from the incline to the horizontal. The conveyor is 42 in. wide, 8 in. deep, and travels at the

rate of about 100 ft. per minute. When fed continually it has a capacity of about 3,000 tons per day. It is constructed of two strands of 18-in. pitch steel thimble roller chain, provided with self-oiling flanged rollers, the chain having attachments at one side of which double-beaded or corrugated plates are bolted. These plates are provided with corrugations something on the order of corrugated roof-

#### A Rotary Smelting Furnace.

A Medbery rotary smelting furnace is attracting considerable attention from the efficiency that it exhibits. The furnace is essentially a steel barrel, lined with fire-brick, rotated in riding rings, and carried on trunnions. The charging door and the slag spout are at the end. The fuel is preferably oil or gas, a test run using 18 gal. of oil per hour. The furnace can

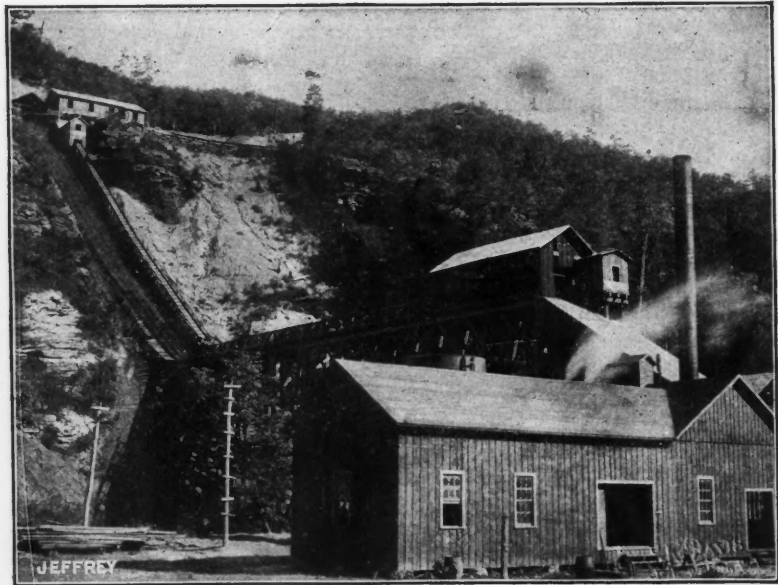


FIG. 2.—GENERAL VIEW OF PLANT.

ing. These corrugations overlap one another at the joints, forming a tight apron or belt which will not open in any position, whether traveling horizontally on a curve or around the wheels at the end. To prevent the coal falling off at the sides, end or side pieces are provided which are 8 in. high, and overlap each other, shingle fashion; thus it will be seen that a traveling trough is formed that carries the coal without friction. Furthermore, the conveyor, being on rollers, will operate with a minimum of friction, wear and consumption of power. The coal is delivered to the conveyor at the top from a bin, the conveyor acting as an automatic feeder, so that no special feeding device is required. It discharges its load at the bottom on a set of screens, from which it goes into the railroad cars below.

The first cost of this type of conveyor is somewhat higher than that of the ordinary scraping device, but this, it is believed, will be more than compensated for by the increased security and efficiency. The conveyor is made by the Jeffrey Manufacturing Company, of Columbus, Ohio. Fig. 1 is from a photograph taken from the foot of the conveyor; Fig. 2 is a general view of the plant.

In a vacuum tube, according to Sir Oliver Lodge, the bulk of the current is carried by positive ions. He also asserts that the flight of cathode rays makes conduction difficult.

smelt lead to bullion, or copper ore to matte, and can even handle iron. The furnace is rotated during the blow, and an hour or two serves to treat the full charge. The furnace seems specially adapted, from its portability, either to be used in experimental ways in remote regions, or in operating smelters, as a handy expedient for treating small lots of special ore, slag, or waste in present practice. It should prove a serviceable accessory to recognized smelting equipment.

Electric operation will pay only on railroads with dense freight and passenger traffic, not on small or branch lines, where the increase to be expected in traffic would not pay the interest on the cost of the electric equipment.

A new coal deposit, the value of which is not yet known, has been discovered in the east of France. For more than 50 years geologists have supposed that the Saar coal-field continued to the old department of the Moselle. Explorations, commenced in 1859 by Jacquot, were abandoned and then resumed in 1899 in Meurthe-et-Moselle. Acting on the advice of Professors Marcel Bertrand, Bergeron and Nicklès, the ironmasters of the district put down more than 30 bore-holes, and on March 19 last one of them struck coal at the depth of 2,046 ft., and passed through several seams, together 47 ft. thick, a great deal of water being encountered.

## The Prevention of Gob-Fires in Coal Mines.\*

BY GEORGE FARMER.

The prevention of gob-fires presents difficulties as peculiar in themselves as the causes. There are three necessary conditions for fire; therefore, in endeavoring to prevent a fire, attempts must be directed to the removal of all or any one of them. It is never easy to prevent the presence of combustible material in the gob, but if this material can be robbed of the heat and oxygen necessary for combustion there will be no fire. This is the logical view, but it is not practicable. Care and foresight may minimize the number of fires, but in some cases where such fires have occurred, the strictest care has been exercised, and rules have been enforced in order to prevent occurrence. The prevention is generally attempted by some special system of working, or some alteration in the ordinary systems of working, as the depth from the surface, and the composition and character of the coal and the adjoining strata cannot be altered.

Under a sandstone roof, care and foresight, together with a good market, may prevent ribs of coal or timber from being left in the gob, and may prevent slack-coal from being thrown into the gob; but even then a certain amount of waste and impurities is left. With a coal or carbonaceous shale-roof combustible material is naturally left in the gob. If slack-coal or impure bands in the coal are found to oxidize and to cause gob-fires, it is better to spend a little money in removing such from the mine than to incur a big expense in dealing with a fire.

The coursing of a strong current of air through the place which is heating, in order to cool it and carry off the heat, has been suggested as a preventive. On more than one occasion the writer has seen fire prevented by tapping or opening out a place which has been found to be heating. Such a proceeding has the effect of liberating the heat, which has been pent up, and reducing the temperature of the place. This can only be effected, however, when the heating is caught in a very incipient stage, otherwise the quantity of air admitted would breed a fire.

The best packs ever built cannot be made air-tight, hence, since the gobs are only separated from the roadways and faces by packs, it is evident that other means must be adopted in order that the air shall be excluded from the gob. This may be effectually done by lining the packs with clay-lumps or wax-wallings. In some cases sand or finely ground ashes are employed for the purpose of making the pack-walls hermetically air-tight. Anything can be utilized that has the effect of preventing infiltrations of air, but the material used must, of course, be non-inflammable.

\*Extract from paper read before the North of England Institute of Mining and Mechanical Engineers.

In working out all the coal away from the shaft-pillar, any danger left in the goaf will show itself in the workings, but if the roadways are driven out first to the boundary and the coal worked homeward or back to the shafts, the gob and its dangers are left behind. This system, however, has the decided disadvantage of not allowing any extension of area, and of heavy initial cost, coupled with a small output when opening out.

In the pillar-and-stall system, the area of coal can be divided into small panels separated one from the other by ribs of solid coal. The coal in such districts, or panels, can be worked out more quickly if the districts are small; and the number of openings being few, they can be quickly and completely isolated by stoppings of brickwork and sand. These panels are, however, generally difficult to ventilate.

It is usually costly and, in some cases, practically impossible to prevent the presence of any combustible material in the gob; it is just as difficult and costly to keep the material cooled down to a point below the temperature of ignition; and consequently the chief preventive will be found in the exclusion of oxygen.

Probably the best precaution is to exclude the feed of oxygen to the gob, by making and keeping the gate-packs as tightly closed as possible, and then, by rapid working, keep the faces advancing regularly, and follow up in the gate-roads, not more than 60 or 100 ft. from the face, with sufficient ripping to bury the packs completely. In such a procedure, it is hardly probable that air will permeate into or through the gob. Care should be taken also to maintain a straight line of face, to avoid leaving ribs of coal or timber, and to remove thoroughly all coal from the side of a fault, where a grinding action is almost inevitable. Coal-cutting machinery has done a good deal toward preventing fires by ensuring the keeping of a straight, or regular, line of face, allowing efficient control over the roof pressure, and, in consequence, a more solid gob. Irregular faces, broken down and out of line, do not allow the gob to break and fill up as it should; and cavities are formed, the pressure becomes more violent, and everything is conducive to the initiation of spontaneous combustion. Whenever faces are broken down, they have to be ribbed out, and some colliers are so interested in their work as to care nothing if they can only get the face up again; they require constant watching to prevent the last portion of the rib from being buried and abandoned.

In some mines spontaneous combustion occurs so rapidly that the gob material heats to a high temperature, and, if the feed of oxygen is not at once cut off, bursts into flame in a very short time; hence frequent and periodical inspections of the workings and roadways during and between shifts, and at week-ends and on

Sundays, should be made, and any increase of temperature or any unusual smell should be reported at once to the management. Only trustworthy deputies and others should be employed, who know and would notice the first signs of a fire, namely, gob-smell, steam and sweating.

The most stringent measures should be carried into force against any neglect in timbering and in packing in faces, wilfully leaving timber in the gobs, any attempt to draw out the front row of timber before the back row, any attempt to build coal and timber into packs, or the throwing of slack, etc., into the goaf.

### Economy in Fuel.

Economy in fuel is still the watchword. It is with pleasure that we recently chronicled the first commercial application of a novel item of efficiency, namely, the use of lamp-black oil-coke. The aim of engineers has been to keep this lamp-black (from oil) reduced to a minimum; but, in the plant itself, to utilize what lamp-black may be unavoidable, in the gas process, in briquetting or by agglomeration with oil-residue. This seems to have been accomplished with some saving of heat units, and under conditions not entirely favorable. The tendency is general toward more care in the saving of fuel. Thus, at least, one large Western smelter is jiggging its grating from the reverberatory furnaces, a product that was formerly run to waste. With coal at \$3.50 and coke at \$9, it is easy to see what may be done with grating running 30 or 40 per cent in fixed carbon. In this case, of course, the coke is fine, but it is presumably briquetted with other fine material at nominal expense. The whole list of such improvements is closely akin to the thrifty saving of the old culm piles of Pennsylvania. Indeed, carbon in any combustible form is too valuable a storage reserve of energy to receive any but most careful respect. The necessity for economic saving has only begun to show, for energy available for work is none too abundant.

Hydrogen is the lightest ponderable substance known.

In the determination of arsenic, in calcine or fuel, for example, distinction must be made between the volatile and the non-volatile kind. George McGowan recommends ignition with lime for the total arsenic, and without lime for the volatile portion.

Agglomerated carbon-tube furnaces up to 67 mm. internal diameter have been successfully made. It is hoped to use these in a vertical position so that large crucibles may thereby be heated. In such a tube 850 amperes at 13 volts melt nickel in 12 minutes, and platinum in 20½ minutes.

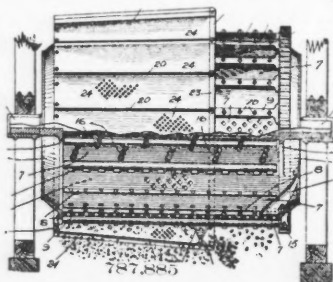
## Patents Relating to Mining and Metallurgy.

UNITED STATES.

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

Week Ending April 25, 1905.

787,885. COAL-BREAKER.—Alfred M. Acklin, Pittsburg, Pa., assignor to Heyl and Patterson, Pittsburg, Pa. In a coal-breaker, the combination of a rotary perforated cylinder of uniform



diameter having an inlet at one end and a discharge-outlet at the opposite end, with means for conveying the refuse from the discharge end, means therein for lifting and dropping the coal, and a perforated jacket extending from the receiving end of said cylinder to a point beyond the mid-point thereof, said jacket having its outer end entirely open.

787,902. LEACHING APPARATUS.—Chauncey E. Dewey, Denver, Colo., assignor to the American Zinc and Chemical Company, Denver, Colo. In a leaching apparatus, the combination of a tank V-shaped in cross-section, and a lead conduit located in the bottom of the tank and provided with vertically disposed orificed nozzles, the said nozzles being of sufficient length to cause the fluid introduced into the conduit to be carried upwardly into the tank in vertical jets or streams.

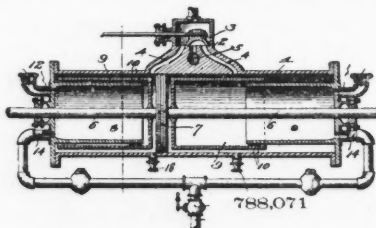
787,928. RADIO-ACTIVE MATTER AND PROCESS OF MAKING SAME.—Hugo Lieber, New York, N. Y. Radio-active matter, consisting of matter having cohesive particles and thorium emanations in combination with the particles of the matter throughout its mass, the matter being free from the thorium from which emanations were obtained and radio-active by reason of the thorium emanations in combination with the particles of the matter throughout its mass.

787,926. PROCESS OF TREATING IRON, CAST IRON, AND STEEL.—Jean Lecarme, Paris, France. The process of hardening and transforming into steel of variable qualities the entire or part of the surface of objects, rotary cutters, screw-taps and other tools, and bells and other sonorous instruments made of iron, cast iron, or mild steel, said process consisting of coating the objects on the surfaces or parts to be treated with a composition containing charcoal in powder, cyanide of potassium, and a combustible agglutinant body, and then heating these bodies to a bright red excluded from the air.

787,942. COMPOUND FOR PAVING-BRICKS.—Theodore S. Pierce, Walla Walla, Wash. A herein-described composition of matter, consisting of four parts of slag, one part of cement mixed together and then reduced to a plastic mass by the addition of a solution consisting of 15 lb. of silicate of soda, 2.5 lb. litharge, 1 lb. of sulphuric acid and 40 gal. water.

788,010. FURNACE-CHARGING BOX.—Harry Wright, Columbus, Ohio, assignor to the Buckeye Malleable Iron and Coupler Company, Columbus, Ohio. A cast-metal furnace-charging box having cast, integral with one end thereof, a rearwardly projected pocketed enlargement, and webs connecting said enlargement with the end of the box.

788,071. COMBINED ENGINE AND AIR-COMPRESSOR.—Daniel Schiffbauer, Stauffer, Pa. In a combined engine and air-compressor, in combination with an engine-cylinder having an inwardly extending cylinder at one end, a piston operating in the engine-cylinder and



having a piston-rod, cylinders in the engine-cylinder secured to the piston-rod, movable with the piston, and having slidable telescopic connections with the first-named interior cylinders, a valve to admit air to the telescopically disposed cylinder, and an air-duct leading from said telescopically disposed cylinders, and having a valve.

788,096. DUMPING-CAR.—Andrew W. Dahmer, Sonora, Cal. An opening, closing and locking device for the door of dumping-cars, said device comprising a lever fulcrumed to the side of the car so as to provide a long and a short arm, a link connecting the long arm of the lever with the hinged door, and a second link connecting the short arm of the lever with a fulcrum fixed with relation to the car.

788,098. ROASTING-FURNACE.—Frederic J. Falding, New York, N. Y. In a roasting-furnace, the combination of a series of superimposed hearths having concentric openings, a rotatable shaft extending through said openings, detachable fittings carried by and extending bodily into the shaft, and stirring-arms detachably supported by said fittings.

788,100. PROCESS OF TREATING PEAT.—Walter T. Griffin, Limoges, France. A process for treating peat, which consists in passing the material through a zone of sufficient length and high degree of temperature to heat the peat to a degree which will cause the cells thereof to burst, and relieving said material of the effects of said zone substantially at the moment of the bursting of the cells to arrest the tendency of the oils or hydrocarbons to volatilize.

788,119. HYDRAULIC TUBE EXPANDING AND COMPRESSING MACHINE.—Alfred T. Pope, Louisville, Ky., assignor of two-thirds to Curran Pope and Frederick E. Heinig, Louisville, Ky. In a hydraulic tube expander and press, a hydraulic cylinder having a piston therein and a plunger on said piston, a reinforce in said cylinder having a chamber into which said plunger fits, a water-supply tube leading to said chamber, a water-supply tube leading into the cylinder behind the piston, a forming-shell attached to the cylinder and having a passage thereto from the said plunger-chamber, and means for supporting a tube in the forming-shell.

788,131. METHOD OF MANUFACTURING REFRACTORY MATERIAL.—Guilford C. Glynn, Iola, Kan., assignor of one-third to Frank B. Smith. A method of preparing refractory material, which consists in taking a mass of kaolinite, freeing it from moisture or any uncombined water, pulverizing it, then burning the pulverized mass in the presence of free air to eliminate organic and volatile impurities and to reduce the ferric compound to metallic iron, and then precipitating the product, while heated, into a water-bath.

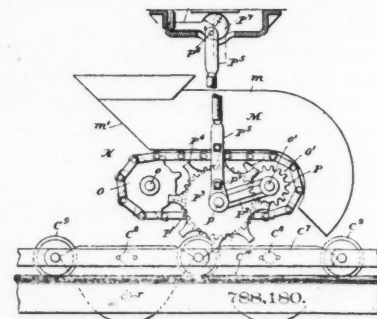
788,132. REFRACTORY MATERIAL AND METHOD OF MAKING SAME.—Guilford C. Glynn, Iola, Kan., assignor of one-third to Frank

B. Smith. A compound to form a refractory material consisting of finely divided aluminum, ferric oxide, titanite iron ore, and a binding agent.

788,151. X-RAY METER.—Tomas P. Hall, Chicago, Ill., assignor of one-half to Samuel T. Hutton, Chicago, Ill. In a device for measuring X-rays, a screen and two measuring-strips of different opacity to X-rays extending in front of said screen and movable relatively to each other.

788,167. PROCESS OF COLORING STEEL OR IRON PLATE.—Thomas O'Brien and William P. Long, Elwood, Ind., assignors to American Sheet & Tin Plate Company, Pittsburg, Pa. That method of coloring metal sheets, which consists in heating the same in a closed receptacle, reducing the temperature of the receptacle and sheets, and thereafter introducing an oxidizing liquid into the receptacle while the plates are hot and the cover remains over the sheets.

788,180. CONVEYOR-LOADING DEVICE.—Freeman R. Willson, Jr., Columbus, Ohio, assignor to Joseph A. Jeffrey, Columbus, Ohio. The combination with the hopper or chute, and



the series of conveyor buckets or receptacles of the endless carrier interposed between the buckets and the chute, and arranged to have its plates form a cut-off floor for the chute upon which rests the material therein, and automatically acting devices movable to and from an operative position for imparting a step-by-step movement to said carrier, its said movements being in one direction.

788,207. CRUSHING-MACHINE.—Thomas J. Gray, Chicago, Ill., assignor to National Drill & Manufacturing Company, Chicago, Ill. In a crushing-machine, a reciprocating jaw supported for tilting and bodily forward-and-back movement; a toggle action for operating the reciprocating jaw comprising a pitman, an arm rigid with the reciprocating jaw and extending back to and having a separable hinge connection with the pitman, and a pair of swinging tie-bars hinge-connected with the pitman and tied to an axis forward of the reciprocating jaw; and a tension-rod extending between the reciprocating jaw and the pitman and arranged substantially parallel with and adjacent to a right line between the central portion of the reciprocating jaw and the point of hinge connection between the jaw-arm and the pitman, the tension-rod thus arranged between the reciprocating jaw and the pitman having jointed connections therewith and having a spring interposed in one connection to maintain the jaw-arm in hinge connection with the pitman.

788,211. COMBINED DREDGE AND MINING-SLUICE.—Charles H. Lewis, Baltimore, Md. A combined dredge and mining-sluice, which comprises a rotatable vessel provided at or near its forward end with a series of angularly placed and projecting scoops in communication with the interior of the vessel, and having at its rear end an outlet-opening.

788,247. ORE CONCENTRATION.—Arthur E. Cattermole, Henry L. Sulman, and Hugh F. Kirkpatrick-Picard, London, England. A process of concentrating ores which consists in mixing a freely flowing ore pulp with a soap solution and a mineral acid so as to liberate the organic acid from the soap throughout the suspended ore mass in intimate contact therewith, whereby the

organic acid coats the desired mineral particles and not the gangue, and thereafter separating the coated mineral matter from the non-coated gangue.

**788,251. VISCOSIMETER.**—Fernand A. Courtois, Newark, N. J., assignor to Fiske Brothers Refining Company, New York, N. Y. A viscosimeter comprising an oil-container having an upwardly extended tube open at the bottom, a test-cup removably placed in said tube and having an opening in its lower end, a valve for said opening, a heating device arranged below the container, and means for supporting thermometers in the container and test-cup.

**788,256. PROCESS OF OBTAINING OXYGEN FROM ALKALI PEROXIDE.**—Hans Foersterling and Herbert Philipp, Perth Amboy, N. J., assignors to the Roessler & Hasslacher Chemical Company, New York, N. Y. The process of obtaining oxygen gas from an alkali peroxide consisting in the bringing of a solidified, fused mass of alkali peroxide into contact with any suitable liquid.

**788,308. STEAM-HAMMER.**—Frank C. Emrick, Bluehill, Neb. The combination of a cylinder, a piston therein, a rod attached to the piston, projecting members attached to the rod outside of the cylinder, a support upon which one of the said members has guided movement, a valve for controlling the movement of the motive fluid in the cylinder, a rock-shaft, means for operating the valve from the rock-shaft, tappet-fingers mounted to slide on the shaft but to turn therewith and adapted to be engaged by the other projecting member of the piston-rod, and independent means for sliding each of the tappet-fingers on the rock-shaft.

**788,315. METHOD OF ELECTROLYTIC SEPARATION.**—William Hoopes, Pittsburg, Pa. The method of electrolysis which consists in passing an electric current through a solution of a compound in anhydrous ammonia.

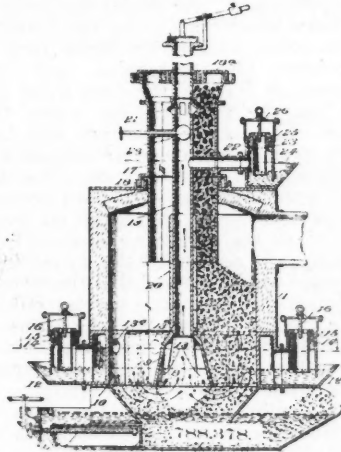
**788,330. APPARATUS FOR THE TREATMENT OF ORES.**—Robert G. Reilly, Albuquerque, N. Mex., assignor of two-thirds to Thomas J. Curran, Albuquerque, N. Mex. In apparatus for treating ores, a vertical smelting-chamber comprising a lower and an upper section, the lower section being provided with lateral apertures above the bottom thereof, air-chambers adjacent to the lower section and communicating with the said apertures, air-chambers adjacent to the upper section, means for forcing cold air into the said upper and lower air-chambers, and agitating devices arranged in the upper air-chambers and having bars arranged to project through apertures in the walls of the upper sections of the smelting-chamber.

**788,334. APPARATUS FOR CASTING METAL.**—James Scott, Pittsburg, Pa., assignor to American Casting Machine Company, Pittsburg, Pa. In casting apparatus, the combination with two or more adjacent sets of molds, having mechanism for moving them, of an intermediate casting-pot provided with a well, and troughs integral with and leading from it, and means for tilting the pot, whereby the liquid metal may be directed into either set of molds, or in equal or varying streams into both sets.

**788,339. INGOT-STRIPPING APPARATUS.**—Clarence L. Taylor, Alliance, Ohio, assignor to the Morgan Engineering Company, Alliance, Ohio. In an ingot-stripper, the combination with a hollow rack-bar carrying tongs, and a screw within the bar, of a plunger also within the bar and carrying a nut which engages the screw and means for rotating the screw.

**788,343. WELL-DRILLING MACHINERY.**—William Ackerman, Chanute, Kan. In a rig of the character described, the combination, with a platform having a main drive-shaft thereon, and a friction-wheel upon the shaft, of a second shaft above the platform, a bull-wheel mounted thereon, a slide interposed between the friction- and bull-wheels, a friction-pulley upon the slide adapted to move into or out of contact with the friction and bull-wheels, and means for operating the slide.

**788,378. GAS-PRODUCER.**—Josef Reuleaux, Wilkesburg, Pa., assignor to Alexander Laughlin, Sewickley, Pa. A gas-producer having an air-distributor located centrally of the fire-bed,



an air-heating chamber surrounding the producer, and a series of lateral branches connecting the chamber and the distributor, said chamber and branches being constructed so as to contain a body of water.

**788,353. BOTTOM PACKING FOR OIL-WELLS.**—William H. Downing, Parkersburg, W. Va. A well casing or tubing, a packer, and set-screws connecting the tubing and packing to permit the packer to slide without operating the screws.

**788,375. STONE-CUTTING APPARATUS.**—William C. Quinlen, Barre, Vt. A stone-cutting apparatus comprising a carriage, a wheel rotatably mounted thereon and having on one of its side faces adjacent to its periphery a series of surrounding spaced-apart bearing-blocks, the bearing-faces of which are diagonally inclined downwardly and each terminating at their inner ends in a cutting-blade opening formed in the wheel and having its opposite side faces inclined to correspond with the inclined faces of the block, a series of straight cutting-blades having inclined cutting ends arranged in line with the body of the blade, said blades being mounted on the blocks and having longitudinal slots therein, means passing through the slots and secured to the blocks which serve to give the blades an endwise adjustable movement of the blocks, so as to permit of the cutting edges of the blades passing through said openings and projecting beyond the periphery of the wheel.

**788,405. APPARATUS FOR MAKING GAS FROM OILS.**—Nicholas G. Hock, Greeley, Colo. An apparatus having retorts at different elevation, return-elbows forming conduits detachably secured to the retorts and connecting the opposite ends thereof together in pairs, to secure a flow of the liquid lengthwise through a series of retorts, and a substantially horizontally disposed pipe extending through the return-elbows at one end of the upper retorts and detachable from the said retort with the said elbow when the latter is removed from the said retort, the said pipe when the elbow is secured to said retort extending into the latter to supply material thereto.

**788,443. PRECIPITATION PROCESS.**—George H. Waterbury, Denver, Colo., assignor to the Waterbury Metals Extraction Company, Spokane, Wash. A process of precipitating copper in solution, consisting in placing the solution in a tank or receptacle containing pieces of aluminum of a shape to allow the solution to pass readily therethrough, and introducing air and steam simultaneously for agitating purposes.

**788,480. PRESERVED RADIO-ACTIVE ORGANIC MATTER AND FOOD.**—Hugo Lieber, New York, N. Y. Preserved organic matter, consisting of organic matter and thorium emanations free from the thorium from which they were obtained in combination with the particles of the preserved matter throughout its mass, the organic matter being radio-active by

reason of the thorium emanations embodied within it.

**788,503. CEMENT-KILN.**—Carleton Ellis, New York, N. Y., assignor to Eldred Process Company, New York, N. Y. The combination, in apparatus for burning cement, of a pair of long, rotary kilns so inclined that the material passing through one of said kilns travels in a direction approximately opposite to that of the flow of material in the other kilns, at the stack end of each kiln a continuous heat recuperator, means for passing air through said recuperator, and means for conveying the air, preheated by its passage through the recuperator of one kiln, into the juxtaposed fuel-feeding end of the other kiln.

#### GREAT BRITAIN.

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

*Week Ending April 8, 1905.*

**5,648 of 1904. MAKING SLAG WOOL.**—J. H. W. Stringfellow, London. Improved mechanical devices for producing slag wool and fertilizers from blast-furnace slag.

**6,143 of 1904. MAKING LEAD NITRATE.**—W. Mills, London. Making nitrate of lead by adding nitrate of soda to an aqueous solution of silico-fluoride of lead.

**9,103 of 1904. MINER'S LAMP LIGHTER.**—Fabrik Elektrischer Zunder, Cologne, Germany. Improved metallic wire for carrying the electric current used in igniting miners' safety oil lamps.

**10,541 of 1904. BRIQUETTE PRESS.**—A. Reichwald, London. Improved briquette presses in which the amount of material charged and the pressure used may be varied to suit the nature of the material.

**23,473 of 1904. POTASH AND ALUMINA PRODUCTION.**—W. T. Gibbs, Buckingham, Canada. Decomposing refractory silicates such as feldspar, for the production of potash and alumina, by treating them with a solution containing a small proportion of hydro-fluosilicic acid and a large proportion of sulphuric acid.

*Week Ending April 15, 1905.*

**689 of 1904. RECOVERING GOLD FROM SEA WATER.**—H. C. and U. Ciantar, London. Apparatus used in passing sea water through agitated mercury for the purpose of recovering the gold held in solution.

**6,832 of 1904. ELECTROLYTIC RECOVERY OF METALS.**—J. F. Webb, London. In electrolytic precipitation of metals, the use of a graphite anode and a cathode of zinc or graphite.

**7,836 of 1904. DRILL SHARPENER.**—W. P. Lightfoot, Johannesburg, Transvaal. Improved machine for sharpening rock drills that have a cross form in cross-section.

**8,298 of 1904. CENTRIFUGAL DRYER.**—D. E. Bigelow, Kalgoorlie, West Australia. A centrifugal machine for extracting water from crushed ores and for washing the pulp.

**9,110 of 1904. OPEN-HEARTH FURNACE.**—B. Talbot, Leeds. In open-hearth furnaces, making several hearths one after the other so that the heat and oxides contained in the slag on the finished metal on one hearth is utilized for refining the metal in the next by causing it to boil over the separating bridge.

**11,097 of 1904. STAMP SHOE.**—R. A. Hadfield, Sheffield. Special design of stamp shoe made of manganese or other tough and hard steel.

**11,256 of 1904. PURIFYING SALTS.**—R. F. Wood-Smith, London. Removing objectionable coloring matters from natural salts by blowing ozonized air through their solutions.

**12,421 of 1904. MINE-CAR LUBRICATOR.**—G. D. Jones, Treharris, Glamorgan. Improved lubricator for the wheels of colliery cars.

**27,883 of 1904. ROTARY SCREEN.**—S. W. Traylor, New York, U. S. A. A rotary screen of concave form, discharging by centrifugal force over its outer edge.

## Special Correspondence.

San Francisco. May 3.

There have been all sorts of rumors as to a final shut-down of all the smelters of the Mountain Copper Co. at Keswick. This would mean an abandonment of the plant in Shasta county and the transference of smelting operations to the new plant of the company above Martinez on the Bay Shore of Contra Costa county. However, the recent closing down at Keswick is temporary for the purpose of making some changes and removing the converters to the new plant near Martinez. The smelters will not remain idle for more than a couple of weeks at most. Thereafter one furnace will be kept in constant operation and another will be in readiness to be blown in whenever necessary. The Keswick smelters will be used to reduce the Iron Mountain ores to a low grade matte, and this will be shipped to the Bulls Head Point plant for further reduction and refining.

It was reported also that the new Afterthought smelter of the Great Western Gold Co. at Ingot, Shasta county, has closed down owing to the impossibility of properly smelting the ore. This report, too, proved unfounded, although it is not at all improbable that ore-roasting will have to be resorted to. The ore in this mine is probably as "rebellious" as any in Shasta county, and former attempts to smelt it have not been successful. All this, however, was known to the company now running the mine, who considered themselves capable of overcoming the difficulties.

Los Angeles has not had for a long time any regular mining stock exchange and now two are about being started. Some friction has, however, developed among the organizers. The question of location of headquarters appears to have been that which brought about the disagreement. In the same city another effort is being made to establish a custom smelter either near Wilmington or San Pedro, at tide-water. Los Angeles does not like to see the Nevada mining camps sending the rich ores either to San Francisco or Salt Lake, but can make no bid for the business without smelting works. There are no smelters operating anywhere in Southern California. Several attempts have been made to establish them either at San Diego or near Los Angeles, but they never advanced further than the "paper" stage. There is now no large custom smelter nearer the Tonopah, Goldfield or Bullfrog districts than San Francisco and Salt Lake to the north and El Paso on the east.

James R. Garfield, of the Department of Commerce and Labor, has been in San Francisco during the past week and is now visiting the oil fields of Kern, Fresno, and Los Angeles counties, investigating the commercial and transportation conditions of the oil fields of California. The oil producers charge that the pipeline and railroad companies have combined in such a way as to discriminate against them and reduce the prices below a point where a profit may be made. The Standard Oil, Southern Pacific and Santa Fe companies are the alleged offenders in the central valley regions, and the Standard Oil and Pacific Coast railway in the Santa Maria valley. The Associated Oil Co. and the Independent Oil Producers' Agency are reported to be within the same influence. The larger producers, it is asserted, obtain certain advantages in rates, by means of rebates, etc., which the smaller producers do not enjoy. All these mat-

ters are being investigated by Mr. Garfield and his assistants.

In a suit relating to valuable oil lands in Kern county, a decision was rendered by Judge Hebbard. He denies the prayer of the Kern River Oil Co. for the forfeiture of the leases held by the Black Jack and Associated Oil companies, and gives judgment in favor of the Kern River company for the royalties due under these leases. The lands, which are said to be worth over \$1,000,000, were located by J. F. Elwood and his associates. The Kern River company obtained a deed from the Elwood Oil Co. in 1903, with an assignment of all the royalties due the Elwood company. It demanded the forfeiture of the leases on the ground that the terms of the leases had not been carried out, but Judge Hebbard found that the terms and conditions had been performed by the sub-tenants. He will appoint a referee to fix the amount of royalties payable.

The Southern Pacific Railway Co. has served notice on a number of miners in Olinghouse and White Horse mining districts, Nevada, to the effect that they are developing claims on the land grants of the railway company, and they will be prosecuted unless they desist at once. The order has created consternation in the district, to which there has been a rush for several weeks, as many of the best finds made are on the alternate sections held by the company. A meeting of miners to consider the matter has been held, and it has been decided to make a test of the matter. If suit is begun by the company, a case will be carried to the Supreme Court for a finding. The miners claim the company has no mineral rights to the ground. It will doubtless be found, however, as in other similar cases, that if the railroad company patented the ground without protests being filed by miners as to mineral character of certain parts, the miners will be beaten and will have to buy the land at high rates from the railroad company, instead of at low rates from the government.

Denver. May 4.

At a meeting of the Stratton-Cripple Creek Mining & Development Co., six more blocks of the Stratton estate were leased, all in Bull hill. No action was taken on a number of applications for leases on some blocks on the Logan property, the Orphan May and the American Eagle.

An important decision for the Eagle Ore Sampling Co., operating in the Cripple Creek district, has been rendered by the United States District Court. The company secured a preferred claim against the defunct General Metals Co. It was a question whether in the court's opinion, the contract between the Sampling company and the Telluride Reduction Co., to which a large amount of ore had been shipped, shortly before the Metals company went into bankruptcy was for the treatment of ores or for the sale of ores. The former was decided to be the case.

The suit of Frank J. Campbell *et al.* against the Golden Cycle Mining Co. was dismissed by Judge Riner in the United States Circuit Court on account of lack of jurisdiction.

United States District Attorney Cranston, of Colorado, has filed an injunction suit to bar the Denver, Northwestern & Pacific railroad, at present in course of construction from this city to Salt Lake City, from Gore cañon, on the ground that the right of way, granted under an act of Congress, passed March 8, 1875, had

expired when, on March 2, 1903, it was supposed to have been transferred to the above named railroad company. This right of way was originally secured by the Colorado Railway Co., and refers to land in Eagle and Grand counties, through which it expected to build a line. The government intends to use the land in question in connection with a large irrigation project, and the commissioner of the general land office has instructed the local officers to withdraw from entry the necessary quantity of United States' land.

The Waldorf Mining & Milling Co., operating near Georgetown, has paid a dividend of  $\frac{1}{2}$  cent per share amounting to \$15,000. A new mill will be constructed shortly at the mouth of the Argentine tunnel. The company will continue to ship the higher grade ores to the smelters and have the lower grades to be treated in the mill, when it has been completed.

The Denver & Rio Grande railroad has instructed the contractors, building the line from Durango to Farmington, to push the work of construction.

The indications are that the sale of the Golden Cycle and Theresa, of the Gold Knob property in the Cripple Creek district, will not go through unless the owners reduce their price of \$1,800,000. The experts in the case of the intending purchasers consider this price too high, while the owners of the property do not seem inclined to reduce the figure at which the option was given.

Space has been secured for the Colorado mineral exhibit at the Portland exposition. J. C. Langley, assistant curator of the Colorado State Bureau of Mines, accompanied by E. Lyman White and Eugene Grubb, of the Portland Fair Commission, have returned from Oregon.

Scranton. May 8.

The following is a summary of the work done by the conciliation board up to Jan. 12, 1905: Grievances submitted, 125; by employers, 6; by employees, 119; cases compromised, 3; cases withdrawn, 42; grievances sustained, 18; grievances partially sustained, 3; grievances not sustained, 28; mutually settled, 9. The service of an umpire was required in but fourteen cases, all others being settled by the board, and several cases were dropped owing to the fact that the grievances were presented by those not parties to the award.

The employees of the Susquehanna Coal Co. are about to organize a benefit association for the purpose of making some kind of provision for men who are injured or killed in the mines, and to take care of the orphans and widows of those who are killed. It is understood that if beneficial organizations of this kind become general that the operators will freely assist in promulgating their aims.

Gov. Pennypacker today issued the bill providing for new mine inspection district for Dauphin County, and giving an additional inspector to Luzerne, Lackawanna, Columbia, and Northumberland counties each, and lengthening the time of inspection from two to three months. The bill also permits the chief of the department of mines to assign an inspector of one of the districts to another district when they do not have enough work in their own district to keep them busy.

The Meyers Co. of Wilkes-Barre, owners of the Warnke washer at Duryea, which was destroyed by fire about a month ago, has decided to rebuild the plant immediately. The workmen are clearing



away the ruins of the recent fire, and as soon as this is finished, work on the new structure will be started. The Halstead colliery culm dump, from which the washery secures its supply, still contains sufficient coal to warrant the erection of another and larger building than that which was destroyed.

Tests of all coal lands are now being made at Tomhicken, Queene county, and those already made show that the bottom vein has a thickness of fifteen feet and that there are other veins with a thickness of from six to eight feet. The tract of land has an extent of about 1,600 acres, and several Philadelphia capitalists are interested in its development.

Nearly a year has passed away since the great Locust Gap mine fire broke out, and although the fire has been extinguished by flooding, the work of retimbering has not been completed and operations have not yet been resumed. It is estimated that the cost of extinguishing this fire, together with the refitting of the mines, has reached the enormous total of \$1,000,000.

The members of the coroner's jury in the Conyngham mine accident case, accompanied by W. S. Casterline, deputy coroner, have made an inspection of the shaft and rope which was used at the time the accident occurred. They went to the mine in a body and were shown about by Superintendents Morgan and Harris. The old rope was uncoiled for their benefit and compared with the new. Pieces of the old rope which remained on the drum will be placed in evidence. Tests were also made of the carriage loaded with timber to the weight of fourteen men, and in neither of the three tests made did the carriage drop more than three inches, being caught by the dogs, bearing out the contention of the company officials that it was the weight of the cable on the cage that forced the dogs to lose their grip. They also made a trip to the bottom of the mines, carefully examining every foot of the way. The information gained in this examination will be of much value to them at the subsequent hearing. It is believed that it may take three or four hearings to complete the testimony, as expert testimony will be called in concerning the condition of the ropes. The mine workers have also subpoenaed a number of witnesses.

On Friday great excitement prevailed for a time at the Pine Brook colliery of the Scranton Coal Co., when it was thought that twenty miners were in danger of being drowned by water that rushed from the worn-out portion to the chambers of the mine that are now being worked. Torrents flowed through a large opening that one of the miners had accidentally made with his pick. Hearing the rush of water all the miners fled to the surface and notified the officials that men were in danger of being drowned. The officials had the additional pump started at once and sent an emergency call to all parts of the mine to have the men come out. The two big carriages were hoisted as fast as possible, each trip bringing ten men. The men also left the mine by way of the two drifts. When they were all out, a squad was sent down to investigate and found that there was no real cause for alarm, as the water had not reached more than an ankle depth. Work was suspended for the day.

A fire broke out in the east section of No. 5 slope of the Ross vein of the Lance colliery at Plymouth on Friday morning. The officials ran down many pipes and by noon had several streams of water playing on the burning coal. The mine is a gaseous one, and the superintendents and mine inspectors worked to

keep the flames from communicating with this source of danger. Considerable damage was done to the mine, but the loss cannot be estimated as yet. The mine is operated by the Lehigh and Wilkes-Barre Coal Company.

#### Duluth.

May 7.

The important transfers of the Sellwood mines, that have been in negotiation for some time, have been closed. They are of especial importance, not alone from the sales themselves, which are the largest made in the Lake Superior region for some time, but from the further fact that they restrict, by a very considerable amount, the volume of ore free for purchase by independent furnace interests. And it may as well be said right here that these are not the only mines under immediate negotiation for sale to consuming interests to those who will not sell a pound of ore after the mines get into their possession.

The largest of these Sellwood sales is Leetonia, and it consists of more than 10,000,000 tons of good ore, with a considerable area unexplored. The bessemer ore shipped from this mine runs 61 iron and .045 phosphorus, while the Leetonia grade is the same in iron and .060 phosphorus, 13% moisture, and is under 4% silica. The firm of Butler Brothers is at work stripping this mine under a 3,000,000-yd. 30-cent contract, that will continue for some years, and has a contract for mining 1,000,000 tons of ore at 10 cents a ton. The mine is located west of Hibbing, in Section 10-57-21, and the ownership of the land is in the Great Northern road, which gets the haul of ore to the lake. The price of this mine was \$2,000,000, and it is now the property of the Interstate Iron Co., the mine end in Minnesota for Jones & Laughlin's. Leetonia has mined 451,000 tons in the three years it has been operating, and will make nearly as large an output this year as for the entire previous period. The ore is coarse and desirable for furnace use. Croxton mine, situated in Section 13-58-20, has been sold to the Cherry Valley Iron Co., which was a minority holder with Mr. Sellwood. There are 45 acres in the property, and the ore lies along the south side of the tract. It has been stripped, and is mined by the milling process. Croxton ore is of excellent grade, and coarse, running about 59% iron, .057 phosphorus, 6% silica and 10% moisture. Croxton mine is not large, as judged by Mesabi standards. The ownership of this land is in Mrs. Mary Syme, of Wisconsin, who holds several tracts in that part of the range. It has been shipping over the Great Northern road, and has produced to this time 120,000 tons.

The two Sellwood mines, on the Gogebic range, Sunday Lake and Brotherton, have been taken over by the Lackawanna Steel Co., and at a price for the former of \$10 per share, or \$400,000 for the entire property; for the latter, \$7 per share, or \$560,000 for the mine. About 500,000 tons of excellent standard Gogebic bessemer ore are shown up in this mine, so the price is a very reasonable one, for that ore is worth more than \$1 a ton to take out of the ground. Sunday Lake has not so much, but the character is virtually the same as the other. Both are very wet, and their combined gross production to date has been 2,000,000 tons, of which Brotherton has been chief producer. These ores are self-fluxing, and analyses run about 62.25% iron, .025% phosphorus, 7.50% silica and between 8.50 and 8.75%

moisture. Stocks of these companies were somewhat scattered, but the majority was owned by Sellwood and immediate associates at Duluth, with some Cleveland and Detroit holders. Both mines will be worked actively.

The annual commencement exercises of the Michigan College of Mines took place May 3-5, and the chief event, aside from the granting of diplomas, was the address of William G. Mather, on Friday night. It was delivered in the Kerredge Theatre, at Hancock, and was very largely attended by present and past students. Mr. Mather is president of the Cleveland Cliffs Iron Co. and associated enterprises, the latter of which have been increasing in numbers and importance very fast of late years, and is well qualified to speak to mining engineers and students. This feature of an annual address by some man high in the profession was inaugurated last year with a talk from James Douglas, president of the Phelps, Dodge & Co. copper interests, who spoke on the wastes in the profession, and urged careful attention to leaks and more close saving all along the metallurgical line. Mr. Douglas is at the head of a far larger institution than is generally realized, for very few other than those who have come directly into contact with the Copper Queen and other Phelps, Dodge & Co. interests are at all aware of their commanding position in the copper and metallurgical trades.

Kloman mine, at Republic, which was bought for the Flagler Iron & Steel Co., is not being explored and developed, and there is no move about the property that indicates that it ever will be. It is said that recent reports made as to the mine by engineers from Duluth have not been as favorable as the owners were led to expect from what they had been told before by others.

Jones & Laughlin's, who have been buying large Mesabi mines, are working expensively elsewhere now, also they have taken the old Hennepin mine, west of Hurley, on the Gogebic range, and are exploring it with a view to discover any ore deposits that may have been overlooked in the early days; and they are to sink a shaft at the Rolling Mill mine, once the Chester, near Negaunee. They have been drilling the mine, and have evidently found what they wanted. The Rolling Mill has been a lean silicious bessemer producer, and about 50,000 tons of this ore will be mined this year. It is supposed the new owners have found something better than this, however. This silicious ore ran about 40% in iron, and nearly the same in silica, and went about .022 phosphorus. It was chiefly valuable for a mixture with the low silicon Mesabis, and was excellent in this respect, especially on account of its very low phosphorus.

#### Spokane.

May 5.

The Crow's Nest Pass Coal Co. of East Kootenay, B. C., has placed an order for a high pressure air compressor to furnish air for four small locomotives which are to be used in No. 6 colliery at Michel, B. C. Since the recent fire at Fernie, B. C., the town has largely been rebuilt with a better class of structures. The Crow's Nest Pass Co. is constructing new and substantial offices.

The St. Eugene mine of Moyie, B. C., made profits of \$73,000 last month. It has been paying dividends of \$70,000, or two per cent quarterly.

The Success Mining Co. has been incorporated by Wallace, Idaho, people, to take over the Granite mine on Nine Mile creek, near Wallace, in the Cœur

d'Alenes. Treasury stock is being sold to supply a mill for the famous old property.

The Echo Mining Co., operating in the Cœur d'Alenes, which closed last November, has resumed operations, and a 200-ft. drift is being run to catch the ore shoot 250 ft. deep. Green chlorides of silver have been struck and much water is flowing from the face.

The raise from the 1,000-ft. level of the Snowstorm copper mine near Mullan, Idaho, is up 50 ft. It is being driven up on the west drift and is expected to encounter the ore shoot at the 400-ft. level. The leaching plant is being pushed on to completion, and should be in operation in a couple of months.

The Amador Mining Co. at St. Regis, Mont., just east of the Idaho line, is putting in a townsite on a flat plateau overlooking the St. Regis river, and has let contracts for a 10-mile electric line to connect the town and the mine.

Captain Tretheway, of the Mollie Gibson mine in the Slocan district of British Columbia, announces that a 75-ton concentrator will be built this summer at a cost of \$35,000 to handle its silver-lead ores. During the winter the mine worked 21 men, and is developing in four tunnels and two raises. The work has shown a new vein 30 inches wide, which has been opened for 200 ft. During March and April the mine sent out 10 cars of ore that should run \$450 a car. Only two men have been stopping.

Fire is still burning in the Frank coal mines at Frank, Alta, and though it is supposed to be under control, no effort is being made yet to re-open the fire zone, which is about a mile and a half from the mouth of the tunnel.

Prospectors are stampeding into the old Cedar Canyon camp, northwest of Spokane, and are staking the country for tungsten. The Roselle Mining Co. of Spokane, promoted by W. S. Thyng, has done some work with gratifying results, and Mr. Thyng is in the east arranging for concentrating machinery.

Careful sampling of the ore from the Ben Hur mine has started at Republic. Four cars were shipped last week to the Greenwood (B. C.) smelter. J. S. Bédier, lessee of the Morning Glory, reports the surface prospects on that property to be looking well. Ore has been taken out of a trench 10 ft. deep and 30 ft. long. The last smelter shipment went \$137 a ton.

Patrick Clark, who is back from a trip to Nevada, declares that the district from Tonopah south to Bullfrog is the greatest mining field he has ever seen. At the Montgomery-Shoshone mine, at Bullfrog, a crosscut 100 ft. deep has shown a lode 40 ft. wide, of which six feet run from \$1,000 to \$1,400 a ton, and the rest \$80 to \$100 a ton. Values are 75% gold and 25% silver. Mr. Clark has some magnificent samples of copper from the Copper blue group, on the northeast side of Death Valley, which was staked this spring by Phil Creasor, discoverer of the Republic mine, on a grubstake for Patrick and Dennis Clark. The specimens include massive pieces of malachite, copper glance, copper oxide, and even native copper. It is about eleven miles from the route of the railway which "Borax" Smith expects to build this summer to his borax works.

Preliminary surveys are being made for a narrow gauge railway from Lambert creek to the Belcher mine, on Belcher mountain, near Republic, Wash.

Frank Brown, manager of the Jumbo mine, at Buffalo Hump, Idaho, is back from the East, where he was in confer-

ence with the representative of an English syndicate regarding the sale of the mine. It is understood that a deal was practically closed, but Mr. Brown refuses to make a statement.

A. J. McMillan, general manager of Le Roi mine at Rosslund, B. C., who was in the city this week, denied press reports that the deal for the combination of the big Rosslund mines had been practically completed. He particularly denied that the Northport smelter was to be closed by virtue of the combine. Mr. McMillan believes that Northport is one of the best smelting points in the country for handling Rosslund ores, and points out that costs there are being constantly reduced under the efficient management of A. I. Goodell.

#### Deadwood. May 5.

The feature of the week was the most violent snowstorm the Hills has known for years. Two feet and a half at this city, and four to six feet on the mountains has interrupted mining, milling and business generally. After a delay of from 36 to 48 hours, mail trains reached this city today. Nearly every mine is shut down, on account of coal and supply shortage, and the mills in this city, dependent upon railroads to furnish their ore supply from the upper camps, have all suspended. A few days will undoubtedly suffice to put everything in good working order again, however.

The damage done to the Clara Bell mine through fire about a month ago has been completely repaired and operations resumed in the shaft. At present efforts are being directed to getting out a trial shipment of ore that will be sent to a Denver ore-testing works, and upon the returns from which will be based the plans for a new mill the company will build.

The Imperial company has completed the addition to its cyanide plant in this city, and has it in commission. Two new steel leaching vats were added to the four already installed, and with the finer crushing-longer leaching method now to be adopted the capacity of the mill will be increased by at least 25%. The mill last month handled 3,600 tons. The mill is shut down at present, owing to ore shortage and a break of one of the rolls, but will be in operation within a few days.

The Clover Leaf company is dropping 20 stamps at its mine, and will be increasing that number within a short time. Good ore is being stoped on the 600, and mill returns are satisfactory in every way. The company will soon begin sinking the shaft to the 1,000-ft. level, it now being 700 ft. deep.

The Hidden Fortune stockholders are meeting their assessment in a manner that is gratifying to the officials. About \$50,000 has been paid in already, and \$15,000 to \$20,000 more is expected to be received before the date of sale. A large amount of collateral has been secured by the payment of notes with money realized by this assessment, including 300,000 shares of the treasury stock, \$40,000 worth of bonds, etc. Even with all stockholders contributing their assessments, the funds will fall short of paying the indebtedness by at least \$20,000, but it is believed by the management that they can secure money by the sale of a portion of the bonds they will recover.

Henry Earle, of New York City, has organized the Richmond-Sitting Bull Mining Co., to operate those properties at Galena. A cyanide plant will be erected at an early date, probably this summer,

for the treatment of a large amount of ore that is now in sight, both on the waste dumps from workings a score of years ago, and the broken material in the mine itself. C. B. Harris, of Galena, is superintendent of the new company.

#### Butte. May 3.

Mining claims that have not heretofore produced ore to any extent are in demand in the Butte district. They are being tied up on all sides, especially on the north and east. Local men are now negotiating for the Deadwood, Great Eastern and two other locations in the northern part of the district for eastern men and have secured the signatures of most of the owners. Negotiations for the bonding of the Daniel Quilp and Niagara are also under way. The former has been worked quite extensively and has yielded \$150,000 in silver and gold. On the east side, in Park and Horse cañons, about 20 claims have been tied up on bonds during the last two weeks. These claims and those on the north have been located fully a quarter of a century and have good surface indications, but have not been developed to any great depth. They are all patented. Machinery for the Raven property has been purchased. It will take the place of that now in use and will enable the company to sink 1,200 feet.

W. A. Clark has bought a half interest in the Blackrock mine, which is under lease to the Blackrock company for three years, paying \$50,000 for it. Mr. Clark owned a half before making the purchase and is now the sole owner. The company in control of the property is driving a crosscut north at a depth of 450 ft. It has a large vein, but the ore is not rich enough to treat unless it can be done in a plant owned by the company. The ore in the upper levels was rich in silver and gold and was the original source of supply for the Clark reduction works.

The Montana Zinc Co. has announced the success of its plant in the treatment of the zinciferous ores of the Alice company. It can treat about 300 tons per day. It is not receiving this quantity from the mine and is endeavoring to find other sources of supply.

United Copper is not doing much at present, only one blast furnace and one converter being in operation in its plant. Its Belmont mine is still unproductive, but its Minnie Healey, Cora and Rarus are yielding ore. Some improvements are in progress at the smelter. With the exception of the Parrot, which is closed under a restraining order, all of the mines of the Amalgamated are in operation, and its two remaining smelters are running. The Butte & Boston plant is about out of commission. The Butte Zinc & Copper Co. tried to secure a lease on it after the company decided to shut it down, but failed and is now endeavoring to find a site with a view of erecting its own plant for treating the ore of the Emma and other mines.

Drifting on the veins at a depth of 1,200 ft. is in progress at the Pittsburg & Montana and good ore is being raised. The bins are nearly full. The work of this company has been retarded by a heavy flow of water in the workings of its mines and the inability of the old pumps to handle it. This difficulty has been overcome by the installation of two turbine pumps driven by electricity. They are giving perfect satisfaction.

The Reims Copper Co. has its flow of water under control, and is now cleaning up preparatory to the resumption of min-

ing operations on the 800. E. J. Trerise, former superintendent, has been succeeded by John Stewart, recently with the Watseca company.

The Watseca company has suspended work on its mill tailing, having discovered that it could re-crush only at a loss. It made a test run on 300 tons. Too much tail in the tailing to permit of the saving of the gold is given as the reason for the failure. The company intends to sell its machinery and quit for all time.

#### Toronto. May 5.

Professor Baker, of the Kingston School of Mining, has been engaged by the Ontario Bureau of Mines to examine into the clay industries of western Ontario during the next five months. Professors Brock and Gwillim, of the School of Mining, will go to British Columbia during the summer and Professor S. Kirkpatrick to the Yukon.

A royal commission consisting of Aubrey White, deputy commissioner of crown lands, T. W. Gibson, director of mines, and Dr. Kennedy, law clerk of the department, are investigating a dispute as to the ownership of a silver-cobalt mining claim, known as "J. B. 6," sold by W. McQuigge to the Nipissing Mining Co., of New York. The property is also claimed by W. G. Tretheway and adjoins his mine from which much valuable ore has been taken. The case excites much interest among mining men, as it is understood that serious charges of wrongdoing are made, the details of which have not yet been made public, but which will be fully investigated.

Much excitement has been occasioned in the neighborhood of Yamachiche, Que., by the operations which are being conducted there to obtain natural gas and oil. Natural gas has been known to exist there for over two years, but has only been utilized on a small scale. Some of the people obtained gas for their personal use, but a couple of explosions which occurred caused discontinuance of operations. Subsequently much of the land was leased to the Canadian Gas & Oil Co., composed of F. B. Barnard, of Buffalo, Edmond O. Pequegnot, of Pennsylvania, and J. H. Thibedeau, of Fall River, Mass. The company secured control of about 60,000 acres of land comprising virtually the townships of Yamachiche, St. Barnabe and St. Etienne, for a small cash payment and a royalty upon the output. Drilling for oil was begun several weeks ago and continued until April 28th, when a depth of 280 ft. was reached. Then a sudden flow of water, accompanied by gas, sand and stones, and preceded by an explosion that shook the ground for a great distance forced the drill and derrick out of the well. Operations were re-commenced at a distance of 2,000 ft. The formation of the region is considered as similar to that of the oil-fields of Pennsylvania, except that there is a great deal of quicksand. The point where operations are in progress is about six miles from Yamachiche and the same distance from St. Barnabe.

The re-opening of the Bruce copper mines which formerly furnished a large yield is in contemplation. E. O. Williams, an English expert, has been on the ground for some time making a close examination, two of the shafts being pumped out for the purpose. After his investigations he stated that the quantity and grade of ore in sight was sufficient to warrant operations, and that he would report to that

effect to the English syndicate interested in the mines.

A company has been formed at Winnipeg to work the iron deposits in Black Island, Lake Winnipeg.

Active operations will be resumed at the Redeemer gold mine near Dryden, Ont., this month. General Manager Hermann will shortly arrive from Chicago to take charge.

#### Victoria, B. C. May 2.

The Ferguson Mines, Ltd., a British consolidation of the Silver Cup Mines, Ltd., and the Great Western Mines, Ltd., owning the Silver Cup and Nettie L. groups of mines, in the Lardeau district, has passed through the winter without experiencing similar disastrous effects from snowslides to those that seriously damaged property and interrupted operations in the early part of 1904. Work has been resumed at the Silver Cup mine, and, the company's silver mill being in excellent running order, a season of profitable work is anticipated with confidence.

Newspaper despatches sent out from Nelson last month to the effect that if the proposed amalgamation of several Rossland and Boundary mines and the Canadian Smelting Works, Trail, be carried out, it is intended to close Le Roi Mining Co.'s smelting works at Northport, have been authoritatively denied, and an alleged interview with a Le Roi Co. official repudiated as fictitious. George S. Waterlow, of London, who with T. G. Blackstock, of Toronto, was most active in promoting the amalgamation scheme, is slowly recovering after having been operated on for appendicitis. At present he is recuperating at Glacier, a Canadian Pacific Railway Co.'s health resort in the Rocky Mountains, and is expected to shortly proceed to Rossland.

The 1904 annual report of the Minister of Mines is now in the hands of the government printer and should be ready for issue before the close of the current month. It will be the most comprehensive and valuable report the department has yet issued, and among its illustrations will be some lithographed flow sheets—diagrams skilfully prepared by William Fleet Robertson, provincial mineralogist, and designed to clearly show the movement of ore through the concentrating mills of several of the larger silver-lead mines of the province. The provincial mineralogist spent the whole of the field-work season of last year visiting mining properties, descriptions of which will appear in the report. A new feature will be an account of the portland cement works recently started at Tod Inlet, near Victoria, Vancouver Island, this being the first cement manufacturing establishment successfully established in British Columbia.

The blast furnace at the Tye Copper Co.'s smelter at Ladysmith, Vancouver Island, was blown out on April 30 for the purpose of installing a hot blast system designed by Thomas Kiddie, manager of the smelter. The blast from the blower will be conveyed through pipes having a much enlarged heating surface and running nearly the full length of the dust chamber (between the down-take from the furnace and the smokestack) and back to the furnace immediately over which the already heated blast will pass before entering the tuyeres. Experiments extending over several weeks with a blast heated in this way promised such satisfactory results that the substitution of this system of hot blast for the cold blast heretofore

in use at these works was decided upon. It is expected that smelting operations will be resumed before the close of May. It is believed it will be practicable to smelt a larger proportion of raw ore with a smaller percentage of coke under the new conditions than under the old.

The sale of the Northwestern Smelting & Refining Co.'s smelting works at Crofton, Vancouver Island, to the Britannia Copper Syndicate, is reported to have taken place. Several large stockholders in the syndicate visited the Crofton works a few weeks ago in company with James Breen and H. C. Bellinger, metallurgists, who erected and equipped this smelter and operated it until last spring, when it was closed down owing to a failure in the ore supply.

Coast newspapers have published a report from Cumberland, Vancouver Island, that early in the morning of April 26 a serious fire broke out at No. 4 pithead of the Wellington Colliery Co.'s colliery in Comox district, totally destroying the machine shop and blacksmith shop, and causing a loss of about \$25,000. The fan house, hoisting frame and tippie, and the engine house were saved by the efforts of the mine firemen. Later private advices, believed to be quite dependable, state that the machinery suffered but little damage, and that the buildings destroyed were not costly ones, so that the actual loss is not likely to be more than \$2,000 to \$3,000.

#### London. April 29.

When I wrote recently of the improved condition of mine management now met with in West Australia, I imagined that the directors, shareholders and the public generally would agree to let bygones be bygones, and that in future the various managements would act harmoniously in friendly rivalry. This, however, was not to be, for the Golden Horseshoe directors have thought fit to put forth an explanation of the appointment of Messrs. Bewick, Moreing & Co. as managers and its subsequent cancellation. It is just a year ago that the appointment was made, but it soon became obvious that the firm and the board of control could not get along well, and it was no matter of surprise that the arrangement should be revoked. It would have been wise on the part of the directors to say nothing in explanation, but instead of that they must issue through the chairman a long rigmarole of absurdities and personal abuse. Space is not available for a recapitulation of the alleged grievances that the directors have against the firm, and I don't think your readers would care to wade through the complete statement. There appears to me to be no grievance at all. In fact, I think Bewick, Moreing & Co. have the grievance on their side. The directors appointed the firm as managers, and then refused to adopt any of their suggestions, and treated them with petty tyranny. As an example of the refusal of the directors to adopt suggestions may be cited the trouble over the treatment of rich sulphide and concentrate. The firm found that these were being sold to the Freemantle smelter, and a cost incurred of £4 per ton, whereas if they were treated on the spot the cost would only be 30s. As, however, some of the directors are interested in the Freemantle smelter, any reform in the manner of treatment was effectually blocked. As an example of petty tyranny, I may quote the instructions that no communications from the firm's people at the mine should be sent to the firm's London office, but that all communications should be sent to the

office of the company. Then, again, the board would not adopt Bewick, Moreing & Co.'s methods of buying stores and supplies, on the co-operative system, by means of which considerable economies are effected, alleging as the reason that it would involve a change in the system of bookkeeping. They also alleged that Bewick, Moreing & Co. had held a large quantity of gold, but as they have paid £10,000 to the firm in exchange for it the firm must have had a very solid claim to it. The directors make a great point that the firm did not reduce the costs, but they were given no opportunity to do so. At the Ivanhoe, immediately adjoining, the same lode is worked under the management of the firm and the costs are less than three-quarters of those at the Golden Horseshoe. Lastly, it is only justice to the firm to say that the members of the board who practically control its actions are Messrs. Charles Kaufman, Alfred and Albert Reitlinger. There are on the board also several estimable gentlemen, such as Sir John Purcell, Lord Ribblesdale and Mr. Bucknall, the ship owner. These gentlemen, though participating in the thunder of the board are really not responsible for it. Having little or no experience of their own in mining or of the mining fraternities, genuine and imitation, they are easily induced to believe the statements and arguments of the other members of the board whom, for better or worse, they have elected to trust.

The Waihi Gold Mining Co. continues to be easily first among New Zealand gold producers. From 1891, when operations were commenced, the output has gradually increased until in 1904 259,978 long tons yielded gold valued at £683,882, of which £297,544 was distributed as dividends. From the commencement the total dividends have amounted to £1,602,278. The methods of treatment of the ore have varied from time to time, partly because of the varying character of the ore, and partly because the gold is so fine that ordinary stamping lost much of the metal. The mine was an early pioneer in tubemill practice, of which so much is heard nowadays, and it is now experimenting with the vacuum slime process, which, it is hoped, will be cheaper than filter presses. It is interesting to note that the long ton of 2,240 lb. hitherto used is being discarded for the ton of 2,000 lb. which is so generally used by mining men.

#### Johannesburg. April 10.

Diamonds and gold are the chief things to cause a boom in South Africa, but the present excitement in our local share market is due, not to these precious substances, but to tin. This tin boom has been coming on for a long time, and at last it has burst in all its fury. A company, South Africa Lands, known on exchange as "Sallip," has been the chief promoter. An enthusiastic report was made of a tin deposit on one of its farms, Vlaklaagte, north of Pretoria, and the shares have gone sky high. What view a man takes of the find depends largely on whether he is a shareholder or not. If he bought "Sallip" at 20s. and expects to sell them at 100s. he is inclined to believe the deposit the greatest thing on earth. Already the shares have touched 80s., and if the boom keeps on they will undoubtedly reach 100s. The boom in "Sallip" is founded on an optimistic report and "favorable indications." The deposit has yet to be proved in depth. Two kinds of people buy the shares. Some believe they will double in value, and buy for a rise, little caring whether the discovery is

worthless or not. Others are persuaded that a new remunerative industry will open up, and desire to invest their money in it. The skeptic is here also. Concerning the tin boom, he has taken the advice given in 'Letters from a Self-Made Merchant to His Son,' which is, "My son, when a man tells you he will let you in on the ground floor, take the elevator to the top."

Unquestionably the country around Vlaklaagte will be thoroughly prospected, and it is to be hoped that something will come of this tin boom, and that it will not prove simply a share excitement—a double blessing—but a sustained interest that will result in an honest and successful effort to build up an industry that will be for the progress of the Transvaal. Tin is no new thing in this country. It has been known to exist in Swaziland for a long time, and although efforts were made to work it before the war, the results were not financially successful. Working conditions are somewhat improved in this country, but not transformed. The saving in cost per ton works out at a limited number of shillings. With somewhat cheaper working costs, and a higher price for tin, may be the growth of a tin industry in the Transvaal is now possible. With a number of other tin companies at work in the northern Transvaal, this metal is certainly having its day. Some think there will be a general boom, especially after the declaration of the March gold output. All companies have not yet handed in their returns, but so far every company heard from shows an increase. The output will no doubt be a record.

Rather a serious riot broke out among the Chinese coolies at one of the Randfontein mines, in the western part of the Rand, a week ago. The Chinese were not working as they should, and objected to the management insisting on their doing a fair day's work. Affairs got so serious that mounted police were called in to quell the rioters. When such a row happens among Kaffirs, the mounted police simply charge with whips and the mob disperses. Not so with the Chinese. When the horsemen appeared they held their ground, and put up a stubborn fight with bricks and sticks. Although a number of the police were badly hurt by flying stones, they showed great restraint under strong provocation and did not fire. After many hours they succeeded in lodging 55 ring-leaders in the Krugersdorp jail. These ring-leaders were tried, and sentenced to five months' imprisonment. No one was killed or permanently injured. All is quiet on the Randfontein mine now, and the Chinese are working peacefully once more. Considering the number of Chinese now employed on the Rand, there are very few such rows.

The secretary of the British South Africa Co. furnishes the following information: The bridge at the Victoria falls, which was linked up on April 1, will be completely riveted, painted and finished by the middle of June. Railway trucks are already being taken across the bridge with permanent way material for the line northward. It is interesting to note that 50 miles of railway north to the falls were constructed before the material could be taken across the bridge, the locomotives, trucks, rails, sleepers and other necessities being carried across the gorge by means of the electric transporter.

#### Personal.

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

Mr. Percy L. Fearn has gone to Cuba.

Capt. A. F. Lucas, of Washington, is at Chicago.

Mr. H. C. Hoover reached New York on the *Kaiser Wilhelm II.*

Mr. Bertram Hunt is at the Tres Amigos mine at Costa Rica.

Mr. Hennen Jennings has returned to Washington from Mexico.

Mr. H. Clifford Wilmot, of Parral, Mexico, is visiting New York.

Mr. John Markle has returned from : three months' trip in Europe.

Mr. C. L. Stone, of Chicago, has been examining zinc properties in Montana.

Mr. Edward R. Schock, mining engineer, has left London for Johannesburg.

Mr. Richard Provis has returned to London from inspecting gold mines in Egypt.

Mr. G. M. Smith, of New York, is investigating properties at Goldfield, Nevada.

Mr. David Evans, of the Big Four Mining Co., of Mexico, is visiting in this country.

Mr. W. Seymour Pearlless sailed by the *Oceanic* on his return from Mexico to London.

Mr. Drew Haven Dunn, is examining the Peregrina properties at Guanajuato, Mexico.

Mr. Charles Janin, of San Francisco, is examining a placer mine in Routt county, Colorado.

Dr. Seth Gregory, on his return from Colorado, has gone to Mexico, by sea to Vera Cruz.

Mr. Albert S. Crane has been appointed chief hydraulic engineer for J. G. White & Company.

Mr. L. L. Hubbard, manager of the Champion mine, Michigan, was in Chicago on May 6.

Mr. Thomas Travers has resigned as superintendent of the Gertrude nickel mine in Ontario.

Mr. R. C. Turner, formerly at Bodie, Cal., is in temporary charge of the Dolores mine, in Chihuahua.

Mr. Alexander Leggat has been appointed manager of the Argo copper mines near Cañon Ferry, Montana.

Mr. George E. Silvester has been appointed chief engineer for the Canadian Copper Co., at Copper Cliff, Ontario.

Mr. A. E. Drucker has been appointed superintendent of the cyanide department of the Oriental Mining Co., in Korea.

Messrs. J. G. Allyn, of Chicago, and H. E. Hirsh, of New York, are inspecting properties at Cienega de Olivas, Mexico.

Mr. C. M. Eye leaves San Francisco on May 12 for the Philippine Islands, where he will erect and operate a cyanide plant.

Mr. G. W. Williams has been appointed superintendent of the Mountain Iron and Stevens mines at Mountain Iron, Michigan.

Mr. Theodore Douglas, president of the Douglas Copper Co., has gone to the mines of that company at Cocorit, Sonora, Mexico.

Mr. J. L. Pultz has moved from 71 Broadway to 25 Broad street, where he has opened an office as consulting engineer.

Mr. Charles L. Whittle has returned to Boston from a two months' examination of silver-lead properties in eastern Nevada.

Mr. and Mrs. S. F. Emmons sailed on the *St. Paul* for Dinard, in France. Mr. Emmons will visit the exposition at Liège.

Mr. John B. Farish sailed on the *Korea* from San Francisco on May 3. He is on his way to China, and expects to return early in July.

Mr. Howard E. Cole has assumed his duties as manager for the Waters-Pierce Oil Co., in Mexico. Mr. Cole succeeds Mr. T. J. Ryder.

Mr. J. Gordon Hardy, manager of the Dolores mine, Mexico, is at Chicago, where he has successfully undergone a serious operation.

Mr. Dugald Cameron, manager of the Union Jack mines at Ymir, B. C., has returned to the Pacific Coast after a month's visit at Ottawa.

Mr. Frank Fletcher has been appointed general manager of the iron and steel foundry of the Compania Industrial Mexicana in Chihuahua, Mexico.

Mr. William U. Greene, formerly of Charlotte, N. C., is now superintendent of the property of the Albemarle Zinc & Lead Co., at Faber, Pennsylvania.

Messrs. Thos. Chalmers and Ralph Sprado, of the firm of Chalmers & Williams, of Chicago, have returned from a three months' trip in the Southwest and Mexico.

Mr. John Henderson, general manager for the Coast Zinc Copper Co. in the State of Sonora, Mex., is superintending the installation of machinery at El Oro, Sonora, Mexico.

Mr. P. R. Bradley, acting superintendent for the Canadian Copper Co.'s smelter at Copper Cliff, Ontario, has resigned that position, and will devote himself to mining engineering.

Mr. Hudson H. Nicholson, consulting engineer and general manager of the Standard Consolidated mines at Sumpter, Ore., is in the East on business connected with those properties.

Mr. Samuel Sanford, formerly an associate editor of THE ENGINEERING AND MINING JOURNAL, is now connected with the United States Geological Survey, with residence at Washington.

Mr. J. Bonsall Porter, professor of mining at McGill University, Montreal, has been invited to deliver an address before the meeting of the British Association for the Advancement of Science to be held at Johannesburg, South Africa, next August.

Among those who attended the Washington meeting of the American Institute of Mining Engineers were Messrs. Olof Wenstrom, of Boston; W. R. Boggs, from Argentina; John Berkinbine, and E. V. D'Inwilliers, of Philadelphia; James Douglas, James F. Kemp, and Anton Eilers, of New York; Adolf Thies, of the Haile mine, Marcus White from Idaho, and Blamey Stevens, of Alaska.

Messrs. Steinhart & Vogel, chemists and metallurgists, of London, have entered into partnership with Mr. T. C. Cloud late manager of the Wallaroo Smelting Works, South Australia. The new firm of Steinhart, Vogel & Cloud will have its offices at 4 Lloyds avenue, London, E. C., and its testing works at Feltham, Middlesex.

### Obituary.

George Gooderham, of Toronto, died in that city on May 1, in his 76th year. He was prominently identified with many financial and industrial enterprises and was a director of the Centre Star and Wai Eagle mining companies and the head of the Gooderham-Blackstock mining syndicate.

### Societies and Technical Schools.

*American Institute of Electrical Engineers.*—The annual convention of this society will be held at Asheville, N. C., from June 19 to 23.

*Technical Publicity Association.*—The first annual dinner of this society was held in New York, on April 27. An address on 'The Machinery for Marketing Machinery' was delivered by Emerson P. Harris. Representatives from many large manufacturing companies were present.

*New Mexico School of Mines.*—This institution at Socorro has come into possession of the famous library of mining, geology and philosophy belonging to the late Major John W. Powell, who for fifteen years was director of the United States Geological Survey, and for many years one of the pioneer scientific explorers of the West. The library consists of several thousand volumes, many of them very rare and all of great practical value in mining. Among them is a complete set of Major Powell's own voluminous writings. The collection is especially well represented by books on the mining resources of the Rocky mountain region and the great Southwest. These will be of great value to the students of mining and geology interested in the mining industries of the Southwest.

*American Chemical Society.*—The 32d general meeting will be held in the rooms of the Buffalo (N. Y.) society of Natural Sciences, June 22 to 24. At the opening session on Thursday, June 22, forenoon, a brief address of welcome will be made by Herbert P. Bissell, on behalf of the Buffalo Society of Natural Sciences to which President Francis P. Venable of the Chemical Society will respond. Addresses will also be made by Marston T. Bogert on "The Classification of Carbon Compounds," and by John H. Long on "Some Recent Advances in Physiological Chemistry." In the afternoon of the same day there will be meetings of the sections of Agricultural, Sanitary and Biological Chemistry, with John H. Long as chairman; of Physical Chemistry, W. R. Whitney, chairman; and of Organic Chemistry, Marston T. Bogert, chairman. A visit will be made to the Gratwick laboratory. In the evening Francis A. J. Fitzgerald will make an address on "The Electrochemical Industries of Niagara Falls." On Friday, June 23, Victor Leuber will address the members on "Tellurium," and subsequently the sections of Inorganic Chemistry and Industrial Chemistry will meet. A subscription dinner will be given at the Hotel Iroquois in the evening. On Saturday, June 24, there will be brief adjourned sessions of the various sections, followed by an excursion to Niagara Falls. During the session some interesting papers will be read, and the elaborate arrangements of the respective committees foretell the success of this meeting. Detailed information may be had from Secretary William A. Noyes, Bureau of Standards, Washington, D. C.

### Trade Catalogues.

The Wild Mill is described in a folder issued by the S. H. Supply Co., of Denver, Colorado.

The E. Keeler Co., of Williamsport, Pa., has just issued a catalogue of its new water-tube boiler.

Catalogue 055 is devoted to coal-handling machinery, designed and manufactured by the C. W. Hunt Co., of West New Brighton, N. Y.

The Christy Box-car Loader Co., of Des Moines, Iowa, has prepared a descriptive catalogue of its well-known car loaders and their parts.

The Portland Cordage Co., of Portland, Ore., has issued a catalogue and cipher code. It contains descriptions and price lists of the company's products.

'Ideal Power' for April, published by the Chicago Pneumatic Tool Co., contains an unusually interesting variety of matter concerning their pneumatic tools.

We have received from the Westinghouse Electric & Manufacturing Co., of Pittsburg, advance copies of two fan motor folders on the A. C. and D. C. types; they are both illustrated.

The 'Valve World' for April, issued by the Crane Co., of Chicago, contains much readable matter about products of that company, as well as a variety of miscellaneous information.

The American Injector Co., of Detroit, Mich., has prepared a price list of its injectors and their parts. It is prepared with great care, and will be found a great convenience to purchasers of injectors.

Bulletin No. 143, issued by the Stanley Electric Manufacturing Co., of Pittsfield, Mass., is an essay of the design of generators for electric power transmission work by David B. Rushmore. It is illustrated.

'Stirling; A Book on Steam for Engineers,' has been prepared by the Stirling Co., manufacturers of water-tube safety boilers, of Chicago. It contains chapters on superheated steam, fuel burning, utilization of waste heat, chimneys and draft, and analyses of fine gases.

### Industrial.

The Rapid-Economy Stamp Mill Co. of San Francisco, is installing an additional 3 stamp battery of Richards' Rapid-Economy stamp mill on the Gold and Silver mine near Kelsey, El Dorado county, Cal. The owners of the property report remarkable results from the operation of the mill installed by this company last fall, and expect to have the new battery in operation in about thirty days. This mill is an innovation in milling practice, the levers, which are used instead of cams, dropping the stamps at a speed of about 200 per minute.

The Dearborn Drug & Chemical Works have signed a long lease for a suite of six offices, comprising the northwest wing, on the eighteenth floor of the new Barclay building, 299 Broadway, N. Y. The selection of this new location has become necessary, due to the great increase of business in exports, marine and branch offices at Boston, Philadelphia, Buffalo, etc., which come under the New York office direct. It is the company's intention, inside of one year, to equip and establish analytical laboratories at New York to relieve the Chicago laboratories of the mine and Eastern work. Arrangements have been made with the

owners of the building to provide suitable quarters above the offices with private stairs connecting same.

The Stanley Electric Manufacturing Co., and the General Incandescent Arc Light Co. have consolidated. The corporate title of the combined interest will be Stanley—G. I. Electric Manufacturing Co. The Stanley Company, as engineers and manufacturers of the well-known S. K. C. system has acquired the reputation of turning out only such machinery as is markedly superior in points of engineering and manufacture over ordinary electrical apparatus. The General Incandescent Arc Light Co. is well known as builders of high-grade arc lamps, incandescent lamps, alternating and direct current motors and general electrical supplies. The engineers of this concern have for years made a special study of electric lighting, and the new concern cannot help but occupy a foremost rank in the field of electrical illumination. The officers are as follows: Wm. Murray Crane, president; C. C. Chesney, 1st vice-president; M. D. Barr, 2d vice-president, and M. J. Insull, 3d vice-president.

Many varied experiences showing the great merit of Albany grease as an all-around lubricant are constantly brought to the attention of Messrs. Adam Cook's Sons, 313 West street, New York City, the sole manufacturers. The following is an extract from a letter recently received by Adam Cook's Sons, of New York, from L. P. Harvey Clare, Ill., relative to tests of 'Albany' grease made by himself as well as a customer: "I put the cup on the wrist pin of an engine that had always given a great deal of trouble, and from the very first use of the grease the pin ran cool, and has done so ever since, although it is badly overloaded. My customer got a supply of the 'Albany' of a firm in Chicago, and has used it on all of his machinery where possible ever since, and I am certain he will make a permanent customer. One thing he told me was, he had always been prejudiced against your grease on account of its costing him considerable more per pound than other kinds, but he had found out that it took so much less that it really was the cheapest, and then his bearings ran cool."

At a recent conference of the branch office sales managers and the general officers of the International Steam Pump Co., the announcement was made that F. H. Jones, formerly manager of the air-compressor department, would assume the duties of general sales manager and take up the organization of a comprehensive and thoroughly co-ordinated general sales department, similar to those recently organized by several of the large corporations. The International Steam Pump Co. controls Henry R. Worthington, having new and extensive works at Harrison, N. J., the George F. Blake Manufacturing Co. and the Knowles Steam Pump Works, located at East Cambridge, Mass.; the Laidlaw-Dunn-Gordon Co., whose manufacturing plant is at Cincinnati, Ohio; the Snow Steam Pump Works and the Holly Manufacturing Co., both located in Buffalo, N. Y.; the Deane Steam Pump Co., of Holyoke, Mass., and the Clayton Air Compressor Works, of Brooklyn, N. Y. These plants supply a large percentage of the pumping machinery used in this country, including water works pumping engines, steam pumps, centrifugal pumps, vacuum pumps, air compressors, jet, surface and elevated condensers, cooling towers, feed-water heaters, marine pumping apparatus, water meters, and many other types of hydraulic and pneumatic machinery.

## General Mining News.

### ALABAMA.

#### JEFFERSON COUNTY.

*Sayre Mining & Manufacturing Co.*—This company will make extensive developments at its property in the western part of the county. Recently Robert Sayre, of South Bethlehem, Pa., and others interested in this company, were in the Birmingham district and inspected the properties. James Weisel, secretary of the company, has gone East, to confer with the officials in regard to the proposed development. It is understood that the coal production, now between 700 and 1,000 tons, will be increased, and coke ovens will be constructed.

### CALIFORNIA.

#### AMADOR COUNTY.

*Central Eureka Mining Co.*—This company between Sutter creek and Jackson, has declared a dividend of \$28,000 for April.

*Keystone Mining Co.*—At this property, Amador City, a new 15-drill air compressor is being put in. There are now 60 stamps and two roller mills in operation at the mine.

*Rhetta Consolidated Mining Co.*—This company having made final payment on the Bay State, now owns that mine, the Kretcher and the Rhetta. About 30 men are employed.

#### CALAVERAS COUNTY.

*Benson Mining Co.*—This company at Angel's is about to open a new mine near the one now being worked.

*Red Bird.*—At this mine near Vallecito, owned by C. D. Smith, the present three-stamp mill is to be replaced by a larger one.

#### EL DORADO COUNTY.

*New Highland Gold & Copper Co.*—This company is prepared to commence work on a tunnel to tap new ground in the famous Mameluke Hill. It will be started in Illinois cañon.

*Granite.*—The company which recently purchased this gravel mine has set men at work developing it. It is expected that the company will also acquire the Kohn mine adjoining.

#### PLUMAS COUNTY.

*English Bar and Fels Flat.*—James H. Leggett, of Oroville, has been inspecting these gravel deposits on the middle fork of Feather river near Nelson's Point, with a view to dredging them, and a bond has been taken from the owners, A. Benner and P. C. Botzbach. A road will be built and boring machines set at work to prospect the tracts.

*Rush Creek.*—The hydraulic properties formerly owned by A. W. Whitney, have been sold to Eastern men, who will develop them under supervision of John B. Higgins.

#### MADERA COUNTY.

W. H. Gafford, of Los Angeles, and C. M. Ward, have obtained by bond and purchase some four miles of mining ground from Coarse Gold to Grub Gulch in the interests of Eastern men. An electric power plant is to be put in.

*Yosemite Copper.*—In this mine on the Daulton ranch near Madera, a lot of native copper has been found on the 100-ft. level. The vein is 5½ ft. wide.

#### MARIPOSA COUNTY.

*Mariposa.*—At this property, owned by the Mariposa Commercial & Mining Co.,

the skip rails have been removed from the shaft and gallows frame, and men are removing the machinery from the ruins of the burned mill. The heavier machinery and engine were not badly damaged, the greatest loss being in building and concentrators.

*Tennessee & California Gold Mining Co.*—On this group of claims at Indian Gulch, Samuel L. Brown, manager, extensive development work is about to be commenced. The main shaft is down 200 ft. Machinery for hoist and mill have been ordered.

#### MONO COUNTY.

*Tower.*—This old mine near Benton is being unwatered under direction of J. F. Millner. There were 240 ft. of water in the 320-ft. shaft.

#### NEVADA COUNTY.

*Chicago.*—A strike has been made in this mine in the drift at the end of the tunnel. A shoot of high-grade ore has been found.

*More Stamps.*—The Sultana group of Orleans Hill, Grass Valley, is to add 30 stamps to the 10-stamp mill already there. The Orleans is to add five stamps to its equipment.

*North Star.*—On this mine, in the San Juan ridge, recently bonded by Jno. Curnow, to P. Dedeisheimer & Co., work has been commenced on a new shaft, with 12 men at work.

#### SHASTA COUNTY.

*Graham.*—This group at Bully hill has been bonded to Philip Dedeisheimer, of San Francisco, and will be developed this summer.

*Mallard.*—This quartz property at the foot of the westerly slope of the Shasta-Whiskeytown divide, which has been long in litigation, is being reopened, and shipments of ore have been made to the smelters. The present owners are R. V. Molin, G. W. Bush, and Geo. O. Perry, of Redding.

*Conant.*—Charles Butters and Captain James have taken this mine near Whiskeytown and will at once start extensive developments. Considerable work has already been done on the property.

*Tehama Queen Mining Co.*—This company has been organized at Red Bluff, to work a mine by the same name in Harrison gulch district. The directors are Claus Crede, A. J. Bogard, J. M. Wilson, E. J. Blossom, G. H. Chase and Ralph White.

*Gladstone.*—This mine near French gulch, owned by the Hazel Mining Co., J. O. Jilson, manager, is producing handsomely just now, the orebody having increased in richness.

#### TUOLUMNE COUNTY.

*Gold Bug.*—A vein averaging about \$10 per ton has been uncovered in this mine at Big Oak flat.

*Mohican.*—This mine has resumed operations after a month's shutdown, during which time extensive repairs have been made.

### COLORADO.

#### BOULDER COUNTY.

*Last Chance.*—Warren P. Marshall, of Boulder, has made a rich strike in this property in the Jintown district near Ward, three feet of high-grade ore being uncovered which carries values of 77 oz. gold for first class and 32 ozs. gold for second class, besides good silver values. Early shipments from the rich shoot will be made to smelters.

**Smuggler Consolidated Mining Co.**—Jackson, Mich., capital has become interested in the Smuggler property at Ballarat in the Jamestown district, with C. J. Warren in charge of property. The company will operate both on company and leasing account, and intends to install a fine plant of machinery for extensive operations. The property is credited with over \$2,000,000 output.

## CLEAR CREEK COUNTY.

**Idaho Springs Ore Shipments.**—During April there were 255 cars of ores shipped from this depot to the valley smelters, which in comparison with the same month for last year showed an increase of fully 50 per cent.

**East Kentuck.**—In running an open cut on this property in Virginia cañon, a four-inch streak of ore was opened up, assaying 17.50 oz. gold and 18 oz. silver per ton, alongside of which there is a streak of lead ore carrying values of \$55 per ton. E. D. Quigley, Idaho Springs, is manager.

**Sterling Mines & Development Co.**—Shipments from the Beaver lode gave values of \$106 per ton for first-class, the second class going \$40 per ton. Scranton, Pa., parties are interested, with J. J. Hoban, Idaho Springs, as manager.

**Pittsburg Consolidated Mining & Milling Co.**—Pittsburg capitalists are interested, and at their stockholders' meeting held at Idaho Springs this week they decided to erect a 50-ton milling plant on their Dover mill site at the mouth of Fall River, where they will also handle ores from their Brighton property located at Freeland. D. Ellis, Idaho Springs, is manager.

## GILPIN COUNTY.

**April Ore Shipments.**—For last month the shipments of smelting and crude ores, tailing and concentrate to the valley smelters and outside points of treatment, were 271 cars, or 5,700 tons, an increase of thirty per cent. over the corresponding month of last year.

**West Whiting.**—Operations are soon to be resumed with eastern capital and with D. McMasters, Central City, as manager. The shaft will be sunk 200 ft. deeper, and other developments will follow.

**Esculapian Gold Mining Co.**—Articles of incorporation have been filed showing capital stock of \$100,000, with H. A. Hicks, L. H. Williams and D. H. Allen as incorporators. Company will operate in this county, with main office in Denver.

**Wood.**—Operations have been resumed by Philadelphia and Denver operators, drifts being extended at 200 ft., where some smelting ores are being taken out, carrying a small percentage of uranium, or pitchblende values. Heavier machinery is to be installed. W. C. Dennison, Central City, is manager.

**Black Hills & Denver Gold Mining Co.**—Developments along liberal lines are being planned on the property in Boulder Park, their power plant has been installed and the company is figuring on the erection of a 100-ton combination plant. M. H. French, of Denver, is manager.

**Orado Gold Mining Co.**—The following directors have been elected: Otto Muschler, J. J. Davis, J. Meredith and C. S. Karoly, of Aurora, Ill., and Alfred Skeels, of Central City, who is also manager.

**Robert Emmett.**—Some good smelting and milling ores have been opened up in this property in Independent district, and the lessees are figuring on installing heav-

ier machinery. Matt Ryan, Perigo, is in charge.

**Kirk.**—A splendid pocket of uranium, or pitchblende ore, has been opened up in the 200 east level of this mine on Quartz Hill, situated near the well known Wood uranium mine. The property was taken hold of about a year ago by L. G. Nesmith, of San Jose, Cal. A large amount of dead work was carried out, made necessary on account of long idleness of mine; machinery was installed; and the present find of this rare mineral is the best made in the county for a number of years. The pitchblende streak is about 10 inches wide, with the mineral almost solid, one shipment of two tons being made to New York for shipment to Germany, which gave values of thirty per cent uranium, and a four-ton shipment made this week is expected to bring values of fifty per cent, this ore being worth from \$1 to \$2 per unit. L. G. Nesmith, Bald Mountain, Colo., who is lessee, expects to make arrangements to ship direct to the consumer at Hamburg during the ensuing season.

**Annie H.**—As soon as the snow is gone new machinery is to be installed on this property by Pittsburgers, who have recently reorganized, and they will add new machinery to their 25-ton mill. C. A. McNeil, Apex, is manager.

## JEFFERSON COUNTY.

**Copper Strike.**—Henry Koch and others of Golden have opened into some ores west of Golden, which carry gold, silver and copper values up from \$25 to \$50 per ton. They have reached a depth of 150 ft. and are taking out a test run for the Golden smelter.

## LAKE COUNTY—LEADVILLE.

Despite the practically impassable condition of the roads during the month, and the strike at the smelter, the tonnage for April was 67,000 tons. The average amount of ore shipped for the first four months of the year approximates 280,000 tons, and should this be kept up until the end of the year the tonnage of 1904 will be exceeded by 100,000 tons. The trouble at the smelter is ended, and again the eight furnaces are in full blast, and there should be no trouble during May from bad roads, so it is confidently expected that the tonnage will be in the neighborhood of 72,000 tons.

**Favorite.**—The Green brothers, who have a lease on this property, opened ore in the old shaft several months ago, but as it dipped rapidly to the east it was abandoned and a shaft further down the hill was started. During the week, when 150 ft. of sinking had been done, the ore was found, a sand carbonate running well in gold and silver. Sinking is going on, and the bottom of the ore has not been reached yet.

**Alps.**—Several years ago this property, at South Evans, was worked, and very good ore was shipped. James Carpenter and Hugh McCloskey have secured a lease on the group and have started to work. After the shaft is unwatered drifting will be started to locate a body of carbonate that is known to be in the territory.

**Ballard-President.**—The shaft and drifts have been cleaned out and the work of breaking ore is now in progress. Ore has been found in the bottom levels that runs \$15.97 gold, \$3.45 silver and 2 per cent bismuth. Prospecting will be carried on in the large body of low-grade silicious ore, and it is expected that many places

will be found where the ore will be rich enough to ship. The property will ship in the neighborhood of 50 tons daily. When the Ballard orebody is opened up, then some attention will be paid to the President, and an earnest endeavor made to locate the main ore channel.

**Bartlett Tunnel.**—Last week the lessees on this property opened up a vein of ore in one of the stopes that is 18 in. wide and that nets by the carload \$2,500. The ore is in place with two well-defined walls. Outside of the rich streak is a body of low-grade stuff that runs from \$10 to \$15 per ton; some of this will bear shipping.

**Wabash Twin Lakes.**—Sam Dowell has been working all winter on this claim and driven a tunnel into the mountain 200 ft., when the vein was cut; it is 16 in. wide and runs \$50 per ton. Some of the ore taken from the vein assayed as high as 13 oz. gold per ton.

**Buckeye.**—Fryer Hill has been leased to Capt. Jenks and Nicholas Finn. A new shaft will be sunk and sent down to the lower zone. It is expected that good iron will be struck in about 150 ft., as it was at this depth that the iron was found in the old shaft.

**Yak Tunnel.**—The lateral being run from the Silver Cord in the Yak Tunnel to Colorado No. 2, thence to the Tucson and on to the Belgian is making good progress. When this lateral reaches the Belgian it will practically drain the whole of Iron hill, permitting of other properties starting up.

**Brattleboro.**—The water has been taken out of the shaft and the drifts are all cleaned out, and the work of breaking ore is in progress. The ore in the lower levels is eight ft. wide and of good grade, but carries considerable zinc.

**Famous.**—Preparations are being made to start work on this group, and after the preliminary work is completed the property will be vigorously worked all summer and fall. It adjoins the London to the west.

## INDIANA.

The formal merging of the coal mining companies owned by the L. T. Dickason interest and the Job Freeman interest, in the Linton field, was effected May 2. The merger company has opened offices in Terre Haute.

John S. Bays, acting for a New York syndicate, has purchased seven of the best mines in Sullivan county. The consideration is said to be \$2,500,000. The syndicate will take over the property June 1. The mines purchased are: Hymera; North Jackson Hill; Sullivan County Coal Co.; Union Coal Co.; Keller Coal Co.'s mines, owned by Harder & Haefer, of Chicago, and the Glendora, owned by W. S. Bogle Coal Co., of Chicago. The deal includes 10,000 acres of Sullivan county coal lands. The Vanderbilt interests are said to be back of the deal.

The Southern Indiana Coal Co., which is the merger company of the John R. Walsh Southern Indiana Railway Co., has opened offices in Terre Haute. The Leitzinger company, of which F. D. Dugger was president, has sold the mine and much valuable coal land near Jacksonville to the Southern company.

The Panhandle Consolidated Coal Co., composed chiefly of Richmond, Ind., men, and controlling 5,400 acres of coal land in Sullivan county, has sold its interests to an Eastern syndicate at a good profit.

The completion of the deal for the sale of the property of the Central Coal Co., controlled by D. J. Terhune, and lying along the Vincennes division of the Vandalia, with 7,000 acres of coal land, has been announced. The purchase is said to be in the interest of the Pennsylvania railroad. It is undeveloped land, and a number of shafts are to be sunk at once.

The steady decline in the price of crude oil is having a marked effect on oil mining in Indiana. At 82 cents, so long as Indiana wells average almost 34 bbls., as they did this week, there will be operations in this State. There has been no new gushers reported. Compared with the previous six days, there is a decline in new wells of 26 for the two Eastern fields, and a heavy decline in the production. The deep pay sand wells have dwindled in production almost 50%. There were 25 wells completed in Indiana last week, which produced 1,200 bbls. Only one dry hole reported.

### MICHIGAN.

#### KEWEENAW COUNTY—COPPER.

*Keweenaw Central Railroad.*—Excellent progress on the permanent survey is being made. Construction has started, contracts having been let for the grading of 16 miles of roadbed and 50,000 ties. One contractor has taken 100 men to Lac La Belle, where the northern terminus will be established.

#### ONTONAGON COUNTY—COPPER.

*Mass Consolidated.*—This company will begin explorations on the Branch, Minnesota and Calico lodes where they traverse its property in a few days. Some work was done on this group of veins at this point many years ago, but there is no record of the results. The Branch vein is 1,400 ft. west of the Knowlton. A 3-compartment shaft will be sunk on this formation. Two compartments will be 6 by 7 ft. each, for skip ways and the other 4 by 7 ft. for combined pipe and ladder way. After sufficient depth shall have been attained, crosscuts will be extended to tap the paralleling formation. There is now available at the older workings, ample machinery with which to equip the new shaft and prosecute the development work for the first few hundred feet in depth. Therefore, little expense will be entailed, so far as machinery goes, and all of the funds available will be devoted to the vigorous development of the various lodes.

### NEVADA.

#### LINCOLN COUNTY.

*Bell & Jones.*—This mine, four miles east of the Bullfrog, is getting out good ore. No shipments have yet been made.

*Ladd & Benson.*—At this mine on Ladd mountain, five miles east of Bullfrog mines, several trial shipments have been made. The property is incorporated as the Bullfrog Mining Company.

*National Bank.*—This mine, discovered by Patrick, Camp & Patrick, is the east extension of the Ladd & Benson property. There is an 8-ft. vein of rich talc.

*Montgomery-Shoshone.*—At this mine ore is being continually handled to Las Vegas. It is about one-half mile east of National Bank.

#### NYE COUNTY.

*Tonopah Mining Co.*—The annual report of this company shows the total receipts for the fiscal year ending Feb. 28, 1905, as \$891,210 and the disbursements \$624,418, leaving cash on hand of \$270,

792. In the receipts, besides a balance at the beginning of the year, is included \$638,315, receipts from the smelter for ores, and royalties of \$17,610. The chief items in the disbursements are: Cost of operation, insurance, taxes and freights, \$182,210; retirement of preferred stock, \$299,550; railroad construction, \$55,578; interest on preferred stock, \$30,254; legal expenses, including cost of patenting, \$20,741; salaries and clerk hire, \$18,375. The earnings and expenses of the Tonopah railroad from July 1, 1904, to March 1, 1905, were approximately: Gross earnings, \$440,565; operating expenses, \$207,327; net earnings, \$233,238; fixed charges and sinking fund, \$45,575; surplus, \$187,663.

The following directors have been re-elected: James S. Austin, John W. Brock, C. A. Daniel, C. A. Higbee, Charles R. Miller, Henry D. Moore and O. A. Turner.

### OREGON.

#### BAKER COUNTY.

*Bonanza.*—Albert Geiser, the original owner who developed this mine, recently transferred by the Standard Oil people to Hayes, of Philadelphia, has re-opened the property under lease and bond and put a large force of men at work in the upper workings, where he expects again to take out the yellow metal.

*Cornucopia.*—A deed has been filed by H. H. Rogers, of New York, transferring to Robert M. Burnett, of Southborough, Mass., for the consideration of \$98,686 what is known as the Cornucopia mines, consisting of about 25 claims in the Cornucopia camp 60 miles east of Baker City, to which Rogers claims title through a deed from John E. Searles, of New York. Searles is in the bankrupt court in New York, and the property has been in litigation and idle for a year past. It is hoped that this transfer may mean the resumption of work on this great mine.

*Daines.*—The Daines properties, the Belcher and Golden Gate, are working large forces of men and the new 20-stamp mill will now be installed in a short time, as the roads are getting better and the snow is rapidly going off. The orebodies in these properties have shown good values, and when the mill starts up there will be no lack of ore to feed it.

*Platt.*—Superintendent Burt Rush of this group in the Rock Creek district, west of Baker City, reports having made a strike of rich shipping ore in the lower workings of the mine. This vein is the extension of the Cracker Creek mother lode, and the discovery has caused not a little excitement here.

*Sumpter Smelter.*—The Sumpter smelter has been blown in again, and there is now a plentiful supply of lime to keep the plant in full operation day and night. The ore is piling up, all the bins are full, and ore is being held back in various mines awaiting its turn for shipment for treatment.

*Mayflower.*—Manager George W. Boggs of the Mayflower mine has just had a final test made of the ore taken from that property, and the assays give values of \$246 to the ton. It is the intention of Mr. Boggs now to put in at least a 10-stamp mill, with concentrators, and have it in operation by August 1.

*Indiana.*—The shaft at this mine, in the Medical Springs district, has now reached the 300-ft. level. The ore shows values of 6% in copper and from \$3 to \$5 per ton in gold.

### WASHINGTON.

#### FERRY COUNTY.

*Ben Hur.*—Work has been started on the 115-ft. level, drifting northward on the vein. The stope on the lower level is 3 ft. wide, yielding a very good average quality of ore. Four carloads of ore are reported as having been shipped the week of April 29.

*Belcher.*—A survey is being made for a narrow-gauge railroad from Lambert station up Lambert creek to the mine. A 3 per cent grade can be had by developing 12 miles roadway. Another survey will be made from Torboy siding, on the Washington & Great Northern railway, up the north fork of the Sans Poil river.

*Morning Glory.*—A pay streak 30 ft. long by 10 ft. deep has been developed in the surface workings, but continues narrow in width. The ore continues richest in silver. A recent shipment of 5 tons ran \$137 per ton.

### ALASKA.

*Bartels Tin Mining Co.*—W. C. J. Bartels, general manager, writes from Tin City, Alaska, under date of January 20, as follows: "We struck tin ore in one of our tunnels on the Lucky Queen mine here early last summer, but it was only small stringers, the largest one being 10 in., with several of a smaller size. The tunnel runs nearly on top of the claim, so that we now have about 40 ft. of roof above us, the length of the tunnel now being 280 ft. We started a tunnel below the Lucky Queen, on the North Star claim, and struck tin ore within 15 ft., as before. We struck tin ore almost every round blasted, until we got within a distance of 115 ft., when we struck a vein with good ore in the vein filling—heavy brown crystals of cassiterite. The vein filling is of heavy brown or reddish material, mostly iron oxides, with bunches of large crystals of cassiterite. The foot-wall is hard blue crystallized limestone; then comes the vein filling, which is so far from 18 in. to nearly 4 ft. wide; then, without any other distinct wall, it passes into syenitic rock, with dark blue zwitter. We have two electric drills running, with power transmitted two miles. The winter has been very mild so far, only one cold day—20° below zero. From Jan. 1 till now it has been from zero to 30° above, most of the time about 20° above."

### Foreign Mining News.

#### CANADA.

##### BRITISH COLUMBIA—BOUNDARY DISTRICT.

*Boundary Ore Shipments.*—Shipments for the week ending April 29 are as follows, in tons: Granby, 12,390; Mother Lode, 4,064; Brooklyn, 2,555; Rawhide, 763; Mountain Rose, 217; Brooklyn and Stemwinder dumps, 460; Oro Denoro, 100; Providence, 20; Last Chance, 46; E. P. U., 20; total for week, 20,635 tons; total for year, 305,488 tons.

##### BRITISH COLUMBIA—ROSSLAND DISTRICT.

*Rossland Ore Shipments.*—Shipments for the week ending April 29 were as follows, in tons: Le Roi, 2,100; Center Star, 2,010; War Eagle, 1,200; Le Roi No. 2, 120; White Bear, 25; White Bear, milled, 200; Jumbo, 400; Spitzee, 90; total for the week, 6,335 tons, and for the year, 115,087 tons.



# THE ENGINEERING AND MINING JOURNAL

## Air Consumption of Drills.

BY R. R. SEEBER.

The accompanying is a tabulation of the amount of free air used per minute per drill employed at the Champion mine during February, 1905. The general conditions of work are as follows: Four shafts are operated; these are approximately in a straight line about 1,000 ft. apart. The compressor is situated about 1,000 ft. from the first shaft and 4,000 ft. from the last shaft. The pipe line is 12 in. for 1,000 ft., and 10 in. for the remainder of the surface line. The main line down each shaft is 8 in. with branches at the levels, which are 125 ft. apart. The deepest level is the ninth. The compres-

ried is usually about 78 lb., but begins to drop at about 4:30 with the blasting, and the compressor speeds up to keep it as high as possible until 5, when the compressor is allowed to slow down and is stopped at 5:15. The 5 o'clock air-pressure is usually about 50 lb., but sometimes is as high as 70 lb., depending upon the blasting.

The other machinery using air on both shifts is as follows: Two small hoisting 'puffers'; three steam-hammers in the rock-houses for cleaning mass copper, 11 $\frac{3}{8}$ -in. cylinders; four air-hoists for handling large rocks in the rock-houses, 10-in. cylinders. None of these is in continuous use. In addition, on the day shift about 50,000 gal. of water is raised by various pumps, all attended by one pumpman. Two drill-sharpening machines sharpen about 500 bits per day, between 8 A. M. and 5 P. M. A 200-lb. pneumatic

## Glass Bricks.

There are numerous plants in Europe manufacturing paving and building bricks, tiles, and similar products by the Garchey process, which is patented in most countries of Europe and their colonies, and in North and South America. The patents are controlled by the Société Anonyme La Pierre de Verre Garchey, capitalized at \$115,800.

The glass used in making articles that are not uniform in texture and color is obtained from broken bottles, window panes, etc. The higher-grade products are made from specially melted glass which consists of about 5 parts sand, 4 of lime and 1 alkali. After being cooled slightly the glass is granulated by being thrown into cold water. The granules are put into refractory molds and again heated to a temperature below complete fusion until they become plastic. The molds are then withdrawn from the furnace and placed under a hydraulic press to form the desired shapes. After being trimmed, the molds are passed through the cooling process in ovens specially constructed for the purpose. In the two operations of heating and re-heating, the cost of coal is one of the factors which makes the production of the Garchey stone expensive. The American consul at Havre, France, has been informed that Garchey has discovered a process for making the stone from glass in one heating, thus materially reducing the cost.

The owner of the Garchey patents claims that the cost of production under the old process varies from 86.85c. to \$1.06 per 10.76 sq. ft. of glass stone, according to location of plant, the cost of labor, coal, etc., being about 96.5c.

As the Garchey stone has the chemical and physical qualities of glass, it is not readily attacked by acids, and is impermeable to moisture. In France, plain, smooth, or fluted tiles, 7.87 and 13 in. sq., about 0.75 in. thick, used for flagging sidewalks, etc., are quoted at 1 fr. (19.3c.) per sq. foot. Bricks, roughed or fluted, 5.5 in. sq., 1.57 in. thick, and also 7.87 in. long, 3.54 in. wide, 1.79 in. thick, for paving purposes, are worth 27c. per sq. foot. For borders of sidewalks, gutters, or for staircases: Step, fluted or roughened, 19.7 in. long, 6.3 in. wide, 21.2c. each; riser, 19.7 in. long, 7.87 in. wide, 26c. each; bottom of gutter, same dimensions, 28.95c. each. For a highly ornamental tile, 19.7 in. long, 13 in. wide, 63.7c. each. Discounts of 20 to 25% are allowed on large orders. The bricks, squares and tiles can be purchased in white, green, white and black, pink, yellow and other colors.

The so-called gamma, or hard, variety of allotropic iron exists from the solidifying point to 890° C. The alpha, or soft, variety exists below 755° C. Between these two points is the beta iron, the properties of which are also between those of alpha and gamma iron.

CUBIC FEET FREE AIR PER DRILL PER MINUTE.  
CHAMPION COPPER COMPANY.  
FEBRUARY, 1905.

	Day Shift.				Night Shift				Drills Working.
	5-8 About 75 Min.	8-11 3 Hours	11-2 3 Hours	2-5 3 Hours	5-8 About 75 Min.	8-11 3 Hours	11-2 3 Hours	2-5 3 Hours	
1	63.45	62.98	65.49	71.44	62.04	52.95	57.50	56.72	75.5
2	60.08	62.41	63.35	64.12	63.19	50.43	66.46	54.32	76.
3	56.94	59.77	60.57	70.50	62.77	52.20	64.19	50.63	75.
4	58.18	67.95	.....	.....	.....	.....	.....	.....	74.
6	57.63	73.03	69.84	67.14	61.76	53.03	60.17	62.42	74.5
7	64.82	64.19	73.02	63.45	63.09	54.88	58.08	63.24	75.
8	61.48	69.11	63.63	64.12	69.42	51.67	59.14	62.26	76.
9	63.19	66.09	63.81	74.07	65.21	55.87	58.21	65.68	76.
10	65.22	65.52	60.70	65.83	66.92	49.98	58.67	61.78	76.
11	70.97	65.57	.....	.....	.....	.....	.....	.....	74.5
13	57.00	66.21	61.11	66.21	63.80	59.85	57.00	60.08	74.5
14	64.51	71.92	66.37	72.86	65.02	61.76	59.24	55.57	74.5
15	66.69	67.18	62.08	68.11	65.09	54.64	63.66	59.51	74.5
16	59.30	65.99	64.12	70.66	70.31	54.94	54.16	57.12	76.
17	65.17	64.86	64.86	64.86	72.53	56.57	54.20	56.77	75.5
18	63.30	69.99	.....	.....	.....	.....	.....	.....	72.5
20	54.16	75.02	65.21	62.88	67.23	53.85	59.92	61.95	76.
21	73.93	76.89	69.88	62.41	72.84	54.01	60.70	59.92	76.
22	79.84	59.92	65.52	79.69	71.13	56.19	67.55	58.83	76.
23	70.80	65.83	66.61	71.13	70.35	50.11	60.54	64.43	76.
24	70.19	68.32	69.88	68.18	59.77	58.58	54.00	61.47	76.
25	63.51	71.92	.....	.....	.....	.....	.....	.....	74.5
27	52.17	73.32	66.58	68.46	67.06	56.24	71.60	56.56	75.5
28	56.30	64.34	64.34	70.49	61.52	59.45	52.35	62.14	75.
	1,517.63	1,618.93	1,306.97	1,368.60	1,321.25	1,097.20	1,197.29	1,190.60	1,805.00
	63.24	67.45	65.35	68.43	66.06	54.86	59.86	59.52	75.21
			67.10				58.09		

sor was made by the Nordberg Manufacturing Company, and is quadruple-expansion steam, two-stage air. The number of drills in use is about 75. These are of the Ingersoll-Sergeant make, No. D-32, with a 3 $\frac{3}{8}$ -in. cylinder. The miners go down at 7 and are hoisted at 5, both day and night shift. They probably begin drilling about 8 and stop at 12, begin again at 1 and stop at 3:30, blasting before 5. The valves are usually left open to clear away the smoke. The valves are closed by the next shift. Saturdays the miners come up at noon, and the Saturday night shift is composed entirely of trammers.

The compressor is started at about 7 o'clock both morning and evening, and shut down about 5:15. Saturdays it is shut down at noon. The air-pressure car-

\*The Champion is one of the South Range copper mines, in Michigan. Mr. Seeber is chief engineer.

hammer in the blacksmith shop is used occasionally. Some air is also used in trying out drills which are under repairs.

A log is kept at the compressor house giving the reading of a revolution counter every three hours. The time of stopping and starting is always recorded. Lengths of periods tabulated under 5 to 8 average about 75 minutes in length, while all the others are the full three hours in length. From 230 to 250 cu. ft. free air is compressed for every pound of coal burned under the boilers.

'White gold' is a native alloy of that metal with palladium or platinum, and occurs in Minas Geraes, Brazil.

Caddo Island, Louisiana, 22 miles north of Shreveport, is the scene of a promising oil find, the quality of which closely resembles that of Corsicana. The new wells are 200 miles east of the noted Texas field.

## Mine-Car Running Gear.

BY R. V. NORRIS.

About twenty years ago practically the only type of mine-car wheel was a plain open-hub wheel, loose on the axle and oiled by pouring a considerable quantity of lubricant at an oil-hole, which was supposed to exist somewhere on the hub and which was usually filled solid with dirt and grease. Despite the many improvements that have been made, the same type of wheel is today doing duty (or trying to) at fully half the collieries of the country.

The earliest attempts at improvement were in the line of providing removable bushings to replace the worn-out bore;

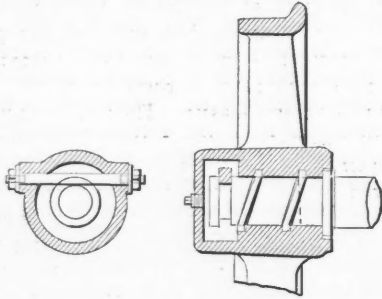


FIG. 7. CATASAUQUA WHEEL.

then came the various types of self-oiling wheels.

Fig. 6, 7 and 8 were closed-hub wheels, with more or less perfect arrangements for the circulation of the oil, and with comparatively small oil-chambers, while Fig. 9 and 10 have open hubs but large oil-chambers, and Fig. 10, while the most widely used, has practically no circulation. This wheel, too, is unique in retaining the oil by a waste packing in part of the oil-chamber located between the spokes of the wheel.

The special advantages of Fig. 9 and 10 are their large oil capacity and ease of oiling, the oil-holes being opened or closed only by a turning cover, while their disadvantage lies in the open-ended hubs and

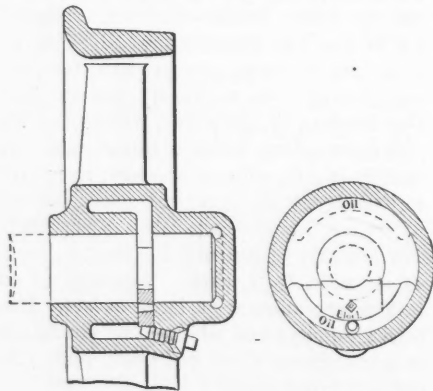


FIG. 6. WHITNEY WHEEL.

consequent escape of oil, especially when the bore is somewhat worn. Fig. 10, too, has the disadvantage that the hub extends over the axle-collar; this, while in use on many wheels and designed to avoid waste of oil, is objectionable in that when the bore is worn the collar rubs, and acts as

a rather efficient brake on the car. The same objection applies to Fig. 7.

Many of the mine cars, especially in the anthracite region, are equipped with inside wheels, with a view of obtaining a car of larger capacity suited for a narrow-gauge track. The wheels are usually loose on the axles, and the latter also free to revolve in journal-boxes of a more or less efficient type. The usual box for inside wheels is similar to that shown, Fig. 11, though this is of the latest type and better designed than the average. It consists of a two-piece waste-packed box with cast-iron seat, the lower half of the box sliding to place and retained by a cotter. Another is a simple construction used with success by the Susquehanna Coal Company at their No. 6 colliery. The extension of the box into the hub is designed to furnish oil to the wheels, which are loose, but are expected to turn on the axles only when one wheel is spragged, or when rounding curves; this projection has the objectionable feature of acting as a brake when the wheel or box becomes worn.

Manganese-steel wheels are largely used throughout the coal regions. They have the advantages of lightness and practical immunity from breakage, but the disadvantage of being excessively hard on the boxes by reason of the hard hub grinding its way into the face of the box. This difficulty can be minimized by the use of two thin soft-iron washers between the hub and the box, which show comparatively little wear and can be readily replaced at a nominal cost. This wheel can be made with closed hub by bolting on a cover. Fig. 13 shows the construction used by Coxe Brothers & Company, and by the Susquehanna Coal Company in the anthracite region, and is believed to represent the best practice up to the present time.

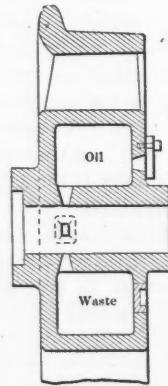


FIG. 10. PHILLIPS WHEEL.

In general, an experience of nearly twenty years with self-oiling wheels of many types has convinced me that a simple closed-hub wheel with liberal oil-chamber is the most satisfactory, and that all attempts at circulation by spiral or other grooves, or by numerous openings

to the axle, are an unnecessary complication, as such grooves fill up in a short time, merely form a lodgment for dirt and grit, and actually hasten instead of retard the destruction of the wheel. Such a form of plain closed-hub wheel is now in use by the Susquehanna Coal Company.

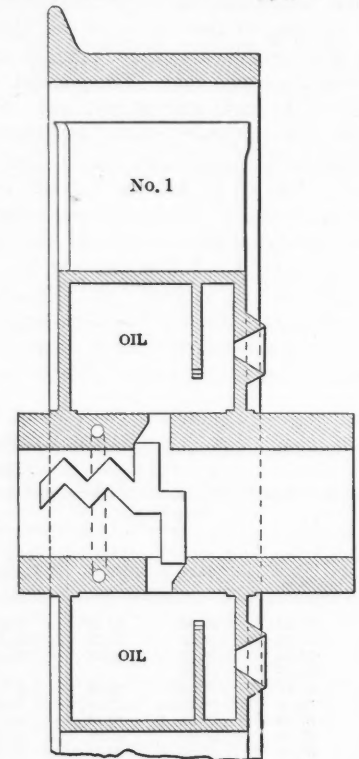


FIG. 9. HOCKENSMITH WHEEL.

The use of a ring of packing to retain the oil, either in the hub itself (Fig. 8), or between the hub and the box, or in a recess in the latter, as in the manganese-steel wheel (Fig. 13), is objectionable for the same reason, as such rings either tear out or become hard, and, in the case of Fig. 13, also tend to act as a brake and increase the friction.

A number of attempts have been made

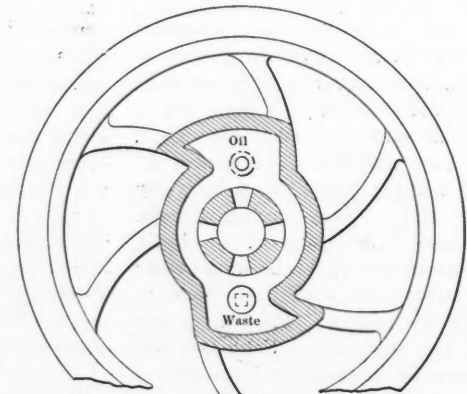


FIG. 10. PHILLIPS WHEEL.

to use mine-car wheels fast on the axles, the latter turning in suitable boxes. While such an arrangement is satisfactory from the maintenance point of view, it has serious objections in practice: First, the necessity of using split boxes (except with inside wheels); second, the car must be



fastenings as grooved axles (Fig. 6, 13, etc.), I have come to the conclusion that for open-hub wheels a large wrought-iron split cotter-pin, opened after being put to place, with a wrought washer between it and the hub of the wheel, is the most

of that city. Later it is conceded that there is needed a more vigorous safeguarding of the quality of the cement and the entrained steel. It is only by failure that success is defined. Reinforced concrete is just as good as the care used in

8,868 in the summer, a number of the small mines being operated only during the winter season. The number of deaths reported from accident in the mines was 11, which shows an average of 1.114 per 1,000 men employed, taking the average

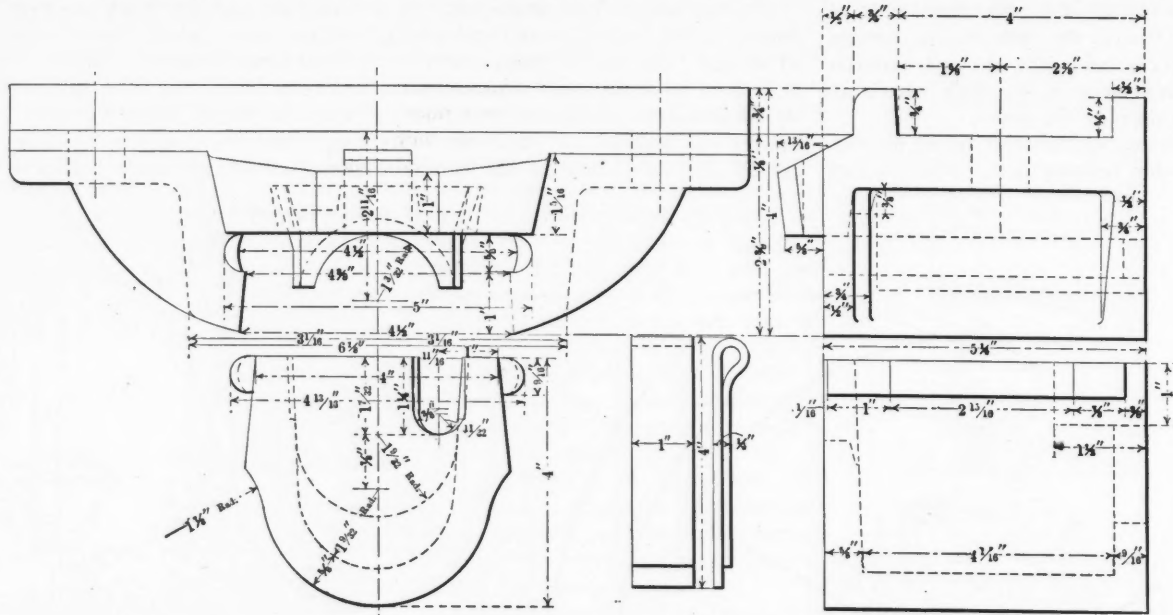


FIG. 11. GLEN LYON INSIDE CAR AXLE-BOX.

satisfactory; while for a closed-hub wheel a large wrought pin, driven solidly in a reamed hole in the axle, gives less trouble than any other type.

The frictional resistance of mine cars on ordinary mine tracks varies from nearly 6%, in starting cars on a curve with plain wheels, to less than 1 1/2% for long trips of cars with self-oiling wheels, moving at the rate of 12 miles per hour.<sup>1</sup>

Reinforced cement, according to the current number of *L'Echo des Mines et*

making and placing it. Its future is assured from our need of it.

**The Coal Production of Missouri.**

Through the courtesy of F. S. Marsteller, secretary of the State Bureau of Mines, we have received advance figures of the production of coal in Missouri for the year 1904. Coal was mined in 35 counties of the State, the more important divisions being Macon county, which produced 899,963 tons; Lafayette, 713,677; Adair, 658,558; Randolph, 578,825; and

between the summer and the winter seasons. The number injured by accident in the mines was 16, which gives a similar average of 1.63 injured per 1,000 men employed.

Fetid calcite, containing inclusions of liquid carbon di-oxide and hydrogen sulphide, is described by B. J. Harrington in the current number of the *American Journal of Science*. The limestone is from the Grenville series of Canada, and was noticed by Sir W. E. Logan fifty years ago.

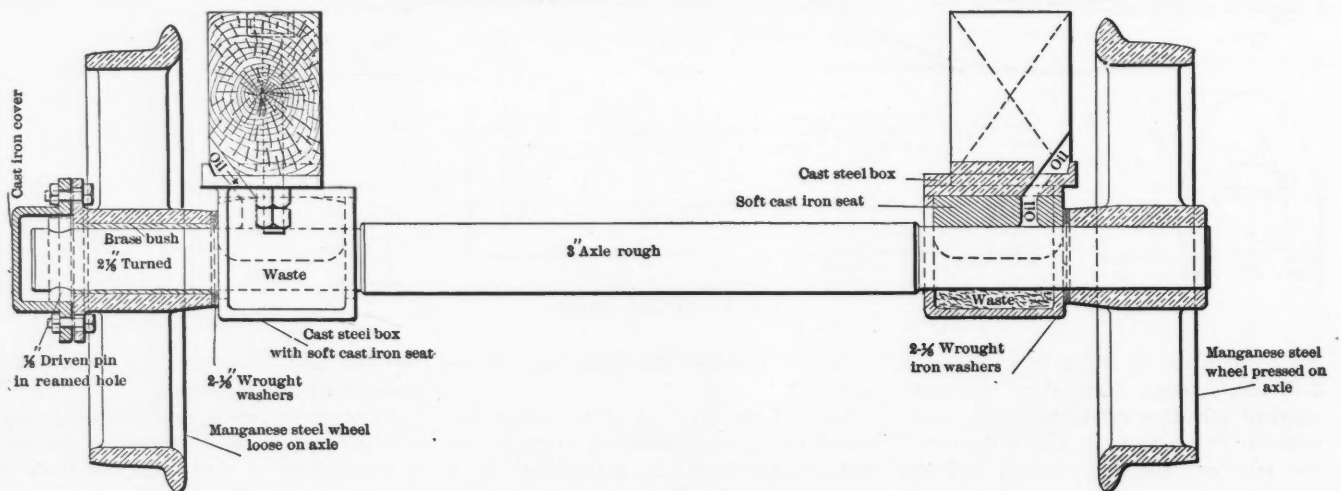


FIG. 13. MANGANESE-STEEL WHEELS—FAST AND LOOSE.

*de la Metallurgie*, has received a setback from the sad accident in the recent collapse of a reservoir near Madrid, Spain, built in connection with the water supply

<sup>1</sup>See *Trans. Am. Ins. Min. Eng.*, Vol. XVIII, page 508.

Ray, 225,485 tons. The total production of the State was 4,115,695 tons, and the value of this product at the mines was \$6,749,381; an average of \$1.64 per ton.

The total number of men employed at the mines was 10,881 in the winter, and

Liquid oxygen has a bluish tint.

Out of 12,655 barrels of cement submitted in a 1903 contract on the New York subway, 3,455 bbl. were accepted and 9,200 bbl. were rejected on test failure.

### The Formation of Veins.\*

BY JAMES PARK.

The solutions either found the cavities awaiting them, or they formed their own channels by a slow process of progressive dissolution. If the cavities were pre-existing, they were formed mechanically by forces either internal or external to the rock affected. In eruptive magmas unequal cooling would tend to create unequal tensions, with the result that fractures of contraction would be formed.

Sedimentary rocks may be fractured by an igneous intrusion, or by the lateral and tangential stresses created by the secular folding of the crust of the earth. Many orebodies do not fill pre-existing cavities. They are apparently replacements of rock, effected by progressive metasomatic action operating from and along an initial line of fracture.

The deposition of dissolved matter from circulating solutions and gases was doubtless in most cases due to a combination of physical and chemical causes, operating in conformity with well-known physical laws. The problem is one of the most difficult connected with the genesis of orebodies, and is made more so by our lack of knowledge of the chemical constituents of the substances held in solution.

It is not uncommon to find a vein containing native gold and sulphides of iron, copper, lead, zinc, antimony and silver, all enclosed in a common matrix composed of quartz. In many cases there is a symmetrical crustification of the vein matter, but in other cases the gold and base sulphides are deposited throughout the matrix irregularly and apparently without order or system. In the same vein are often seen masses of mixed mineral, containing sulphides of iron, copper, zinc and galena, intimately associated, yet still only mechanically mixed, clearly suggesting that the process of deposition had a nuclear tendency, in consequence of which each ore went to itself and formed aggregates, more or less massive.

Depositions of vein matter from underground solutions may be effected by one or more of the following causes: (a) The cooling of solution charged with dissolved mineral matter; (b) a decrease of pressure; (c) electro-chemical action; (d) chemical precipitation; (1) by contact with other mineralized solution; (2) by gaseous emanations.

It has been clearly demonstrated by mining operations in the United States, England and elsewhere that, while in many veins the metallic sulphides are intimately mixed without any definite arrangement, in other veins, particularly those of lead, zinc and iron, there is an orderly distribution, in horizontal zones, in a vertical direction. That is, there are certain horizontal zones, each of which is characterized by a dominant sulphide. This

arrangement of the metallic contents of a vein, in more or less horizontal zones, was noticed in Cornwall many years ago, and no better example could be found than that presented by the celebrated Dalcoath mine, which began as a tin mine, at a lower depth yielded nothing but copper, and again below that tin.

In the great lead- and zinc-mining region of Ozark, in the Lower Mississippi Valley, the vertical distribution of the ores, according to Bain,<sup>1</sup> is as follows: (1) Oxidized zinc and lead ores, with galena; (2) blende, with a little galena; (3) iron sulphide predominates and increases with depth.

Spurr,<sup>2</sup> in his report on Monte Cristo mining district, in Washington, states that the quartz, pyrite, chalcopryrite, pyrrhotite, blende, galena, realgar, stibnite and calcite show a marked tendency to aggregate themselves in horizontal zones in the order named above.

Rickard mentions the orderly distribution of ores in Colorado.<sup>3</sup> Weed states that in the Castle Mountain district, in Montana, the order appears to be galena on top, passing into highly zinciferous ores below, and these into low-grade pyrite.<sup>4</sup>

Weed, in his paper on 'Ore Deposition and Vein Enrichment by Ascending Hot Waters,'<sup>5</sup> appears to support the hypothesis which assumes that the distribution of ores in horizontal zones is the result of primary concentration by ascending hot solutions.

The eruption of igneous magmas is often succeeded by intense solfataric action, of which notable examples are found in the Yellowstone Park, in the United States, and in the volcanic region of the North Island of New Zealand. The ascending waters slowly circulating in contact with the heated rocks below become superheated, and in their upward course dissolve various substances, which they carry with them along the line of least resistance—that is, toward the hot-springs pipe or vent.

Many substances insoluble in normal conditions are rendered easily soluble in the presence of heat and pressure. The underground water will, therefore, possess its greatest solvent power where the greatest heat and pressure are attained, which will naturally be at the greatest depth. With loss of heat and pressure, the less soluble substances held in solution will be precipitated—that is, those substances whose dissolution was effected under extreme heat and pressure. As the waters ascend, they will continue to lose heat and be relieved of pressure, with the result that the dissolved minerals will be precipitated in the inverse order of their solubility.

When the hot waters reach the surface,

<sup>1</sup> H. F. Bain, U. S. Geol. Survey, 22d Annual Report, part II, p. 161.

<sup>2</sup> J. H. Spurr, *loc. cit.*, p. 841.

<sup>3</sup> T. A. Rickard, *Trans. Inst. Min. and Met.*, London, Vol. VI, 1899, p. 196.

<sup>4</sup> Weed and Pirsson, *Bull.* 139, U. S. Geol. Survey, 1896.

<sup>5</sup> W. H. Weed, *Amer. Inst. Min. Eng.*, Vol. XXXIII, 1903.

the only substance in solution in most cases will be extremely soluble alkaline sulphates, carbonates and silicates. An obvious result of this process of vein filling will be an impoverishment of the veins at great depths, due to the migration of the valuable minerals from below to the zones of precipitation above.

It is a notorious fact that hot springs seldom deposit metallic sulphides at the surface. The great mushroom-capped veins of the Hauraki regions and Great Barrier island, in New Zealand, are composed of sinters and chalcedonic quartz, manifestly the result of long-continued solfataric activity. The overhanging mushroom-caps of quartz are almost devoid of gold and metallic sulphides, but the necks in all cases contain gold and sulphides of silver and iron. Had denudation removed the mushroom-caps, the sulphide-bearing necks would now be exposed at the surface.

The well-known Martha lode, at Waihi, consists of chalcedonic quartz, apparently the result of hydro-thermal activity, which at one time probably manifested itself at the surface. There is no overhanging cap. At the outcrop, the quartz is almost pure silica, with no sulphides excepting a trace of argentite associated with free gold, containing about one-third its weight of silver. Above water level, the ore is clean and free from oxidized products. In many places, both above and below water level, the joints in the vein-stone are discolored with films of manganese and iron oxides, which appear to owe their origin to the infiltration of meteoric water from the wall-rock, and not to the oxidation of contained sulphides.

Between the adit level and No. 1 level, there began to appear small limonite-cruste-d cavities in the thin veins of crystalline quartz which traverse the main lode. At No. 1 level, there are detached branches of iron pyrites in the quartz; and at No. 2 level, the sulphide ore forms a rib, two or three feet thick. The lode is being worked to a depth of 750 ft. below adit level, and although there has been an increase in the proportion of iron pyrites, there has been no decrease in the gold and silver values. A greater measure of denudation than the lode has already suffered would have exposed the sulphide ore at the surface.

At the Broken Hill silver-lead mines, in New South Wales, the general distribution of ores in vertical depth has been as follows: (1) Oxidized ores of lead and silver; (2) galena with blende; (3) blende with galena. In the study of vein-filling, it is always well to bear in mind that veins which outcrop at the surface may have been truncated to a greater or less degree by denudation.

After their formation, some veins, through movement of the walls, have been brecciated and re-cemented by circulating mineralized waters. Such waters, ascending through the crushed vein matter, would deposit their metallic contents as sulphides through the reaction of primary sulphides

\*Abstract from 'Mining Geology,' by Prof. James Park, director Otago University School of Mines. *The Australian Mining Standard*, February 23, 1905.

contained in the ore. In this way, a secondary concentration of sulphide ore may be effected by ascending waters. The common belief, however, is that secondary enrichment is, in the majority of cases, the result of the transference of material from the oxidized portions of a vein to a lower level through the agency of descending waters, from which the metallic contents are precipitated by the reducing action of organic matter or primary sulphides.

At Berlin, New Hampshire, a powerhouse has been constructed in the bed of the Androscoggin river for the International Paper Company. Frank B. Gilbreth was the contractor, and Ambrose H. White the engineer.

Crude rubber is said to contain a germ

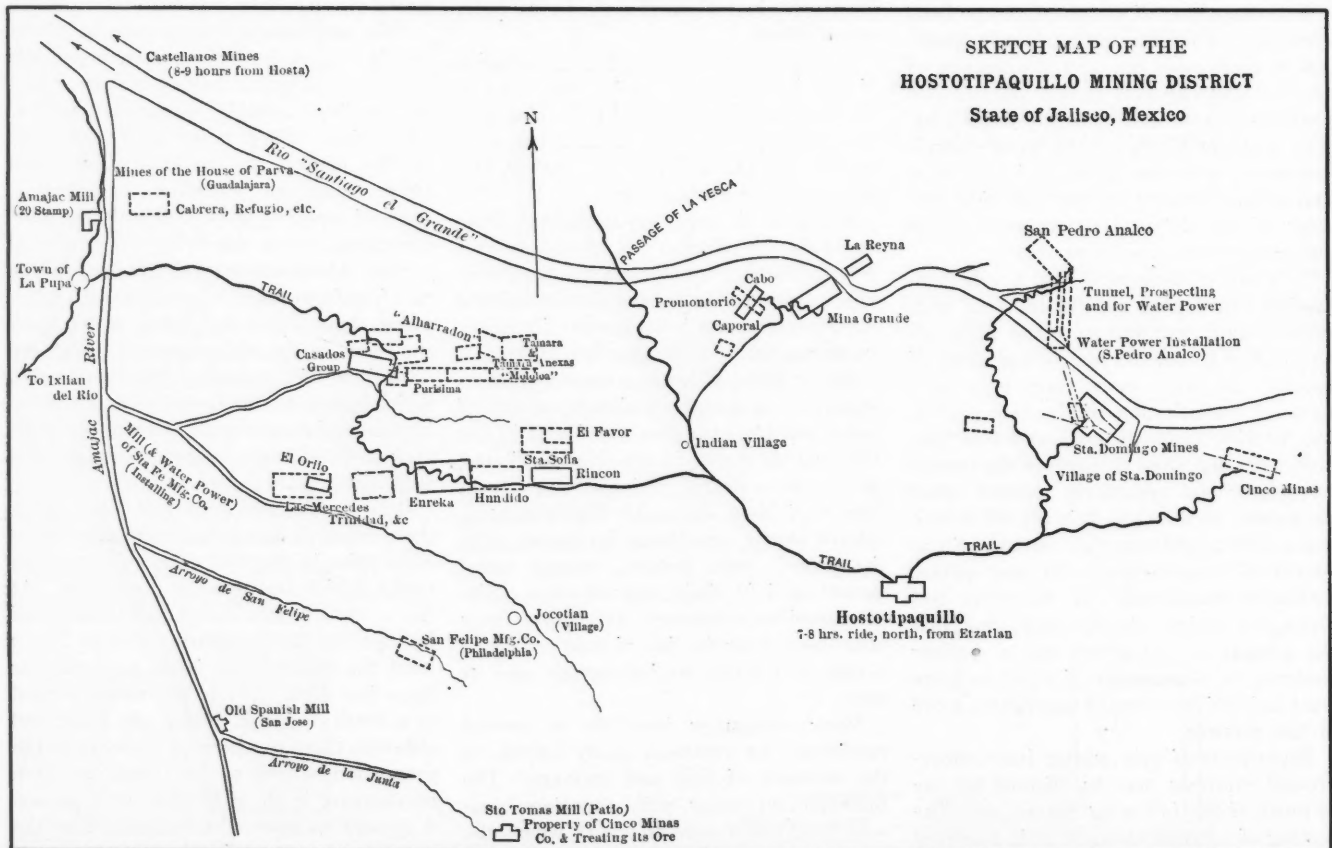
### The Hostotipaquillo District, Jalisco.

BY WILLIAM N. CUMMINGS.

The town of Hostotipaquillo ('Place-of-the-caves') contains about 6,000 inhabitants, and lies some 10 km. southwest of the Santiago del Grande river, and 70 to 80 km. (7 to 8 hours' ride) northward from Etzatlan, a station on the Mexican Central Railway.

The silver-gold district immediately tributary to the town occupies a finely mineralized belt, more or less following the general northwest trend of the river, and roughly 10 to 15 km. wide by 60 or 70 long. The present limits are marked by the Cinco Minas property on the east and the Cabrera-Refugio group on the west. Most of the mines are situated in the hills on the south side of the river, and at elevations of 4,000 to 5,000 feet

on one of the few stones left of an old church that belonged to one of the mines. It is said that the Spaniards cut the waste loose on abandoning the mines; at all events, many of them are at present inaccessible. From the surface indications it is evident, however, that this district was at one time extensively worked. Accurate records of past production would be difficult to obtain. An approximate estimate could possibly be made from the church records of Hostotipaquillo and Guadalajara, and from the mint records of the latter place. The traffic in bullion and ore that has always been carried on in Mexico, both commodities passing through many hands, would vitiate the results as applied to any one locality. It is said that the church records of Hostotipaquillo show that one mine alone produced 2,500,000



which affects its quality for use with copper. A slight amount of sulphur controls the harmful influence of the germ.

Opal consists of complex silicic acids.

A good stoker can make a smokeless fire in almost any grate; but the best smoke-consuming furnace will produce black fume under an incompetent hand.

Cement grouting was used successfully in strengthening the defective foundation of the barrages at the head of the Nile delta. The work was under the direction of Sir Hanbury Brown.

above sea level, and of 1,600 feet above the river. Further to the east lies Mesquite del Oro (in the state of Zacatecas); to the north, La Yesca (territory of Tepic, and 1½ days' ride), and Bolaños (Zacatecas); to the westward, Acuitapilco and Sta. Maria del Oro, etc. (Tepic). The Castellanos and the Pinavete mines are 8 to 9 hours' ride further down the river, and are closer to the town of Ixtlan del Rio.

The district is a very old one, and, with the exception of four or five properties, the mines have lain practically abandoned since the expulsion of the Spaniards during the revolution of 1810, in which Mexico gained her independence from the mother country. I saw the date of 1738

marcos of silver (one marco = 8 oz., Mexican).

The chief producing properties at present are Cinco Minas, San Pedro Anasco, and the mines (Cabrera, Refugio, etc.) owned by the house of Parra. The owners reside in Guadalajara. Recently high-grade ore—said to have assayed as high as 1,200 oz. silver and 20 oz. gold—has been encountered reopening the old workings of the Mololoa-Tamara Anexas ground. On the whole, however, the ores are of milling grade. There are at present three mills working: the patio mill of Sta. Tomas, working the ores of Cinco Minas, and ores from the other mines of the estate of Lino Martinez; the 20-stamp

and Bryan mills of the San Pedro Analco mines; and the 20-stamp and *patio* mills of Amajac, working the ores of the house of E. Romero de Parra, Sucs. (Cabrera, etc., mines). Further to the west (not shown on the sketch-map), the San Antonio mill is being run by Americans. The remains of several mills—Arroyo Hondo, San Jose, etc.—are to be seen, the buildings of the former being in good condition. Some small *patio* plants are being worked, especially near the village of St. Domingo, consisting of a few arrastres, with *tortas* of four or five tons. Much of the present available ore is not very amenable to raw-amalgamation processes, and hence the native workers hunt the oxidized ores, or sometimes give the more rebellious ores a heap roast, without salt, and in cases also use copper precipitate (made from bluestone) in their *tortas*. Manganese is the chief deleterious substance in the ore. Some of the ores will give concentrates (to be followed up with another treatment), but many will not, and for these cyanidation (with or without previous concentration) holds out the most promise. Satisfactory results were obtained on similar ore at La Yesca by roasting with salt; but better commercial results are expected from finer crushing and raw leaching (with cyanide), and this mill is now being altered with that end in view. The Hostotipaquillo miners sort their ore, the higher grades—about 70 oz. and up—being transported on mules to Etzatlan, and thence shipped by rail to the customs smelters at Aguascalientes, Torreon, and elsewhere.

The whole country is eruptive. The series range from rhyolites to basalt, through quartz-porphyrines, granites, syenites, andesites (and andesitic breccias), and hornblende rocks. Along the river—between the St. Domingo mines and the San Pedro Analco crossing, and at Mina Grande—granites and syenites (hornblende granite) are the predominating rocks. These are cut in all directions by dikes of basalt and amphibolite. To the north of the town of Hostotipaquillo there are a number of sinks, in which the predominating rocks are basalts. Rhyolites (including gradations from felsite, through typical rhyolite, to quartz-porphyry) occur both along the river and toward the tops of the hills, being more prevalent at the higher elevations. They occur in flows (sheets), bosses and dikes (I have seen portions of the latter only 10 in. thick). The rhyolites are of later origin than the andesites. The andesites and andesitic breccias form the mass of the hills, and are for the most part the enclosing rocks of the veins. They vary in color from purplish and greenish to gray. Hornblende seems to be present in all varieties.

On the whole, the eruptive flows are conformable and have a general strike to the northwest, with dips of 65 to 70° to the northeast. (This applies more par-

ticularly to the Sta. Domingo region.) The rocks, on the whole, are not much decomposed, those in the western portion of the field showing more alteration than those of the eastern end.

The strike of the veins vary from a northwest-southeast direction, in the eastern portion of the district, to a nearly east-west trend in the western part. The dips are almost universally to the northward—45 to 80°. Apparently the main mineralized belt takes a serpentine course through the Cinco Minas, St. Domingo, San Pedro Analco and Mina Grande properties (though not so abruptly as shown in the sketch, the latter being made more shortened east to west than is really the case). To the westward of Mina Grande the belt would appear to split, the northern branch passing through the Mololoa-Casados system, thence through the Cabrera-Refugio group to the Castellanos and Pinavete mines, following quite closely the course of the Santiago river.

In width the veins vary from narrow—usually high-grade—stringers to large low-grade veins of about 100-ft. thickness. The veins that have been the most extensively worked seemed to be characterized by three parallel streaks, in places joined, in others 100 ft. or more apart. The middle streak is usually the most important. Old stopes of 10 to 20 ft. wide are not uncommon, and it is said that the pay-ore in the Cinco Minas and San Pedro Analco mines is much wider in places. Judging from the cave, several hundred feet wide, on the surface over the Huido-Salomon mine, the workings must have been very wide. The veins are, as a rule, well marked, with two walls, with gouge usually better developed on the foot-wall. Some of the veins, however, seem to occupy shearage zones, along which the ore has been formed by a replacing and cementing process. The silicification has extended beyond the ore into the adjacent rocks, tightly 'freezing' pay-streak and country, making it difficult at first to distinguish the ore. The latter, however, is more highly silicified, and contains small crystals of galena and blende sparsely scattered through it. In the St. Domingo workings, in which these 'frozen' veins are to be seen, the enclosing andesitic rock has been altered in places along the veins to a peculiar porous and tough chlorite. This has a radiating fibrous structure resembling willemite, but an analysis for zinc gave only a per cent or two.

Cross veins and slips are the rule throughout the field, and faulting is common. Faults are especially noticeable in the St. Domingo ground, where, with later surface slips, they have complicated the prospecting for ore.

The gangue varies from pure quartz, through various mixtures of quartz and rock, with differing degrees of silicification, to a porous earthy filling. The best ore in the Mina Grande has the appearance of a dirty brownish half-burnt brick

(called by the miners 'canela' ore). As a rule the filling is massive, although crushed locally. The quartz occurs both with and without admixture of calcite. There seems to be no glassy or porcelain-like quartz in the district; it is, instead, of a 'live' and 'likely' appearance, and varies from hard compact to sugar and honeycomb quartz.

The silver-gold minerals are stephanite (hard, lustrous and brittle), argentite, and probably tetrahedrite (gray copper), with their oxo-sulphides. Chlorides, bromides and iodides are not much in evidence. Iron and copper pyrites occur in small amounts, the copper pyrite usually being seen in the higher-grade ore. Galena (usually argentiferous) and blende occur sparingly—not uniformly disseminated, but rather in patches and separate streaks. (One of the old mines has considerable galena—carrying some copper and silver and gold—left on the walls.) It may be worth mentioning that many of the silver-gold mines of Jalisco contain varying amounts of galena and blende, but that commonly these minerals have had a separate origin from that of the silver-gold ores. At times the mine may appear to be going into lead and zinc (with low contents in silver and gold), but further work shows the interdependence of these and the silver-gold ores.

Like all of the mining districts of Jalisco, Hostotipaquillo has suffered from the lack of transport facilities. The country adjacent to the mines is rough, but a railroad could be built to the town, and extended for some distance to either side, without excessive cost. Negotiations to this end have already been opened. There is a scarcity of water for treatment purposes in the near vicinity of most of the mines. The mines themselves make little or no water. The Santiago and Amajac rivers have an abundance of water the year round for milling purposes, and the Santiago for power. The Castellanos mines have had a ditch in for a number of years, and the San Pedro Analco people are now installing a power plant (said to be about ready for selling power).

Timber is scarce, though scrub growths of hard woods are convenient to some of the mines, and are used for timbering. The old-time miners used very little timbering, and by following their method of leaving pillars where the ore is low-grade and narrow, not much will be needed. Cord-wood can be floated down the Santiago river from its northern tributaries.

While some of the mines will have to be reopened with shafts most of them have been and can be opened with tunnels, both crosscut and on the course of the veins, at least during their earlier stages, after which interior shafts will be the rule.

The old Spaniards had great capacity for finding ore, and, with the uniformly good results that have accompanied the reopening of their old mines throughout Mexico, this district will attract capital.

## The Grangesberg Iron Mines in Sweden.

BY J. W. H. HAMILTON.

For several centuries mining has been carried on in the rich iron ranges in the middle part of Sweden. Until recently the mining industry in this section has been hampered by the difficulty of getting cheap power, the water-falls in most cases being too far off for a mechanical transmission of power, and the price of coal being too high. During the last decade, however, electric-power transmission has brought about great changes, and the mining industry in Sweden has grown to large dimensions.

The Grangesberg Mining Company has taken the lead in this development. For a number of years this company bought and equipped mines at Grangesberg, in Dalarna, and gradually became the owners of most of the iron mines in that vicinity. Lately the company has also acquired con-

beside old-fashioned machines, the design of which may date a hundred years back. The old 'Polhem transmissions' never fail to excite the interest of foreigners, and the company keeps them, perhaps, partly as a matter of curiosity.

The mining was previously done mostly in open-cuts or pits, and was therefore very simple. Lately, however, the open ore deposits have hardly given merchantable ore, whereas rich veins of ore were found at greater depths. The company had long been aware that it would be necessary to adopt deep mining on a large scale. Careful plans for this kind of mining were made a few years ago, and the methods now practiced are the following:

Shafts are sunk into the rock near vein, and a main drift is run along the vein. From the main drift crosscuts are opened

would be of the old type, only of much larger capacity, and with the addition of a very heavy fly-wheel. While the elevators were waiting for a load, the fly-wheel would accumulate a great deal of energy, to be given off when the load was thrown on the hoist. The advantage of this scheme was that the 500-volt three-phase current, which was already available, could be used directly on the hoist motors, and the cost of the machinery would be comparatively small. There were, however, many drawbacks. Even when using a very heavy fly-wheel, serious disturbances would take place in the whole power system, as an induction motor of a capacity up to 1,000 h.p. takes a very heavy starting-current. The line drop would be too great, and the synchronous motors, which are running to balance up the power factor of the system, would be likely to fall out of step. The stopping of the synchronous motors would immediately bring down the power factor of the whole system to such an extent that every induction motor would stop. Unless a separate transmission line were run for this hoist, a new scheme had to be adopted.

It was therefore planned to use a storage battery, instead of the fly-wheel, for the accumulation of energy. This plan would necessitate much extra machinery and many buildings, and would therefore be very expensive. Considering, however, that the safety of operation would be of great importance this system would perhaps in the long run be the most economical, and it was adopted.

A motor-generator set is used for transforming 500-volt three-phase alternating current to 500-volt direct current. On account of the high frequency a rotary converter would be entirely out of the question. A synchronous motor is used, running at 70 cycles per second. The direct-current generator is connected to a set of bus-bars, which, through various switching apparatus, can be connected to the storage battery and to the cables going to the hoist-motors. The whole electrical equipment is furnished by the Magnet Electrical Company, of Ludvika, Sweden. The storage battery, which is of the Tudor system, is made by the Storage Battery Company, of Hagen, Westphalen. It consists of 243 units, and has a capacity of 610 ampere-hours. A test showed that the battery could give an output of 937 ampere-hours, which is 50% above the capacity guaranteed by the company. The battery is divided into three equal sections, two sections at a time being connected to the bus-bars. When the generator and battery are working in parallel the total output may rise to 1,400 amperes. The current is carried through lead-covered cables, laid in concrete conduits, to the hoist-motors, which are located in a separate building.

The mining hoist, which is gearless, has attracted a great deal of attention. Much thought and preliminary engineering work

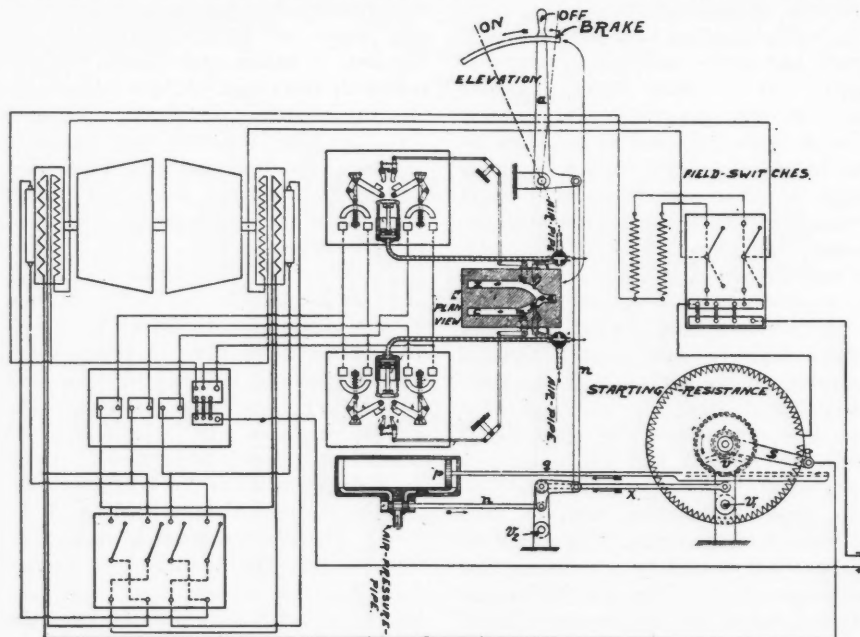


FIG. 1. ELEVATION OF ELECTRIC MINING HOIST.

trol of the vast and rich iron ranges in Lapland (the northern part of Sweden), and it is now by far the largest mining concern in the country.

It has always been the policy of the company to keep step with the advancement of engineering methods. As soon as long-distance electric-power transmission came into commercial use, the Grangesberg Company harnessed the water-falls in the vicinity of the iron range, and concentrated several thousand horsepower at the mines. A three-phase 8,500-volt system was adopted. At the center of distribution a transformer station was built, in which the voltage is stepped down from 8,500 to 500. Electric power is now used throughout the mining district for driving hoists, pumps, locomotives, cranes, conveyors, magnetic separators, ore-crushing, grinding and screening machinery, air-compressors, power drills, etc. It is very interesting to see this modern apparatus

through the vein. Raises are opened from the crosscuts, and the excavation is done upward. The ore falls into chutes and is stored in bins, whence it may be dumped into steel cars, which are hauled by electric locomotives to the hoisting shaft. The weight of each car is recorded on an automatic scale, and the ore is then dumped into pockets, which may be emptied into the elevator buckets by opening a gate. After deep mining had been developed, the old ore-elevators and mining hoists became inadequate. These hoists are of the ordinary type, run by three-phase induction motors geared to the drum. Hoists of much larger capacity than any of the old ones had to be built. The first one of these hoists, with its ore-crushers and separators, was completed last year, and has been in service for about eight months.

Two separate plans for the hoist were laid out. According to the first, the hoist



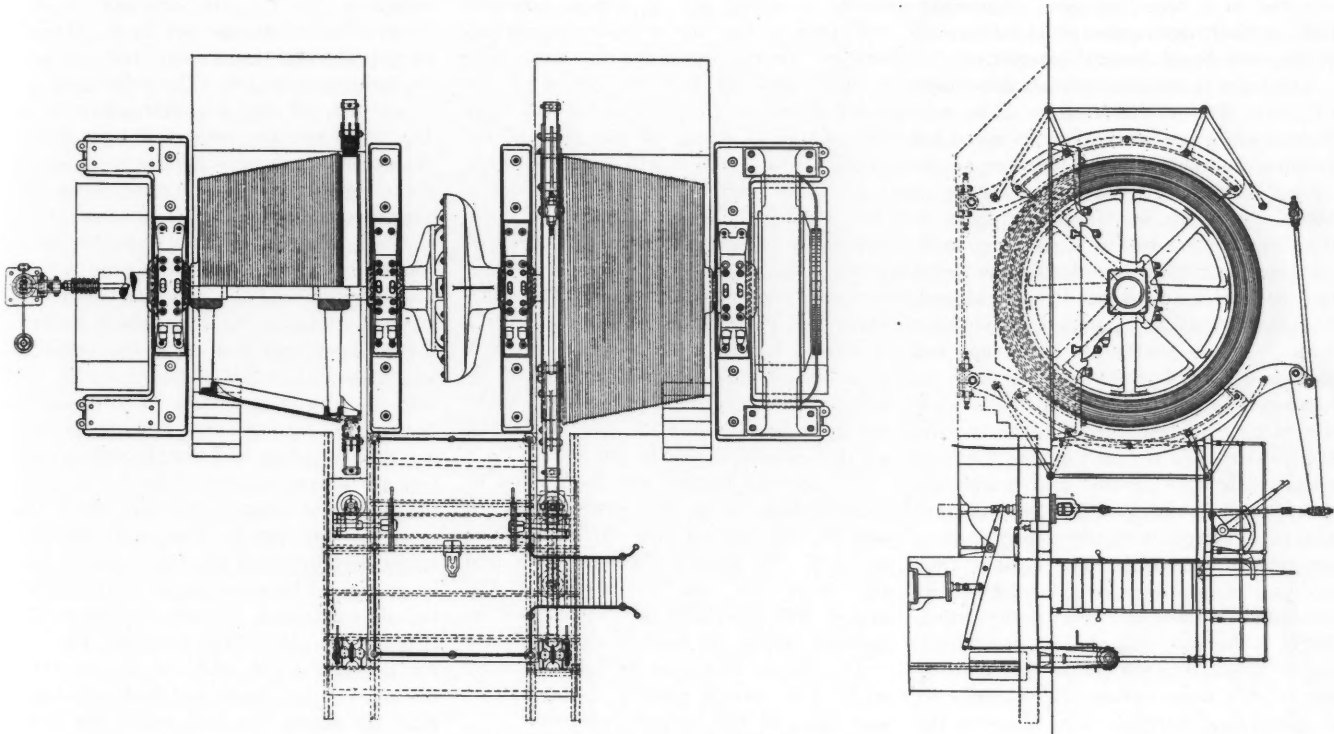


FIG. 2. DIRECT-CONNECTED ELECTRIC MINING HOIST.

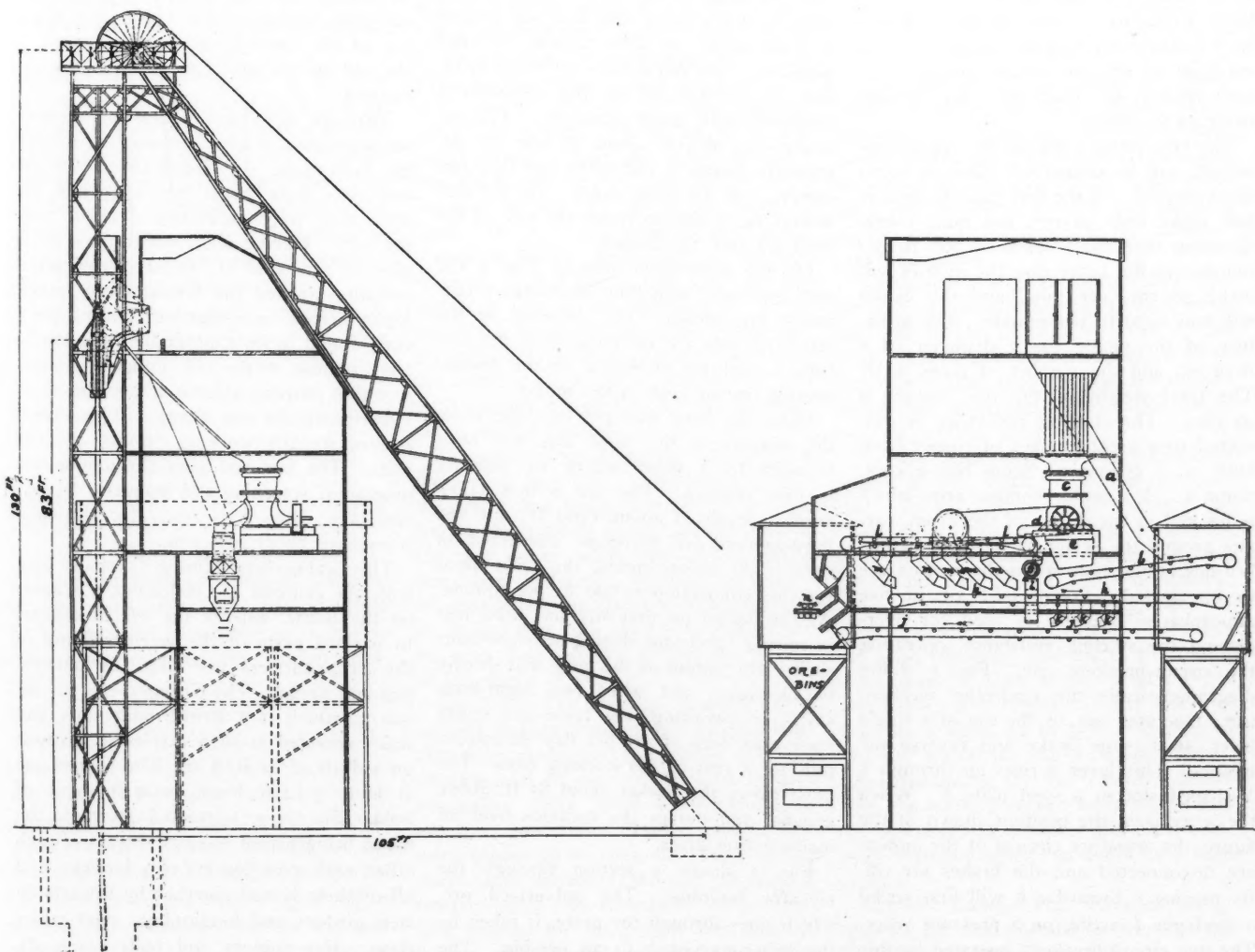


FIG. 3. HEAD-GEAR AT GRANGESBERG IRON ORE MINES.

were expended on this hoist, and it has resulted in a beautiful piece of mechanism. A short description of its mechanical design will be of general interest.

The hoist is designed for a cable-length of 2,000 ft. on the drums. The two drums, which are conical, are grooved for guiding the cables. The diameter of the cables is 1.58 in. When the mining is done at a depth not exceeding 1,000 ft. the elevators are run at a speed of 10 ft. per second; for greater depths the speed can be increased to 20 ft. per second. The two drums are mounted on separate shafts. These shafts are lined up, and their ends, being close together, can be connected by a friction clutch. The electric motors are mounted directly on the drum-shafts, one on each shaft. The aggregate length of the two shafts, with the clutch, is 43 ft. Each of the direct-current motors develops normally 450 h.p. at a potential of 500 volts. The hoist is thus made up of two units, which may be disconnected, if desired. One of the drum-shafts is hollow, and the friction clutch can be operated at the end of this shaft by means of a lever system. The object of sectionalizing the shaft is to allow of the running of but one elevator, which will be necessary when the hoist is to be adjusted for a different depth. The weight of the hoist, not counting the electric motors, is 110 tons. The elevator buckets have a maximum capacity of 8 tons. Two car-loads of ore are usually dumped into each bucket, the load of a car varying from 2.5 to 4 tons.

The two motors, which are compound-wound, can be connected either in series or in parallel. In the first case the motors will make only 19 rev. per min., corresponding to a cable speed of 600 ft. per minute; in the latter case the motors will make 38 rev. per min., and the cables will run 1,200 ft. per minute. The armature of the motor has a diameter of 8 ft. 2 in., and the number of poles is 16. The total weight of the two motors is 49 tons. The starting resistance is connected to a great number of copper bars, built on a cylindrical drum like a commutator. A movable contact arm, which is pivoted in the center of the drum, carries around the periphery a set of carbon brushes at the time when the motors are to be started. Compressed air of five atmospheres' pressure is used for overcoming the starting resistance, operating the circuit-breakers, etc. Fig. 1 shows diagrammatically the controller mechanism. One man can, by the use of a single lever, start, stop, brake and reverse the motors. This lever *a* runs up through a Y-shaped slot in a steel plate *b*. When the lever is in the position shown in the figure, the armature circuits of the motors are disconnected and the brakes are off. By moving *a* toward *c* it will first strike a steel pin *d*, acting on a pressure valve. The two circuit-breakers, operated by this valve, will be closed and locked, and the

motors will start. The lever will next strike a second pin *m*, which, however, will turn to the side without causing any action. In the meantime the slide-valve *o* will open through the action of the lever system *n*. Compressed air will move the piston *p*, acting on the gear of the contact arm *s*, which will begin to rotate, cutting out part of the series resistance. The segment *v*, which is geared to *s* and pivoted in *v*<sub>1</sub>, will also move, and through a rod *x* the whole lever system *n* is made to rotate around *v*<sub>2</sub> as center. The slide-valve will close again, unless the lever *a* is moved further. To a certain position of *a* corresponds a certain amount of resistance in series with the motors; when the lever has reached the end of the slot all the resistance will be cut out.

To stop the motors, the lever must be brought back to its first position. When striking the pin *m*, the circuit-breakers will trip. By moving the lever back into the short slot, the air-valves for the brakes will open and the brakes will be applied. When the lever is moved toward *c* the motors will start in one direction; when it is moved toward *z*, the motors will start in the opposite direction.

The operation of the hoist is the simplest possible. The engineer stands on a platform, about 8 ft. above the ground floor in front of the hoist. Two drums, geared to the hoist and rotating around vertical axles, are also mounted on this platform. On spiral lines on these cylinders the position of the two elevators is indicated with great exactness. The operator has also in front of him an air-pressure gauge, a voltmeter and two ammeters, one for each motor. By the ammeters he is able to judge the size of the load put into the buckets.

On the right-hand side of Fig. 1 the field switches, with their discharge resistances, are shown. The switches on the left-hand side are for connecting the motors in multiple or series, or for disconnecting one or both of the motors.

Since the hoist was put into operation, the output of the mine has not been brought to a point where its capacity is fully utilized. The ore is now taken from a depth of about 1,000 ft., and the hoist-motors are therefore connected in series. As before noted, the cable-speed for this connection is 600 ft. per minute. At this speed no difficulty has been met in raising 1,000 tons during an eight-hour shift. The output of the mine will shortly be increased, and when two eight-hour shifts are working, the hoist can easily raise 2,000 tons of ore per day, or 600,000 tons for a year of 300 working days. The hoist raises the bucket about 85 ft. above ground, and dumps the contents over an inclined iron grate.

Fig. 3 shows a section through the elevator building. The pulverized ore, which goes through the grate, is taken by the belt-conveyor *b* to an ore-bin. The rest of the material falls into an ore-

crusher driven by a 150-h.p. electric-induction motor. The capacity of this ore-crusher is 200 tons per hour. Having passed through the crusher, the ore falls on shaking-screens *d*. The pulverized ore is carried off by the belt-conveyor *b*. The small-size ore and rock falls into a Wenstrom magnetic separator *g*, in which the magnetic ore is separated from the hematite and rock. The magnetic ore is taken through a chute *i* to the belt-conveyor *j*, which dumps it into a bin. The hematite and the rock are carried by another conveyor, *h*, along which a number of boys and men pick the hematite and drop it through chutes *k* on to the belt *j*. The larger sizes of ore, which do not go through the shaking-screens, are carried off by the belt *l*. Along this belt are also a number of boys, who pick the rock and drop it through chutes *m* on to the conveyor *h*. The ore is dumped, either directly from the belt *l* into a bin, or is carried by a conveyor *n* to another bin, when desired. There are three ore-bins on one side of the building; one bin for pulverized ore and one for rock on the other side. Each bin holds 150 tons. Railroad tracks are laid under the bins, and the cars are loaded directly through hoppers. Beside the ore-elevator here described there are two other hoists in the same shaft, one for the men, and one for carrying timber. The hoists for these are of the same design as those used in the old mines, and are of no particular interest.

Through the introduction of modern ore-separators a great advance in mining has been made. In former times only the rich ores were taken care of, while the poor ores were recklessly dumped with the rock. During many generations great piles of this kind of ore have been accumulating around the Grangesberg mines. Upon careful investigation, it was presently found to be a profitable business to start mining at the old dumping-ground. For this purpose a large steam shovel of American make was bought. This shovel is now steadily working through the old piles. The material goes through a wet process of screening and magnetic separation, and when it is ready for shipment it contains about 70% iron.

The Grangesberg Mining Company controls the railroad to Oxelosund, a seaport on the Baltic, whence the ore is shipped to various parts of the world. Some of the cargo-carriers are ships of unusual size and design. The *Grangesberg*, for instance, which is a British-built ship, and was completed in 1903, carries 10,300 tons on a draft of 22 ft. 8 in. The boat is 440 ft. long by 62 ft. beam by 29 ft. depth of hold. She is a 14-masted steamer, the masts being placed in pairs abreast of each other, each mast bearing two derricks, and all of them bound together by thwartship steel girders, and longitudinal steel cable-stays. Her engines and boilers are aft, and the bridge and charterhouse are amid-

ships. The ship takes in her 10,300 tons of ore at Oxelosund in little over a day, the ore being simply poured from chutes. She makes the run to Rotterdam, Holland, at a speed of 10½ knots, requiring 4½ days. The hull of the ship is divided into 24 compartments. There are 12 hatches and 12 double-ended winches. In discharging, collapsible platforms are run out over the sides of the ship. Four derricks to each hatchway work in conjunction with the 12 double-ended winches. The whole cargo can be discharged in 34 hours, and the boat made ready for another trip.

For the benefit of its workmen, the Grangesberg Mining Company has built a number of small dwelling-houses, which are scattered over the hills all around the beautiful neighborhood of the mines. On the slope of one of the highest hills, whence one gets a magnificent view of the landscape, with its extensive woods and numerous lakes, a large ornamental building has been erected. This building is named 'Cassel's,' after its donor, Mr. Cassel, a prominent English business man who for a number of years was connected with Swedish mining enterprises. It contains a large concert hall, library, reading- and writing-rooms, etc. A good understanding has always prevailed between employer and employees at these mines, and the mining district gives the general impression of being a very prosperous little community.

Through the courtesy of A. E. Salvén, director of the Grangesberg Mining Company, I received an invitation to visit the mines last summer. Mr. Salvén, under whose wise management the mines have developed so rapidly, has twice visited this country, and is well known in the mining districts and among manufacturers of mining machinery.

I am also very much indebted to E. Nordenstrom, the electrical engineer of the company, who was my guide through all the labyrinths of the mines, and through whom most valuable information was obtained.

The oil from the Borneo field is largely marketed in India.

Per-borates have an alkaline reaction; and, like many other salts of 'per-acids,' may be regarded essentially as mixtures of the respective salts with hydrogen peroxide.

According to R. N. Campbell, in the current number of the *Philosophical Magazine*, there is a peculiar ionization of air enclosed in many receptacles; this is due probably to an inherent property of the containing material. It might be expected that these materials would give off a radio-active emanation; but it was not detected in the case of lead, zinc or aluminum.

**Some Pumping Data.**

BY R. GILMAN BROWN.

The following figures have been collected from records kept at the Brunswick mine, Grass Valley, California, during the fall and winter of 1903-4. In the previous year an extraordinary flow of water was cut on the 1,250-ft. level (1,017 ft. vertical depth), which quickly drowned the Cornish pumps by which the mine had previously been drained. The water raised to the 700-ft. level (505 ft., vertically, below the collar of the shaft and 376 ft. below the drainage adit), and was there held by the 12-in. plunger of the Cornish system.

The problem of unwatering presented some complications, chief among which was the small size of the shaft compartments, which, in the upper and older part, were 32 by 39 in. clear. This precluded the use of large sinking-pumps and finally led to the selection of the air-lift for the actual unwatering, lack of efficiency being of but small moment when compared with the advantages offered in compactness, simplicity and small first cost. The use of the air-lift for the work was first suggested by E. A. Rix, of San Francisco.

The general scheme for freeing the mine of water and installing a permanent system was worked out as follows: Starting from the rate at which the flooding water had risen in the shaft, it was determined that the permanent system should have a maximum capacity of 500 gal. per min.; a pump of that capacity was to be installed at the 700-ft. level and the water lowered from that horizon with an air-lift to the 900-ft. level. There an auxiliary pump was to be placed, and the water again lowered by the air-lift to the 1,000-ft. level. Here a second permanent pump was to be placed, discharging to the 700-ft. level. Below the 1,000-ft. level the unwatering was to be continued as far as possible, a pump station to be cut out and the auxiliary pump to be removed to it, the remaining distance to be freed by the air-lift again, assisted by a small sinking-pump and by bailing.

The event showed that the capability of the air-lift had been underestimated, for the water was lowered with it from the 700 to the 1,000-ft. level, and there held for five weeks while the second pump was being installed. During this period of installation the lift was handling 25.6 cu. ft. per min. to a vertical height of 288 ft., with a submersion below the surface of the water of 152.

*Air Lift.*—The air was supplied by a pair of duplex single-stage compressors, driven by electricity, and giving a united displacement of 9.91 cu. ft. free air per revolution. The speed was constant at 110 rev. per min. These compressors were placed 50 ft. from the collar of the shaft, and delivered the air through a receiver and a 4-in. air-column to the mine. The column for the air-lift was of 7-in. tubing, with flange unions, and it was lowered down the shaft on skids sliding

on the track of the skipway. The interior air-pipe was two inches.

The following table gives the record for a part of the unwatering period, arranged in a decreasing series, according to the ratio of submersion to lift. By 'submersion' is meant the vertical depth of the bottom of the air-pipe below the surface of the water, and by 'lift' the vertical height of the discharge above the surface of the water. 'Free air' is assumed to equal the displacement of the compressor cylinders.

Submersion per foot of Lift. Feet.	Vertical Lift Feet.	Submersion. Feet.	Air Pressure. Pounds.	Cubic Feet Per Minute.		Cubic Feet Air per Cubic Foot Water.	Efficiency, i. e. Cent of power used in Water Thrown.
				Free Air.	Water.		
1.86	103	191	90	541	58.9	9.2	10.1
1.84	97	179	90	541	58.9	9.2	9.1
1.67	156	260	87	907	46.5	19.5	9.6
1.64	113	185	89	541	56.5	9.6	10.7
1.25	138	172	84	541	49.	11.	12.4
.87	174	151	90	1090	48.5	22.5	7.9
.86	204	175	90	1090	33.	33.1	6.3
.75	186	139	89	1090	43.	25.4	7.1
.72	189	136	89	1090	40.5	26.9	7.
.65	240	157	94	1090	31.9	34.2	6.7
.65	288	190	93	1090	25.9	42.1	6.2
.59	273	161	99	1090	29.5	37.	7.2
.59	277	163	99	1090	30	36.3	6.8
.58	264	152	98	1090	30.4	35.9	6.7
.57	280	160	97	1090	27.7	39.4	6.7
.57	281	159	97	1090	27.7	39.4	6.4
.53	287	153	96	1090	27	40.4	6.4
† .25	196	48	60	1090	9	121.1	1.8

† Below 1,000-ft. level.

The data given in this table are somewhat conflicting, but they indicate clearly the change in efficiency of air-lift work due to decreasing submersion. The power consumed was determined by meter readings over extended periods, and includes all the mechanical losses in the compressors and pipes.

Subsequently a 4-in. column and 1-in. air-pipe were used below the 1,000-ft. level, with the results given at the foot of the table. This was more in the nature of an experiment than anything else, and showed clearly the unsatisfactory operation under such an extreme condition.

As the final result of the experience gained in this work, it can be conceded that constant volume of compressor delivery (that is, constant speed of motors), and frequent changing submersion and lift are not conducive to economical work; exact adjustment of air volume and pressure to submersion and lift are essentials for good efficiency, and under the conditions usual in work of this kind are not obtainable. For regular air-lift work, as from deep wells, 32 to 35% is spoken of as quite within the range of possibilities. Notwithstanding the low efficiency, however, the method proved itself highly useful, and cost less in power and plant combined than any other that could have been applied.

*Electric Pump.*—The electric pumps adopted for this installation were of the Aldrich type, manufactured by the Allentown Rolling Mills. The two main pumps

were 5-plunger, single-acting, 6-in. diam. by 12-in. stroke, with a rated displacement of 66.7 cu. ft. per min. One of these was placed at the 700-ft. level, before the unwatering was commenced. It was driven by two 40-h.p., 440-volt, induction motors, through a single set of reduction gears. The other pump was a duplicate, except that it was driven by one 50-h.p. motor. The respective heads for these pumps are 376 and 290 ft. The auxiliary pump was of 3-plunger upright type, driven by a 40-h.p. motor. The current was brought into the mine by lead-covered, armored, three-conductor cables. As originally installed, the cable, as far as the 700-ft. level, was of a carrying capacity of No. 1 wire B. & S., and below that level of No. 3 B. & S. It was found, however, that the lack of radiation caused a dangerous rise in the temperature of the upper cable, and it was accordingly reinforced by the addition of another one of No. 2-0 carrying capacity.

Under full load these pumps have given a power efficiency of 72.3%, based on a 100% displacement of the plungers. The actual displacement of the plungers has been shown by tests to be 94.5% of the theoretical, so that the actual horsepower in water handled is 69% of the power delivered to the conductors at the collar of the shaft. This includes, besides the conductor loss, two series of lamps in the pump stations.

**Cornish Pump.**—The Cornish-pump system presents the following: Stroke, 6 ft.; maximum strokes per min.,  $8\frac{3}{4}$ ; 1 plunger, 14-in. diam., under 128 ft. head, 400-ft. level; 1 plunger, 12-in. diam., under 250 ft. head, 700-ft. level; 1 plunger, 12-in. diam., under 287 ft. head, 1,000-ft. level; 1 plunger, 12-in. diam., under 230 ft. head, 1,250-ft. level.

The pump is driven by water, under 288 ft. kinetic head, the first speed reduction being by belt and the second by gear. The rod is of Oregon fir, 12 in. sq., and is supported by rollers in the customary fashion. There is an angle-bob at the 400-ft. level, where the shaft changes dip, and an ordinary counterbalanced operating bob on the surface, besides a balance bob at the 900-ft. level.

The data following are for the month of February, 1904: Horsepower in motive water, 181; horsepower in water thrown (on basis of full displacement), 65; apparent efficiency, on same basis, 53.7%. The actual water thrown amounted to but 75% of the displacement, because of the necessity of drawing back water from the columns into the pumps for considerable periods, in order to keep the pumps 'solid.' This is automatically done by floats and 'siphons,' and no special measurements were made to determine the actual displacement efficiency. This, however, with such slow-moving parts, should certainly be above 95%, with valves and packing in good condition, giving 51% total efficiency for the pump. There is, however, a further

loss due to the stretch of the rods and to lost motion. In this case, at the 1,250-ft. level, this has been determined to be  $3\frac{1}{4}$  in., or  $4\frac{1}{2}$  per cent.

A most serious drawback to the use of Cornish systems of pumps lies in the point touched upon in the last paragraph: The fact that all the plungers must operate at the same speed, and with practically the same length of stroke, makes imperative the drawing back of some water to make up deficiencies at some of the pumps. The plunger, however, so long as it is raising to the next lift, is doing its work against the full pressure the whole time, even though nine-tenths of its water is being drawn back. This is inherent in the system, and can no more be avoided—though it may be minimized—than the change in the rate at which water 'makes' in the various levels can be prevented.

It would be interesting were data at hand for similar work by other styles and systems of pumps, but it seems highly improbable that efficiencies as high as 69% can be obtained by other than those electrically driven, with the possible exception of pumps using re-heated air.

#### German Iron Production.

The output of the German blast furnaces in March showed an improvement over the earlier months of the year, when the coal miners' strike interfered with operations in several districts. The total for the month was 895,908 metric tons, being 223,435 tons more than in February, and 45,568 tons more than in March, 1904. For the three months ending March 31, the production compares with that of 1904 as follows, the figures being in metric tons:

	1904.	1905.	Changes.
Foundry iron...	442,266	409,448	D. 32,818
Forge iron.....	207,673	191,147	D. 16,526
Steel pig.....	143,374	151,994	I. 8,620
Bessemer pig...	122,171	81,148	D. 41,023
Thomas pig....	1,546,369	1,500,853	D. 45,516
Totals...	2,461,853	2,334,590	D. 127,263

The total decrease this year was 5.2%. The only increase shown was in steel pig, which includes spiegeleisen, ferromanganese, ferrosilicon and all similar alloys.

Metallurgy is the art of concentrating and refining metals.

Mining, milling and metallurgy comprise the work of metal extraction from the earth.

Concrete, according to Edward Atkinson, writing in the April issue of *The Cement Age*, can be applied economically, not only to dwelling-houses, but also to warehouses and factory buildings, especially when appropriately reinforced. Such structures are not so subject to vibration of heavy machinery, as compared with the so-called slow-burning construction.

Friedelite is the name given to a new mineral consisting of hydrated manganous silicate, with some chloride.

#### The Recovery of a Diamond Crown from a Deep Bore-Hole.\*

BY C. B. HORWOOD.

With the object of exploring for the Van Ryn reef, boring operations were commenced in 1902 on a farm on the far east Rand, about 33 miles from Johannesburg. When work had proceeded for more than a year, and the bore-hole had reached a depth of 3,233 ft., the bit became jammed, and the rods were consequently withdrawn. When the last rod had been removed, the core-barrel, which was 40 ft. long, was drawn up. On its arrival at the surface, it was found that the core-barrel contained no core, and that the shell and diamond crown were missing.

The shell is a piece of steel tubing, about 4 in. long, containing the spring which holds the core in position in the barrel, and it forms the connecting-piece between the core-barrel and the bit or crown. The thread at the end of the core-barrel, which screws into the shell, had broken off flush with the top of the shell. The core, with the exception of about  $\frac{1}{2}$  in. at the bottom end, was recovered without difficulty, and the shell was recovered by means of a tap, cut short in order to ensure its not being too long for the threaded tapered portion to grip the shell. When the shell was brought up it was found that the crown had broken off from it, flush with the end of the shell, leaving its threaded portion within the shell.

In order to recover the crown, a special tap was made in Johannesburg. This tool was 6 in. long, of which  $1\frac{3}{4}$  in. was threaded to screw into the end of the bottom rod; the next 2 in. consisted of a shoulder, 2 1-64 in. outside diameter, to guide the tool, and contained four longitudinal grooves to allow the water to pass up outside the edge of the bore-hole; and the remaining  $2\frac{1}{4}$  in. consisted of a threaded tap, tapered from 1 9-16 in. to 1 5-16 in. diam., as shown in the cut. The tool was not solid, being  $\frac{3}{8}$  in. inside diam. It was made of steel, the end of the taper being softened to permit of diamonds being set in it. Four small diamonds (about  $1\frac{1}{2}$  carats in all) were set in the end, in order to cut, within the crown, through and beyond the rock in which it was presumably imbedded. By the use of this tool the crown was speedily recovered. All the diamonds were found to be intact; there were eight diamonds on the face of the crown, four inside and four outside, and also four inferior diamonds round the outside of the bit, to keep the hole sufficiently large to ensure easy working and to prevent the bit from becoming jammed. The carbons, when recovered, weighed  $17\frac{3}{4}$  carats, and were valued at more than £230, or £13 per carat; moreover, having been used, their quality had been tested, and reliance could therefore be placed upon them.

When the crown was recovered it was

\*Abstract from *Proceedings of the Institution of Civil Engineers*.

found to have been very badly burned, and to be worn down to only 1/2 in. in depth, a new crown being 3/4 in. deep, neglecting the threaded portion. The bit having first broken off flush with the end of the shell, the two parts had been grinding against each other. As it was afterward discovered that three rods had split at a depth of between 1,700 and 2,000 ft. from the surface, it was concluded that the pressure-water, which is forced down through the rods and returns through the clearance-space between the outside of the rods and the side of the bore-hole, had escaped where the split occurred, and so had found a quicker and easier course to

removal. The core-barrel was in two 20-ft. lengths.

The risk involved in the accident was that the hole might have to be abandoned entirely. This would have meant: (1) a year's work wasted; (2) probably 9 months' delay before the same depth could again be reached in another hole; (3) loss of the total amount spent up to that time (about £8,000); (4) loss of £230 worth of diamonds; (5) loss owing to depreciation of plant and machinery for one year; and other incidental losses.

The reef was eventually struck at 3,412 feet.

**Crystallizing Molten Substances.**

Many students of para-magnetism and dia-magnetism have long predicted that interesting results would be obtained by crystallizing molten substances such as magnetite, pyrrhotite, metallic iron, metallic bismuth, etc., in the magnetic field. The experiment has been done for bismuth by A. Leduc, as described in the *Comptes Rendus*. The crystals formed with a molecular orientation at right angles to the lines of magnetic force (as dia-magnetic substances should do) and persisted in showing this property when cooled. What will be the intensity of the similar but antithetic property of magnetite, or iron, when subjected to this same treatment of cooling and crystallizing from the molten condition and while in the magnetic field, is a fascinating topic for anticipation, which, presumably, will shortly be answered by experiment by the same author. It is a matter of regret that Tyndall, who did so much for dia-magnetism and magne-crystalline action, should not have followed up this avenue of research.

Liquid hydrogen is colorless and transparent.

Kaolin is used in wall paper, porcelain, and the very finest in highly finished paper for fine half-tone printing.

Saltpeper has been found in conglomerate and sandstone in the Caucasus, near the station Nasran.

The barometer at 10,000 ft. altitude stands normally at about 20.48 in. The variation of the barometer seems to be closely connected with the escape of carbon dioxide from the rock-walls of certain mines in high altitudes.

In the new titanium arc of Ladoff, ferro-titanium is used as the negative electrode (or for both). The arc is of the 'flaming' type, brilliantly white, and while it smudges somewhat, yet the efficiency is considerable, being nearly three candle-power per watt.

**Electric Smelting of Iron and Steel.\***

BY F. W. HARBORD.

Electric-smelting furnaces are divided into three classes: Induction, resistance, and arc furnaces. The first type is specially adapted for melting rather than smelting; the others can be adapted for either purpose.

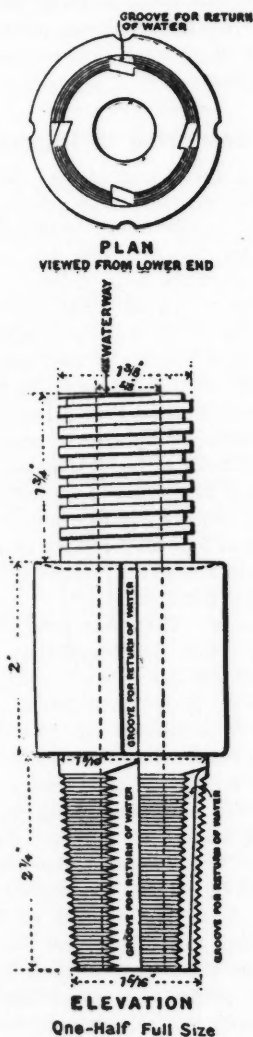
1. Induction type. The best-known furnace of this type is the Kjellin furnace. This is, in effect, a step-down transformer, in which the content of the hearth forms the secondary circuit of the transformer. Any grade of steel, from 0.10 to 1.50% carbon, can be produced in this furnace; but high-class material must be used, as there is no elimination of impurity. The furnace at Gysinge, in Sweden, which has been in operation since 1900, is now 175 kw. capacity, and its output is 5.2 to 5.5 tons per 24 hours. The furnace absorbs from about 0.13 to 0.16 e.h.p.-year per ton of ingot, according to the carbon content of the product.

2. Resistance type. (a) The Héroult furnace; a 4-ton furnace at Kortfors, in Sweden, and a somewhat smaller one at La Praz, in France, are producing high-quality steel on a considerable scale. The furnace is tilting, and is basic lined; two large adjustable electrodes pass vertically through the roof. In this furnace, ordinary steel scrap can be converted into steel of the highest quality, the impurity being removed by suitable fluxes. Steel varying from 0.079 to 1.000% carbon is made with perfect ease. At La Praz, an alternating current of 4,000 amperes and 110 volts is used. The furnace absorbs about 0.111 e.h.p.-year per ton of ingot in the case of low-carbon steel, and about 0.17 e.h.p.-year for high-grade carbon steel.

(b) The Keller furnace; this is similar to the Héroult furnace, differing only in detail. The author saw tests made with a 35-cwt. experimental furnace at Livet. Common scrap was the raw material, and the energy absorbed was about 0.12 e.h.p.-year per ton of ingot.

(c) The resistance furnace, for direct-smelting from the ore; experiments made at Livet in the Keller furnace demonstrated the possibility of making pig of the most varied composition. The type of furnace is identical with that used for making iron alloys, such as ferro-chrome, ferro-tungsten and ferro-silicon. The furnaces at Livet are vat-shaped, and connected at their lower ends by a central well; four are usually grouped together. The current used in the trial-runs varied between 10,600 and 12,000 amperes, at voltages from 63 to 68; and the energy

\*Abstracted from the *Proceedings* of the Faraday Society of London, England, March 6, 1905. The paper embodies the principal results of the investigations made by the commission sent to Europe last year by the Canadian government for the purpose of reporting upon the different thermo-electric processes for the smelting of iron ores and the manufacture of steel at works in Europe, together with some additional information bringing the subject up to date. The author acted as metallurgist to that commission.



the surface. Thus no circulation of water had been taking place round the bit to keep it cool and to carry away the cuttings. The bit would thus quickly become jammed, and, probably weakened by overheating, would be unable to withstand the torsion to which it was subjected, and would therefore break. The fracture occurred in the lower quartzites of the Upper Witwatersrand beds.

The drill was a Sullivan machine, warranted to bore to a depth of 4,000 ft.; the rods used were of steel, of English manufacture, in 10-ft. lengths, which at this depth were unscrewed in 50-ft. lengths for

absorbed was 0.25 h.p.-year per ton of pig for a white iron containing little silicon and manganese, and 0.53 h.p.-year for a gray iron more silicious. The coke used averaged 767 lb. per ton of pig iron produced, and the estimated cost of electrodes was 84c. per ton of iron. At Livet, 45 to 60% ferro-chromes and 25 to 80% ferro-silicons are made regularly. For such high-grade alloys, the electric furnace is more economical than the blast furnace.

(d) The Gin process; in this it is proposed to dispense with carbon electrodes, using instead large water-cooled block terminals, which lead the current into a long, basic-lined, narrow channel, forming the furnace hearth. The author does not know whether the process has been tried on a commercial scale.

3. Arc type. The heat is obtained from direct radiation from the arc, and by reflection from the roof and sides of the furnace.

(a) The Stassano furnace; the latest type at Turin is a 5-ton furnace (per 24 hours), and absorbs 4,900 amperes at 150 volts, the current being distributed between two arcs (and having, therefore, four electrodes), which meet at the center of the furnace. The furnace is lined with magnesite bricks. Steel is produced direct from the ore (pure hematite) in the one furnace. Reduction is effected only by the carbon, which, with the ore, is molded into briquettes, and a practically pure iron can be obtained. The energy consumption is 0.186 e.h.p.-year per ton of steel, and the consumption of electrodes 5 kg. per ton of steel.

(b) The Harmet process; in one form of furnace the inventor melts oxides of iron in a vertical shaft by means of producer gas, and reduces them by solid incandescent carbon; in another form carbonic oxide is his chief reducing agent. The process has not yet been tested on a commercial scale.

General conclusions: (a) Steel, equal in all respects to the best Sheffield crucible steel, can be produced even in this country, either by the Kjellin, Héroult, or Keller process, at a figure considerably less than the cost of producing a high-class crucible steel, assuming electric energy to cost \$50 per e.h.p.-year.

(b) At present, structural steel, to compete with Siemens or bessemer steel, cannot be economically produced in electric furnaces, and such furnaces can be used commercially only for the production of high-class steel for special purposes.

(c) Speaking generally, the reactions in the electric-smelting furnace are similar to those of the blast furnace. By altering the burden, and by regulating the temperature with variation of the electric current, any grade of iron, gray or white, can be obtained; and the change from one grade to another is effected more rapidly than in the blast furnace.

(d) Pig iron can be produced on a commercial scale, at a price to compete with

the blast furnace, only when electric energy is very cheap and fuel very dear. With electric energy at \$10 per e.h.p.-year, and coke at \$7 per ton, the cost of production is approximately the same as that of producing pig iron in a modern blast furnace. Under ordinary conditions, where blast furnaces are an established industry, electric smelting cannot compete; but in special cases, where ample water-power is available, and blast-furnace coke is not readily obtainable, electric smelting may be commercially successful.

In the discussion which ensued upon the reading of the foregoing paper, the following information was contributed.

Adolphe Minet communicated further particulars of the Héroult process, giving a sketch of its development. About 3,000 tons of steel have been made. The process is an advance upon others, and upon the crucible furnace, because it allows of a complete elimination of sulphur and phosphorus; and common raw material, costing \$14 a ton, can be used. The current consumption at present is 120-kw.-hour per ton of steel.

B. H. Thwaite described a scheme for the production of high-quality ingot-steel in Canada, suggested by him in 1903. The anthracite has to be imported from the United States, and it is proposed to briquette raw material to be reduced in a special design of arc furnace. The gas evolved is to heat an open-hearth furnace in which the steel is to be made, additional electric heating also being available. He considered that both the Keller and Héroult processes are available for the useful employment of the power-producing resources of the blast furnace, now mostly going to waste.

W. Murray Morrison agreed that the Keller and Héroult furnaces seemed at present the only ones practicable, as far as England is concerned. M. Héroult has recently reduced his energy figure to 0.15 e.h.p.-year per ton of steel, starting with scrap; and to the remarkable figure of 0.0114 e.h.p.-year (equivalent to 56c. a ton), starting with molten metal; he is now constructing a 300-ton mixer and a 50-ton furnace, in which still better results are expected.

R. S. Hutton pointed out that electric heating is economical only when very high temperatures are desired, and therefore that it is not desirable to use electric furnaces for melting. One of the advantages of the Héroult furnace depends on the fact that it is an arc as well as a resistance furnace. The two sources of intense heat cause convection currents in, and hence intimate mixture of, the molten charge.

R. L. Gamlen, speaking as one interested in the production of cheap power, was of the opinion that the limiting figure of \$50 per e.h.p.-year, mentioned by the author, could be lessened by producers of power on a large scale. In considering this question of cheap power, too much stress is usually laid on fuel cost; capital

cost is an even more important item. This is very large in the huge gas-engines required by low thermal-value gases, such as blast-furnace gases; and steam-power is therefore more economical, even if the gas costs nothing.

Dr. O. J. Steinhart drew attention to the difficulty of making low-carbon ferro-chromes, especially in arc furnaces. The value of these is high, compared with those of higher carbon-content.

The chairman, F. W. Perkin, in moving a vote of thanks to Mr. Harbord, remarked on the enterprise of the Canadian government in appointing a commission to study this question. He wished that our manufacturers were more alive to the possible future of electric smelting, and to the desirability of making further experiments on the subject.

#### Shot-firing in Illinois.

The Illinois Legislature has finally passed the bill making the employment of shot-firers in coal mines compulsory. The text of the bill, omitting the usual preliminary formula, is as follows:

"Section 1. In all mines in this State where coal is blasted, and where more than 2 lb. of powder is used for any one blast; and, also, in all mines in this State where gas is generated in dangerous quantities, a sufficient number of practical, experienced men, to be designated as shot-firers, shall be employed by the company, and at its expense, whose duty it shall be to inspect and do all the firing of all blasts, prepared in a practical, workmanlike manner in said mine or mines.

"Section 2. That shot-firers shall, immediately after the completion of their work, post a notice in a conspicuous place at the mine, in which shall be indicated the number of shots fired; also the number of shots they did not fire, if any, specifying the number of the room and designation of the entry, and giving reasons for not firing same. In addition they shall also keep a daily permanent record in which shall be entered the number of shots or blasts fired, the number of shots or blasts failing to explode, and the number of shots or blasts that in their judgment were not properly prepared and which they refused to fire, giving reasons for same; the record to be in the custody of the mine manager and to be available for inspection at all times by parties interested.

"Section 3. The superintendent or mine manager shall not permit the shot-firers to do any blasting, exploding of blasts, or to do any firing whatever, until each and every miner and employee is out of the mine except shot-firers.

"Section 4. Any willful neglect, refusal or failure to do the things required to be done by any section, clause or provision of this act on the part of the person or persons herein required to do them, or any violation of any of the provisions or requirements hereof, or any attempt to

obstruct or interfere with any person in the discharge of the duties herein imposed upon them, or any refusal to comply with the provisions of this act, shall be deemed a misdemeanor, punishable by a fine not less than \$100, and not to exceed \$200, or by imprisonment in the county jail for a period not exceeding three months, or both, at the discretion of the court: *Provided*, that whoever shall discover that any section of this act, or part thereof, is being neglected or violated shall report same to the superintendent of the mine and ask immediate compliance therewith; and in the case of continued failure to comply shall, through the State's attorney, or any other attorney in case of his failure to act promptly, take the necessary legal steps to enforce compliance therewith through the penalties herein prescribed."

#### Books Reviewed.

*Report of the National Academy of Sciences for the year 1904.* Alexander Agassiz, President. Washington; Government Printing Office. Pages, 56.

The pamphlet describes the organization, history and various administrative detail of this hazy agglomeration of some of the more prominent scientists of America.

*The Berlin-Zossen Electric Railway Tests of 1903.* Translated from the Official Report of Franz Welz. With *Introduction* by Louis Bell. New York; The McGraw Publishing Company. Pages, 74; with illustrations and 38 full-page diagrams. Price, \$3.

The official results of the celebrated tests conducted in Germany in the fall of 1903 are here given in an attractive folio form, and through the medium of an authoritative translator who contributes a 12-page introduction. The report of Mr. Welz covers 58 pages, to which are suffixed 38 full-page plates of structures and diagrams, though unfortunately neither author nor translator was thoughtful enough to provide an index.

*Second Report of the Geological Survey of Natal and Zululand.* By William Anderson, Government Geologist. London, England; printed for the Colony of Natal. Pages, 200; illustrated.

This folio is a series of papers, partly paleontological, but containing also records of several valuable tours of reconnaissance, among which, especially to be mentioned, is the favorable report on the Stormberg Coal-Measures to the west of Molteno. The whole bespeaks the tone of a good worker, trying to cover a large territory, but hampered by a limited staff and small equipment.

*Elements of Mechanical Drawing. Their Application and a Course in Mechanical Drawing for Engineering Students.* First Edition. By Alpha Pierce Jami-

son. New York; John Wiley & Sons. London; Chapman & Hall, Ltd. Pages, 226; illustrated.

This is a plain, systematic presentation of the tools, methods, purposes and results of drafting. The author is assistant professor of drawing in Purdue University, which guarantees the treatise as sufficient for present practice.

*Mysore Geological Department. Records. Volume IV. 1902-1903.* Bangalore, India; published for the Department. Pages, 180; with maps and illustrations.

This is a modest statement of routine chemical, geological and petrographical work, conducted from June, 1902, to June, 1903. The first part comprises general and administrative work by Mr. Smeeth. Part two comprises preliminary tours in various sections, by Mr. Wetherell, assisted by H. K. Slater, A. Primrose and others. Many economic non-metallic minerals are noted. The value of the report is much depreciated by the lack of an index.

*Geological Survey of New Jersey. Clays and Clay Industry of New Jersey.* By Heinrich Ries, Henry B. Kummel and George N. Knapp. Trenton, N. J.; State Printer. Pages, 548; with maps and illustrations.

This is Volume VI, of the final report of the State Geological Survey. The substance of the volume is a systematic and exhaustive treatise on clay, in which Messrs. Ries and Kummel are assisted by George N. Knapp. Part 1 deals with the occurrence of clay, the prospecting, mining and dressing thereof, together with its physical and chemical properties. Part 2 treats of its geology (stratigraphic) as distributed in the various horizons of the New Jersey strata. Part 3 treats of its manufacture; and part 4 of its distribution in the State, from the geographic phase of economic geology. The book is admirably illustrated, mapped and indexed, and will easily assume at once a deserved place among the authorities on clay.

*Manual of Chemical Analysis as Applied to the Assay of Fuels, Ores, Metals, Alloys, Salts and Other Mineral Products.* By Eugene Prost. Translated from the Original by J. Cruickshank Smith. New York; the D. Van Nostrand Company. London; Maclaren & Sons. Pages, 300; illustrated. Price, \$4.50, net.

The application of chemical analysis to the assay of commercial products is a matter of constant growth; and the treatise in hand is peculiarly interesting as a timely description of present practice in one of the chief manufacturing centers of Belgium. A great deal of ground is covered in a concise way, and unnecessary repetition is avoided by skillful cross-reference, though sufficient detail of manipulation is

given to guide one who is well grounded in the principles of analysis. The author has drawn not only from his own experience, but also from many colleagues with experience in technical and commercial laboratories. The translator was himself some time connected with technological chemistry in the Glasgow-and-West-of-Scotland Technical College; and it is due to his careful and enthusiastic editing that the full table of contents and the index is given. While the methods can be commended, and the book will serve as a valuable reference guide, yet a casual examination does not indicate that our European friends surpass us in that shrewd combination of speed and accuracy which is the aim of commercial work.

#### Books Received.

In sending books for notices, will publishers, for their own sake and that of book buyers, give the retail price? These notices do not supersede review in a subsequent issue of this JOURNAL.

*Foreign Commercial Guide. Part I, Section 27. Panama.* Edited by Edward James Cattell. Philadelphia; the Philadelphia Commercial Museum. Pages, 20; with map.

*Mechanics of Air Machinery.* By Julius Weisbach and Gustav Herrmann. Authorized Translation, with *Appendix on American Practice.* By Amasa Trowbridge. New York; D. Van Nostrand Company. Pages, 212; illustrated. Price, \$3.75, net.

*Goldfields of Summit County, Colorado.* Breckenridge, Colo.; prepared and issued by the Summit County Mining Exchange. Pages, 16, illustrated. Price, 25 cents.

*Les Mines et la Metallurgie à l'Exposition du Nord de la France.* By Ed. Lozé. Paris, France; Veuve Ch. Dunod. Pages, 400; with 368 illustrations. Price (in New York), \$6.25.

*Coal Mines in the State of West Virginia. Twenty-second Annual Report.* James W. Paul, Chief Mine Inspector. Charleston, W. V.; State Printers. Pages, 328.

*Gold Dredging.* By C. C. Longridge. London, England; *The Mining Journal.* Pages, 196; illustrated. Price, \$4.

*A Primer of Forestry. Part II. Practical Forestry.* By Gifford Pinchot. Prepared for the United States Bureau of Forestry. Washington; Government Printing Office. Pages, 88; illustrated.

*Properties of Steel Sections. A Reference Book for Structural Engineers and Architects.* By John C. Sample. New York; the McGraw Publishing Company. Pages, 128; with tables and diagrams. Price, \$3.

*Connecticut Geological and Natural History Survey. Preliminary Report on the Protozoa of the Fresh Waters of Connecticut.* By Herbert William Conn. Hartford, Conn.; State Printers. Pages, 72; with 34 plates.

### Correspondence.

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

Letters should be addressed to the Editor. We do not hold ourselves responsible for the opinions expressed by correspondents.

#### Conditions in Mexico.

Sir—Allow me to state a few facts regarding mining in Mexico, covering an experience of twenty-five years in that country; and to show how mining is affected by the new monetary system, etc. Americans were induced to invest in that country by the government representations that they would have ample protection; by glowing reports of the richness of the old mines, cheap labor and fine climate. The latter statement is the only one which holds true. The government protection amounts to nothing. If a company desires police patrol to guard against robbery and lawlessness, and to protect its property and employees against drunkards and thieves, it must furnish its own special police. The mines of the country are, with rare exceptions, low-grade propositions, which, if they were situated in the United States, where fuel, machinery and supplies are at normal prices, would pay handsomely. The labor-saving machinery and absence of heavy taxes more than offset the low price of labor in Mexico.

Take one company's operation in that country as an example. It disburses for fuel, labor, freights and supplies \$60,000 per month, Mexican currency, and extracts from the mines \$75,000 per month. The new monetary system causes the company a loss of from \$8,000 to \$10,000 a month, compared with what it received when exchange was based upon the price of silver alone. On the extraction they pay the government \$6,000 a month in taxes. In addition to this sum the company is obliged to pay stamp tax on goods purchased and sold, on bills of lading, duties on insurance, taxes on the wages paid the salaried men, State tax and a half dozen smaller taxes that absorb the remainder of the income.

A government official, in a public document, states that if, under the new law, the mining companies cannot make money they should stop business. If his advice were followed in the instance of this company it would ruin two small adjoining towns, deprive the government of, say, \$100,000 a year, and cause a loss to the company of over \$1,000,000 in gold. Suppose his remarks were extended to the railroads, plantations, electric companies, etc., which have made their investments, hoping eventually to make them pay, the government having so far derived almost the entire benefit; they are now calmly requested to get out if they do not like the new monetary law, forgetting that we live in hopes that in future the government will revise the heavy burdens it places on mining and the other industries.

The small reduction in taxes made as a

concession to the miner for his loss on his product amounts to very little. The reduction of the *pertenencia* tax from \$10 to \$6 per annum is prejudicial to a large producing company. It encourages blackmail from anyone denouncing the extensions of the working company's mines, at an expense of a few dollars a year. It prevents mines from being worked by responsible parties, who would take them up were they not held at prohibitive prices by the mining shark who follows in the wake of the working companies. The producer bears the entire burden, even if producing at a loss, as his taxes are assessed on the gross production, not the net. The dynamite concession benefits only a few government officials and obliges the mines to pay \$2 a case more than formerly.

When silver fell in price in the United States we turned to Mexico, because it was expected that, in view of the low price of labor, money could be made in mining. This is a fallacy, owing to the monetary law, taxes, dynamite and the persecution by the different States. Notwithstanding the large sums of money paid the State and Federal governments the mining companies have never received proper police protection, nor has the government ever voluntarily built a road or put one in condition, nor has it, in any public manner, aided companies in works.

The mines brought the railroads to Mexico, the railroads brought the people and transportation for the country's products. Before the advent of the miners and railroads, corn, for example, sold in good years as low as 40c. per hectoliter. In a bad year much suffering was caused, and in some cases starvation, from the high price of this cereal. At present corn will sell year in and year out around at \$3 per hectoliter, assuring the farmer of a constant demand and price for his product owing to transportation facilities and the increased demand. Wages of all classes have doubled since the advent of the *Gringo*.

Lands all over the country, since the arrival of the railroads and the miners, have increased in price from 100 to 1,000 per cent, and the taxes—well, that is different. The landholders are the men who control the government, and they will not tax themselves. The company before mentioned pays more taxes in 15 days than the owner of \$50,000 adjoining acres pays in a year. The miner and the railroad have made the landowners rich; why not tax them on their increased increment and relieve the miner? A small tax on the land would do it. Two cents per acre would produce \$10,000,000 annually. It would cause the large ranches to be divided, and would make a middle class that would be the salvation of the country. As long as foreigners can be made to pay the government's expenses the Mexican will be free from taxation. The native does not pay a tithe of the taxes that the law is supposed to place equally

on the miner, merchant and farmer, regardless of nationality. The foreigners are constantly visited by the *visitor*, or government inspector. The foreigner's books are minutely examined as to the manner of conforming to the stamp tax. The slightest error due to neglect or ignorance is punished by an exorbitant fine. The company referred to has been examined twice in one year. The merchants in a neighboring town have never been examined; do not keep books as the law requires, nor stamp their invoices; nor do they make returns of sales, etc., as required by law. The stamp law is so ambiguous that the best lawyers in the country state their inability to interpret it. This gives the inspector his opportunity, and although the company, with the aid of good legal talent, is doing its best to respect the law, it is mulcted according to the whim of the inspector.

The foreigner is pestered, harassed and blackmailed at every turn. He is hated and only endured because he is a source of income. The delightful speeches one reads emanating from high public officials are for the benefit of those contemplating investments. Between the lines, as in a lying prospectus, the victims read of the bait given out to catch the unsophisticated. The foreign companies in Mexico with their millions at stake are awaiting the time when the actual condition of affairs is understood; when money will cease to flow in and an attempt will be made to take money out of the country. Americans are supposed, on a conservative estimate, to have \$500,000,000 invested in this country. Suppose this money was earning 5%, it would call for an export of \$25,000,000 gold annually, or \$50,000,000 silver. All the world knows that it would bankrupt Mexico if it should pay that sum to foreigners, in interest on their investments. The entire bank capital of the country is only \$200,000,000 silver; inadequate as it now is, it would be completely exhausted in less than four years if the foreign industries in Mexico were on a paying basis and investors were receiving interest on their investments. As long as the ignorant continue to pour money into the country under the specious promises of statesmen and glowing reports from subsidized newspapers who withhold the facts, so long will Mexico be able to pay interest on its national debt and support its army of officials.

The new monetary law at present helps the railroads, the merchants and, more than all, the government, which owes its debts in gold. It may, later, help the miner, but at present it will only cause shut-downs.

Neither the government nor the miner can afford to wait until the matter adjusts itself. The government will lose taxes due to shut-downs, and the subsequent lawlessness caused by the unemployed, and the influx of new capital, will cease.

Mexico, May 1, 1905.

DIRECTOR.