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## Iron Mining Practice on the Marquette Range

The Caving System Predominates but Milling and the Inverted Cone Methods Are Also Used When Conditions Require

BY REGINALD MEEKS

The Marquette range extends from a point about a mile east of Negaunee, Mich., westward a few miles from Michigamme. The range consists of many low diorite hills between which are found deposits of soft and hard hematite. These orebodies vary in size and shape, but for

### OPERATING COMPANIES

The mines of the Marquette range are worked principally by three concerns. These are the Oliver Iron Company, a subsidiary company of the United States Steel Corporation; the Cleveland Cliffs Iron Company, and the Inter-State Iron

the open market. These companies are also mining on the other ranges of the Lake Superior district.

The various systems of mining hard and soft ore have been brought to a high state of efficiency and practically all of the ore is extracted. This is especially true of



OPEN PIT IN BED OF LAKE ANGELINE, LAKE MINE OF CLEVELAND CLIFFS IRON COMPANY

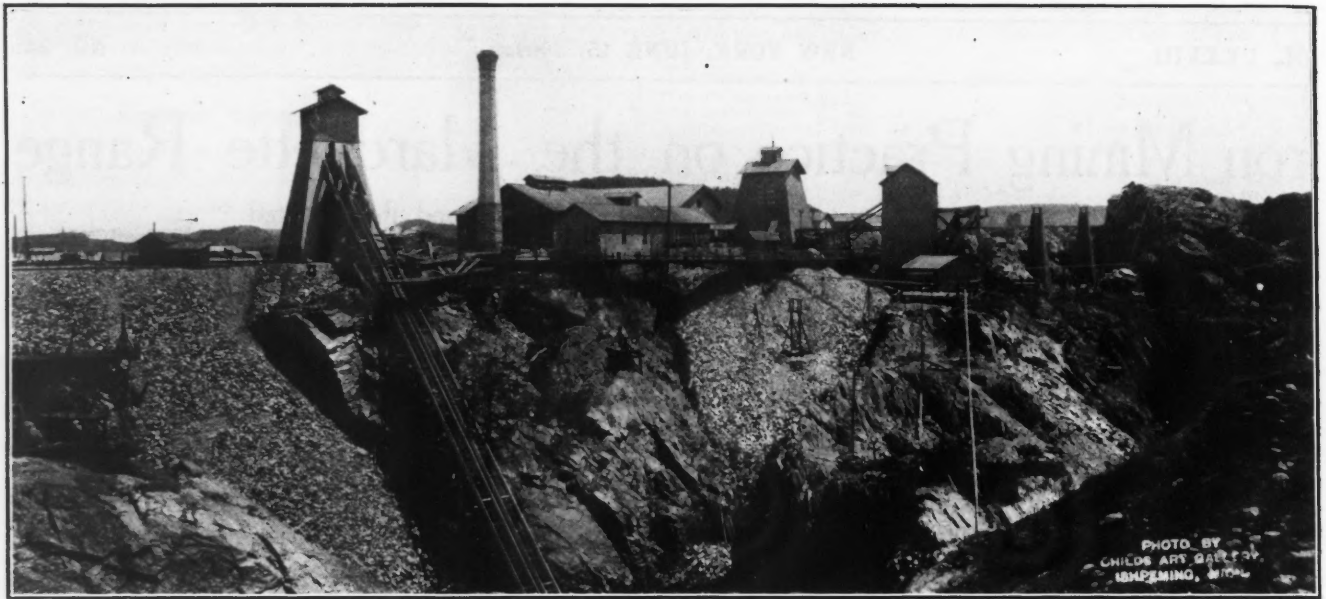
the most part they conform to lenses between hanging and foot walls of diorite. In some cases the ore was found close to the surface, but frequently the deposits were covered with many feet of overburden. Both bessemer and non-bessemer ores occur.

Company, the operating concern of the Jones & Laughlin Steel Company. The Cleveland Cliffs Company operates several charcoal blast furnaces at Marquette and at Gladstone, Mich., but these furnaces are not able to handle the output of the mines; the surplus ore is sold in

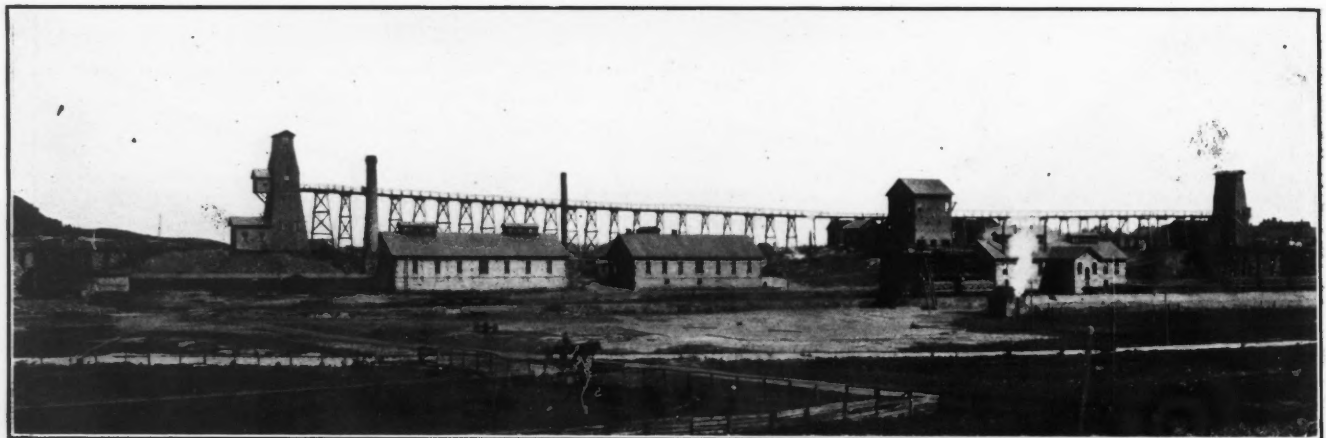
the caving system, which permits of an extraction, in some cases, of more than 95 per cent.

### THE SWANZY DISTRICT

Twenty-five miles south of Negaunee, on a branch line known as the Munising



LAKE SUPERIOR NO. 1 SHAFT, OLIVER IRON COMPANY, ISHPEMING



CLIFF SHAFT MINE, ISHPEMING, CLEVELAND CLIFFS IRON COMPANY



AUSTIN MINE, CLEVELAND CLIFFS IRON COMPANY, PRINCETON, ON THE NEW RANGE BEING OPENED

Railway, which connects with the North-western system at Little Lake, is the Swanzy district. Although ore was carted to Marquette, 25 or 30 years ago, from the old Swanzy pit, little mining was done until about 1900, when the Cleveland Cliffs Iron Company started the mines at Prince-

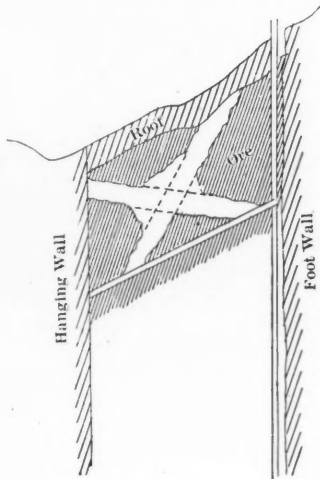
the Stephenson. The new mine is to be known as the Smith, but so far no ground has been broken. The orebody has been proved by diamond drilling and the first section of the shaft, known as the "shoe," is in place ready for the excavation.

The location chosen for the shaft is close to a branch of a river and it is believed that serious trouble will be experienced with water and quicksand when sinking begins. Perforated pipes have been sunk all around the shaft site, and it is hoped that the water level may be lowered in this way. Another alternative is to deflect the direction of the stream, and this method will probably be adopted.

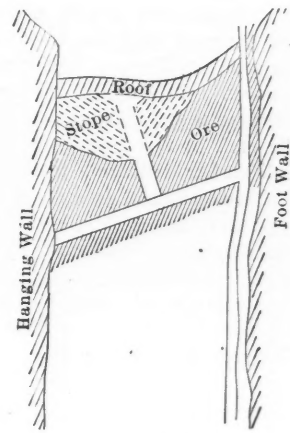
The Austin and Stephenson mines are more than a mile away from the two Princeton mines, but each pair of mines lies close together; a central power plant, which is now being built, will furnish power for drills, pumps, lights, etc., and later for electric haulage, where underground locomotives are installed.

The Stephenson mine is equipped with a steel head-frame, which has just been

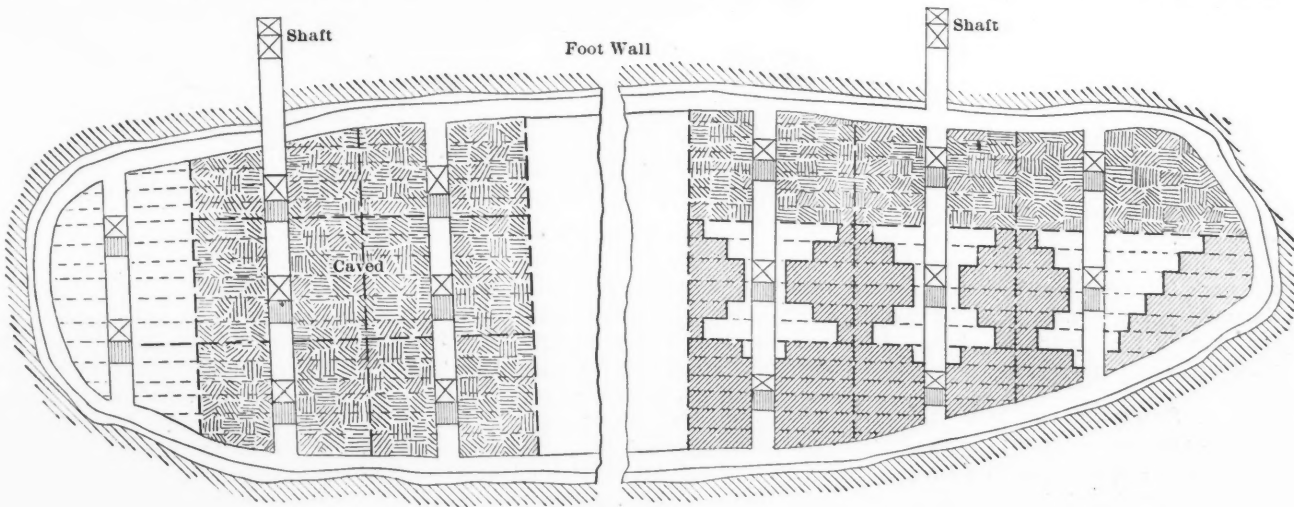
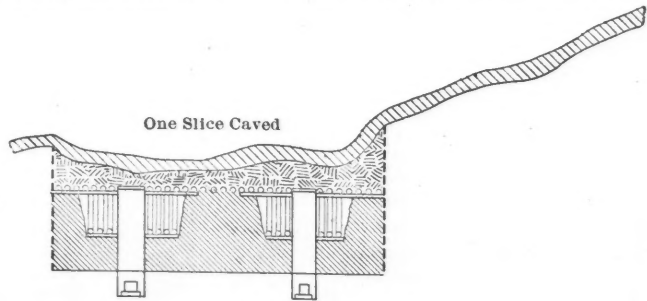
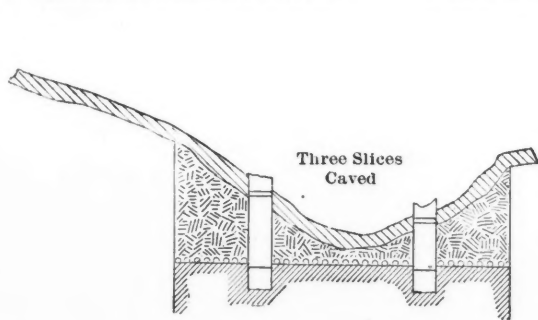
**THE CAVING SYSTEM**  
 Along all the iron ranges in general where the ore is comparatively soft, and where there is a roof or cap, the caving system is adopted. If the deposit comes almost to the surface the ore is milled down chutes to the lower levels and then



METHOD OF OVERHAND STOPPING



METHOD OF UNDERHAND STOPPING



PLAN OF WORKINGS

ton and Austin. This company operates four mines and is opening a fifth. The Oliver Iron Company owns one mine in the district, the Stegmiller, but the former company has the most important and extensive holdings. The four mines are Princeton Nos. 1 and 2, the Austin and

completed. This head-frame represents the more modern ideas of construction, and new shaft-houses will probably conform to this type, because it is strong, safe and efficient. The other mines at Princeton use the older wooden construction.

hoisted to the surface. This method resembles the caving system to a certain degree.

The mines in the Lake Superior district have developed and perfected the caving system to a marvelous degree, and it has been brought to a state of great elasticity.

In the hands of experienced engineers a mine can be worked in many stages of development, and caving may be done at several different points at the same time, and from various depths. To the uninitiated the method appears dangerous and uncertain, to say nothing of seeming chaotic. But the system has proved itself to be safe, rapid and economical.

The orebodies are usually about four times as long as they are wide and lie between walls of diorite. The method of attack consists in sinking one or more two-compartment shafts, usually situated near the ends of the deposit, in the solid foot wall and cross-cutting to the formation. A level is then driven around the entire bed close to the foot, and at points, approximately 40 ft. apart, cross-cuts are run through to the hanging wall. Three raises—sometimes only two—are then cut up to the roof, and the portions of the mine between the cross-cuts are let on contract to the miners in groups of two each. It is usual to take three slices between levels. If the formation is regular and sufficiently extensive the mine is divided into 40-ft. squares, but conditions frequently interfere with this arrangement.

#### REMOVING THE ORE

The miners work out, from the top of the raise, to the limit of their boundary line, and then start to mine at right angles to the cross-cut. As the ore is removed timber is set in place; this consists of ordinary round caps, and posts, with lagging placed on roof and floor. When the contractors have advanced 20 ft., and have met the men on the opposite breast, they work back, toward the raise, to the next breast. In no case is it permitted to start a second breast until the first has been completed. The ore taken out is trammed to the raise, and sent down the chute to a car on the level below. These cars are collected and hauled to the shaft by electric locomotives.

In the illustration it appears as though several consecutive breasts were being worked at the same time. The sketch was made this way to show the progress of the work from the boundary line back to the raise. The bottom slice is never started until the upper two have been taken out.

#### SUPPORTING THE ROOF

The whole upper slice is removed in this manner and the roof is temporarily supported by the timber. In time the weight of the roof crushes the supports and this causes a cave filling the whole upper slice. Usually the caving of the roof follows the advance of the men. Frequently it is necessary to blast the timbers away, but the natural caving of the roof is the desideratum.

When the whole upper slice has been removed and the roof has caved, work is begun on the second slice in the same

manner and finally the third slice is taken out. In the meantime on the level below, the cross-cuts and raises have been completed and this work is always well in advance of the slicing of the level next above.

The breasts are usually 5x7 ft. and the men are paid by the linear foot advance, in some cases, but usually by the load of ore. The price includes setting the timber; supplies are paid for by the contractors.

#### HARD-ORE MINING

The orebodies of hard hematite are usually 40 to 60 ft. thick although a thickness of 125 ft. or more is met with. The method of extraction in general is to sink

from the hanging wall over toward the foot wall and the other raises slope in the opposite direction. These raises intersect and continue on to the roof, walls or, if lower down in the mine, to the level above. The ore is broken down by overhand stoping and sent down the raises.

#### THE MILLING METHOD

Where the ore comes to the surface and is soft, the deposit is worked by open pit; but the ore, instead of being taken out from the pit, is milled down chutes which have been raised from the level below. The pit gradually becomes deeper as the ore is taken out and level after level is brought into service. This system is clearly shown in the illustration. This pit



STEVENSON SHAFT, CLEVELAND CLIFFS IRON COMPANY, SWANZY DISTRICT

a shaft, in the formation and close to the foot wall. Cross-cuts are then driven to the hanging wall about 60 ft. apart. The method of attack will be decided by the character of the orebody and the position of the walls. One method is to cut a raise up to the roof from the first level and then break the ore down by underhand stoping. In wide deposits more than one raise may be necessary. The ore is sent down the raises to the level below and trammed to the shaft. Pillars are left to support the roof and when these are ready to be robbed the stopes are filled, either from outside or from the hanging wall, and the pillars are taken out from below.

Another method is to raise up from the level, keeping one set of raises sloping

is being worked by the Cleveland Cliffs Iron Company at its Lake Angeline mine.

Mining methods at various mines differ but slightly, because conditions are nearly alike. All soft orebodies are mined by the caving system which is practically the same as that in use in northern England for many years.

The production of the three copper smelting works in the Urals in 1906 was 258,793 poods, against 223,883 poods in 1905. The increase was due to the Bogoslovsk works, the Nigni-Tagilsk and Verch-Izetsk works having made decreased outputs. A new smeltery, with capacity of 30,000 to 40,000 poods, is to be erected at the Blagodot mine, Peklevsk Kossel.

## Temporary Whim for Hoisting

By GUY C. STOLTZ\*

The accompanying drawing shows a whim which has been built for temporary hoisting, in sinking the Clonan shaft, on the Port Henry Iron Ore Company's property at Mineville, N. Y., of which E. P. Clonan is superintendent.

Some advantages of this style of whim are noteworthy. The rope winds on the drum at the same elevation as the head frame sheave. This obviates the loss of power attended, when the rope is lowered to the whim drum. The horse is not hindered underfoot by the sweep, and should the rope or the horse's hitching break, instead of depending upon a dog to catch, the driver would apply the hand brake. The driver and horse are in little danger of being thrown to the ground by this overhead sweep.

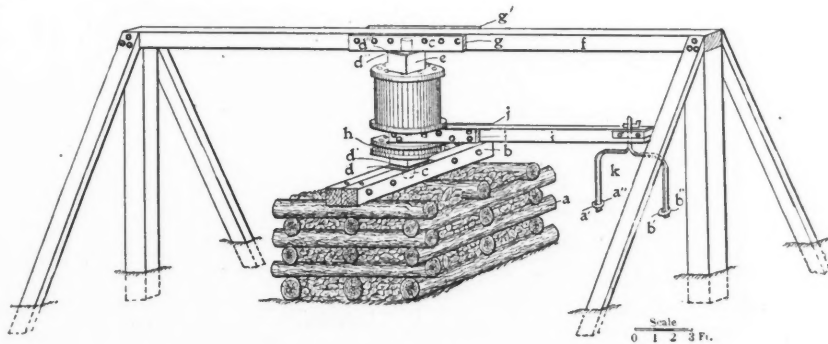
The site chosen for the drum foundation was on a side hill, at a point about

The drum is then faced with vertical strips of hard wood 1 in. thick, on which winds a  $\frac{3}{4}$ -in. steel rope. Attached to the center post and below the drum, a hand brake  $2\frac{1}{2}$  in. wide works by means of a lever arm on a  $3\frac{1}{2}$ -ft. diameter disk of 3-in. plank *h*.

The sweep *i*, which is a stick of yellow pine, mortised and tenoned into the center post, between the drum and the brake disk, is further fastened to the center post by bolting on either side 5-ft. lengths of 3-in. plank *j* and *j'*.

The cross piece, a 10x10-in. by 30-ft. stick *f* resting on 12x12-in. posts, is reinforced at the center of the space, where the mortises for center-post tenon have naturally weakened it, by bolting 3x12-in. planks *g* and *g'*, on each side of the timber.

The horse is hitched under an inverted V-shaped yoke *k*, made from two 6-ft. lengths of 3x $\frac{3}{4}$ -in. flat steel; these are welded at the middle of the V and swedged to 2 in. in diameter, in order to act as a hanger for the



TEMPORARY WHIM FOR HOISTING

15 ft. higher than the collar of the shaft. The foundation *a* is built up in log-cabin fashion to a height of 6 ft. with rough cedar sticks, 8 ft. long and 10 to 14 in. in diameter. The sticks are all drift-spiked, and further anchored by a filling of lean ore and stone. Two 10x12 in. by 8-ft. sticks bolted securely together and again to the crib work offer a foot-step bearing *b* for the center post of the drum. This center post, a 12x12-in. stick, is cut down at the ends, forming a tenon 6 in. in diameter and 6 in. long, *c* and *c'*. The tenons at the ends, fitted with 6-in. pipe couplings, rest in mortises 6 in. in diameter and 6 in. deep cut into the foot-step timber and again into the cross-piece stick.

Steel plates  $\frac{3}{8}$  in. thick, *d*, *d'*, *d''*, *d'''*, are lag screwed to the shoulders of the center post and to the collars of the foot-step and cross-piece bearing.

The drum, 3 ft. 6 in. in diameter and  $2\frac{1}{2}$  ft. high, is built of segments of plank 3 in. thick bolted together, and fitted horizontally around the center post *e*.

yoke which turns freely in the end of the sweep. The method of fastening the horse to the sweep allows him to be hitched once for all throughout a shift. When the bucket is raised the tugs pull on hooks *a'* and *b'*, and when lowered the horse makes a half turn in the whim round, and holds the load by hold-backs fastened to hooks *a''* and *b''*.

The load handled by a horse weighing 1100 lb. when the steel bucket is filled with its usual load of drift and water amounts to about  $2\frac{1}{2}$  tons. The average speed of hoisting is 27 ft. per minute. The cost of a whim of this kind, including labor and material, amounted to \$70.

After describing the various processes to prepare metallic uranium, pure or cast, I. Escard, in *Rev. de Chim. Ind.*, April, 1907, remarks that no very important application has yet been made of this metal, though it appears that Messrs. Krupp, of Essen, have tried uranium steel for ships' steel plates. The French navy has tried it for other purposes. The chief quality of uranium is to give steel great hardness and raise the annealing temperature.

## Legal Rights of the "Grub Stake"

The United States Circuit Court of Appeals in San Francisco has decided an important "grub-stake" case in affirming the decree of the lower court dismissing the suit of Isaac L. Marks against William C. Gates, alias Swiftwater Bill, and Howard Turner, holding that the contract between the parties was unjust, oppressive and iniquitous. On April 27, 1903, Gates contracted with Marks in this city to convey to Marks a 20 per cent. interest in any and all property which Gates might, either by location, purchase or otherwise, acquire in the Territory of Alaska. Marks claimed in the suit that the real consideration of the contract was the cancellation of a prior indebtedness of \$11,225 due to him from Gates and the payment by the appellant to Gates of \$1000 cash, and that in pursuance of the agreement Gates went to Alaska and acquired mining claims in the Fairbanks mining district, the value of which is more than \$750,000.

Circuit Judge William B. Gilbert, in delivering the opinion of the court, said: "For aught that appears in the complaint to the contrary, Gates purchased this property and paid full value for it. If the appellant now has the right to such belief, it follows that he may hereafter sustain suits to acquire a life interest in all property of every nature and description which Gates may obtain at any time in Alaska, and that such life will end only with the life of Gates. But where the consideration is grossly inadequate, as it is in the present case, and the contract is made without any knowledge at the time of its making on the part of either of the parties thereto of the nature of the property to be affected thereby, or of its value, no equitable principle is violated if specific performance is denied and the parties are left to their legal remedies, if any they have."

## Mineral Production of Russia

Statistics published in the *Gornui Journal*, St. Petersburg, recently, show that in 1905 Russia produced 19,167,399 short tons of coal. Of this total the Donetz basin furnished 14,355,540 tons or 74.9 per cent.; the Dombrowski basin, 3,939,840 tons, or 20.6 per cent.; the Ural district, 582,482 tons, or 3 per cent.; the Samoskowskaja mining district, 257,936 tons, or 1.4 per cent.; and the Kaukas, 31,600 short tons, equal to 1.6 per cent. of the whole.

In the same year 4009 short tons of copper were produced in Ural smelting works from local ores, which shows a decrease of 1034 tons since 1902.

The production of manganese ore in 1905 in the same district, was 5090 short tons, 2070 tons more than in 1904, and 1671 tons less than in 1902.

The production of oil in Russia in 1905 amounted to 7,254,000 short tons, 24.2 per cent. of the world's production.

\*Mining engineer, Port Henry Iron Ore Company, Mineville, N. Y.

## The Smelter Fume Question in Great Britain

BY EDWARD WALKER

Until the beginning of the present year the smelting works in Great Britain have been free to discharge their fumes into the air as long as their neighbors have not objected, and they have been entirely free from government control. With the beginning of 1907, this state of things was altered by the inclusion of all smelting works in the new alkali works regulation act. There was one curious exception to the former freedom of smelters from government interference. Zinc appears to be the scapegoat of all governments, and for a somewhat odd reason the works where zinc ores are smelted were included in the Alkali Act of 1881. In one of the districts in England where zinc dross from galvanizing works is smelted, a good deal of local discomfort had been occasioned by the sal-ammoniac fumes and hydrochloric acid fumes given off, so that special representations were made to Parliament. The act, as passed, was made to include all zinc works, not only galvanizers' waste works, so that the zinc smelter was saddled with government control, while the copper smelter who gave off far more sulphuric fumes, was not.

As already mentioned, until recently the copper and lead smelters have been governed in the fume question entirely by the common law. Their neighbors, either as corporations or as individuals, could sue for damages and obtain injunctions. Consequently, smelting works have always been erected in districts where population was scarce, and where a sufficient tract of land could be bought to isolate effectively the plant from the property of other people. If, after the works were started, the district became a center of population, nothing could be done in any way to restrain the gaseous output. The history of Swansea exemplifies this fact. The town became the center of copper smelting over a hundred years ago when the Cornish output of copper was of importance. The smelting of the ores was more conveniently done on the coast of Wales, in close proximity to the source of fuel, than at the mines. Until thirty years ago the sulphurous fumes in Swansea district, due to the roasting of the ores, were prodigious. That the nuisance was mitigated was due not to the pressure of public opinion, but to the establishment of sulphuric acid works by some of the smelters, and by the gradual decay of the district as a center for the smelting of copper ores. At the Vivians' works, roasting furnaces were introduced, for the manufacture of sulphuric acid, and a good deal of the copper output is now disposed of as sulphate. At the present time the valley behind Swansea, for two or three miles in the districts of Landore, Llansamlet and Morris-

ton, is moderately smoky, but the smelters are not the special offenders.

A notable case of the stoppage of a smelter by injunction obtained by a neighbor was that of the Smelting Corporation some six years ago. The works were erected at Ellesmere Port, on the River Mersey some 10 miles away from the South Lancashire chemical and smelting centers, to work the Fry process for treating zinc lead sulphides. No negotiations were entered into with adjoining landowners, and the consequence was that directly the roasting of the sulphides was commenced an injunction was obtained, and the works rendered useless. It happened also that the process itself was a failure, so that the fact of the suppression of the works as a nuisance was lost sight of by the public in the general confusion.

The new law of 1907 is not exactly an absolute *o.e.*, and leaves the method of dealing with existing smelting works somewhat elastic. It says: "An inspector may inquire whether in any smelting works means can be adopted at a reasonable expense for preventing the discharge of any offensive gas; where it appears that such means can be adopted at a reasonable expense, the owners may be required to adopt the best practicable means for the purpose."

This is a reasonable enough requirement, and if carried out in a fair and equitable manner by the government departments no smelter will have any fault to find. There is only one smelter in South Wales that will be very much affected, and as it is situated a good distance from any center of population it may escape from the serious attention of the inspectors. In South Lancashire and on the Tyne some alterations may be necessary. It will be interesting to see how this new law is carried out in practice.

It is not probable that any damage is done by the escape of flue-dust from any of the British smelters, for they work on such a small margin of profit nowadays that they cannot afford to waste anything. The only noxious emanations that will have to be dealt with are the sulphuric fumes. The maximum amount allowed by the act is the equivalent of  $1\frac{1}{2}$  grains of sulphuric anhydride per cubic foot of gas discharged from the chimney.

The new act does not say anything about works established in the future. As there is not much prospect of any such extension of smelting operations in Great Britain, it is hardly necessary to enlarge on this side of the question. The only new works at present contemplated are those of the Central Zinc Company, which are now being built near West Hartlepool. These are located on a low-lying tongue of land at the mouth of the river Tees, and they are hardly likely to do any damage to property or life in the neighborhood. There is some prospect of the Zinc Corporation establishing its zinc reduction plant in South Wales, but the scheme

is only in nebulous form at present. There is no possibility of any new lead or copper reduction works ever being established in Great Britain. It is more probable that the few survivors will experience a gradual thinning out process.

## The Deacon Zinc Mine

The Trinity Zinc, Lead and Smelting Company, of which J. P. Newell, of Carthage, is manager, operating in Richland valley, Duenweg district, Missouri, is erecting, with the exception of the Yellow Dog, the largest mill in the Missouri Kansas district; it will be known as the Deacon. The capacity will be 700 tons of dirt per 10 hours; it is the intention to run the mill two shifts per day, three shafts having been sunk from which to hoist the dirt to keep the mill in steady operation. All hoisting is to be done with double engine hoists. The mill is to be equipped with three 150-h.p. boilers, two compressors with a capacity of 1900 ft., a Corliss engine of 200 h.p., a generator for light and motor, drill sharpeners, etc. The mill building is 180 ft. in length, the jig room occupying 130 ft. The height of the derrick is 78 ft. The hopper has a storage capacity of 1100 tons. There are two other 300-ton mills operating on this tract.

## Canadian Mining and Metallurgy

Hon. Wm. Templeman, Canadian minister of mines, has authorized the collection of authentic information for a detailed report on the mining and metallurgical industries of Canada covering the entire country. It will deal only with producing mines, mines under development and metallurgical plants, and will give in each case the names and full information concerning the companies engaged, number of men employed, wages, markets, etc. As regards the mining industry, information will also be afforded as to the land owned or controlled by each concern, the character of the ore and average quality as shown by analysis, and the method and cost of mining and treatment. The returns concerning the metallurgical industries will show the location of the plant, the ore treated and the quality of the product, method of treatment, description of machinery, source of supply and composition of raw material, and cost of production.

It is reported that promising deposits of graphite, of steely and metallic appearance, have been discovered on the banks of the Gamboa river, in the department of Castro, in the eastern part of the Chiloe island, at latitude 42 deg. 28 min., in Chile.

# The Stassano Thermo-Electric Furnace

With Rotary Agitation and a Closed Melting Chamber It Produces Malleable Steel with a Thermal Efficiency of More Than 50 Per Cent.

BY ERNEST STASSANO\*

In order to utilize the heat generated by transforming electric into thermic energy with advantage for industrial purposes, and especially in the metallurgy of iron, the apparatus must meet the following conditions:

(1) The chamber in which the transformation of electric energy into heat takes place, and in which the metallurgical operations are effected, should not be subjected to the immediate action of air, but should, chemically considered, be absolutely neutral.

(2) The heat generated by the repeated transformation should be utilized at the highest possible temperature.

(3) The materials to be treated should not have direct contact with foreign bodies capable of unfavorably affecting their composition.

(4) All of the apparatus in which the

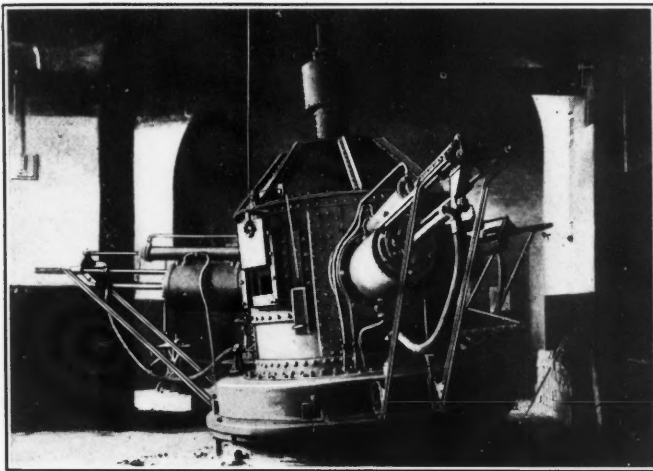
shell is lined with refractory material, which incloses the cylindrical melting chamber, terminating at the top in an arch. Suitable openings in the refractory wall admit the electrodes which extend into the melting chamber and meet in the center. The current which operates the furnace generates an arc at the point of contact at a convenient height above the bottom of the furnace. Double-walled metal cylinders provided with guide rods support and protect the carbon electrodes, which are connected by means of suitable metal sleeves, metallic rods and flexible cables with the current collector at the lower part of the furnace.

A current of water between the double walls of the cylinders maintains a comparatively low temperature at the coupling between the metallic part of the carbon holder and the electrode.

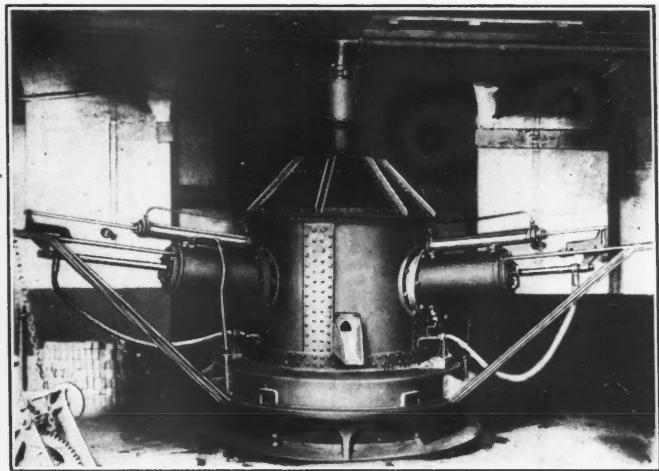
electrodes with the current generator. Groups of brushes on the metallic support below the furnace maintain a contact with the copper, both when the furnace is at rest and when it rotates about its axis.

A valve attached to the supporting mechanism distributes water under pressure to the hydraulic cylinders and the jackets of the electrode holders. Rotation of the furnace does not interrupt the free circulation of water.

Besides the openings in the refractory walls of the melting chamber to admit the electrodes, there is a tap pole on the extension of the bottom, a charging door and an outlet at the top of the vault for volatile products. This outlet opens into a pipe extension of the furnace shell, the connection being sealed by a sand valve and the end of the tube dipping into a tank of water.



TAP-HOLE SIDE, STASSANO FURNACE



STASSANO REVOLVING ELECTRIC FURNACE, CHARGING-DOOR SIDE

various metallurgical operations are performed should be so constructed as to be capable of always working under full load.

In an article published in the *Rivista di Artiglieria e Genio*, of 1902, I gave the details of my experiments, and I therefore limit myself to a short description of the two furnace types which in my opinion meet the conditions.

## THE ROTARY ELECTRIC FURNACE

The rotary electric furnace comprises a metal shell of cylindrical shape, terminating at the top in a truncated cone. The

Each of the cylinders is provided with a hydraulic cylinder and piston, which controls the position of the electrodes.

## WATER AND CURRENT CONNECTIONS

The furnace has a ring support surrounding the shell which bears upon a metal crown provided with truncate conic rollers. The rollers travel on a circular cast-iron rail, the upper face of which is in the shape of a truncated cone. The rail is not placed horizontally but is fixed on an inclined floor.

Below the base of the shell is a gear which by means of a shaft and bevel gears serves to rotate the furnace on its inclined axis. Suitable copper rings insulated from the furnace proper, iron bars, and flexible cables serve to connect the ends of the iron rods which support the

The circulation of air is thus prevented. When the feed door is closed, the gases in the interior of the furnace are above atmospheric pressure; and when the door is opened there are no currents because the upper outlet of the vault is closed.

## ADVANTAGES OF THE FURNACE

The furnace therefore meets, within the limits of practice, all the requirements named in the beginning of this article. The atmosphere in the melting chamber is chemically neutral. The transformation of electric into thermic energy is effected by the electric arc, which is known to produce the highest temperatures practically obtainable. The materials to be treated are not in contact with the electrodes and therefore are not subject to

Note—From a paper published by the International Congress of Applied Chemistry, Rome.

\*Major of artillery, director of the Stassano Thermo-Electric Furnace Company, Turin, Italy.

alteration by absorption of foreign substances.

Active agitation of the molten material obtained by the rotation of the furnace facilitates chemical reaction, and reduces the time necessary for the operation to a minimum, so that the furnace may always be worked under full load, thus obtaining the highest utilization of the energy.

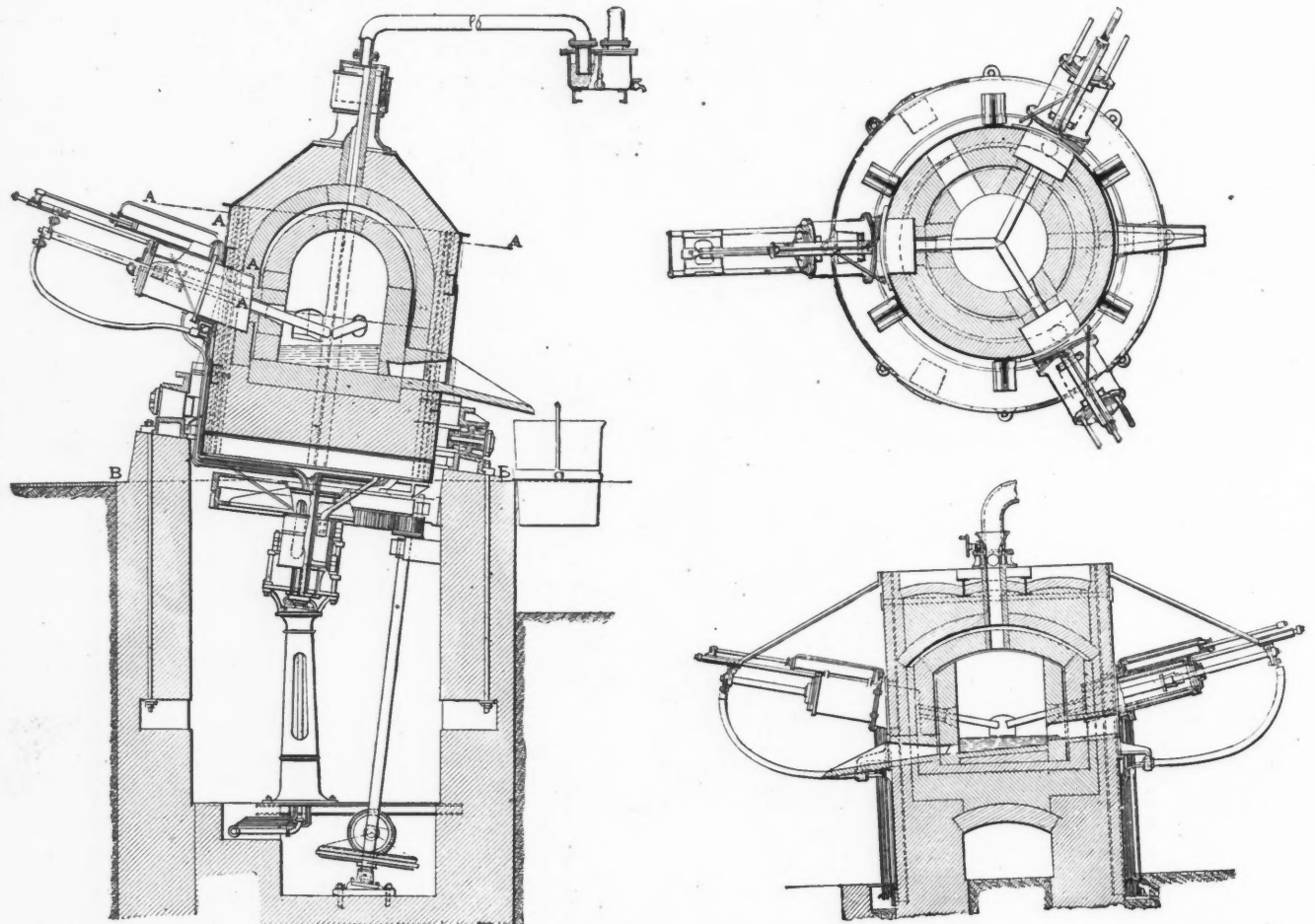
Reducing the furnace to its simplest expression, it appears to comprise a closed chamber in the center of which a thermic source, independent from combustion, radiates heat at a very high temperature.

It is obvious that under these conditions the temperature of the chamber

reactions. In this case the furnace, while keeping its special features, may be simplified by omitting the rotating mechanism. The bottom of the fixed furnace becomes rectangular, the charging doors are placed at the ends, while the tap-hole is on one side, and the slag discharge on the other. The uniform distribution of heat throughout the melting chamber is obtained by multiplying the radiation centers. This type of furnace is especially adapted for reducing fusion operations, and has the advantage of being more economical and more easily manipulated.

In practice it may sometimes be found necessary, as in the treatment of certain

industries, except in large blast furnaces where it may reach 70 per cent. and perhaps more. Upon closer examination, however, this relatively high utilization is found to be more apparent than real. If we consider that in the blast furnace besides the reduction of iron ore that of silica, manganese oxide and other substances is also obtained, and that such bodies deprive the iron of its characteristic malleability and ductility, so that the cast iron obtained must be subjected to long and troublesome refining operations, the advantages of this high rate of heat utilization disappear. It is true that cast iron, as it comes from the blast furnace,



STASSANO ELECTRIC FURNACE, REVOLVING AND STATIONARY FORMS

tends to increase gradually and uniformly until it reaches that of the source of heat. Owing to radiation from the walls the temperature of the melting chamber, although approaching that of the thermic source, will never equal it. Thus by proportioning the capacity of the melting chamber to the quantity of heat which it is proposed to generate, and suitably regulating the charges, we may maintain the temperature necessary for the operation without overheating the molten mass.

#### OTHER FORMS

It is not always necessary in practice to agitate the mass in order to accelerate the

copper ores, to keep the materials for a long time in a molten condition in order to permit the metallic part, spread through the molten mass, to separate by gravity from the slag. In these cases a furnace of the fixed type, modified in a suitable manner, will permit the material to remain for a long time in a special chamber. It is obvious that in apparatus of this kind, modifications and adaptations for special requirements are easily effected.

#### THERMAL EFFICIENCY

As I have stated elsewhere the utilization of the heat of fuels varies and is very low in the furnaces now used in the

is largely used in practice, but the increasing use of soft-iron and steel castings in the industries shows that if malleable iron products could be obtained directly from the furnace, many articles which are now, for the sake of economy and convenience, made of cast iron, would certainly be constructed of the purer metal.

Since all other types of furnaces used in metallurgy generally and the production of iron especially have an output inferior to that of the blast furnace, generally not exceeding 20 per cent., I may say without fear of being contradicted that, if it is possible to obtain in thermo-



electric furnaces a rate of utilization equal or superior to 50 per cent. of the heat provided by transformation of electric into thermic energy, the new process may support a metallurgical industry where natural fuels are lacking. Where water power is available at a cost of about 40 lire (\$7.72) per electric h.p. year, electric smelting is not out of the question. It may also be used in special appliances even where water power is not available, when fossil fuel is abundant, or when other cheap combustibles, such as blast-furnace gases, may be utilized.

EXPERIMENTAL DATA

Lunge's tables, completed by Juptner V. Jonstorff,<sup>1</sup> give the quantity of heat necessary to heat 1 kg. of iron to 1200 deg. With the aid of this we are enabled to determine approximately, by prolonging the curve constructed on these data, the quantity of heat necessary to heat iron to the melting temperature, and beyond, while with the aid of the data given by Grüner, Ledebur and other prominent metallurgists we can ascertain the quantity of

COMPOSITION OF ORE TREATED AT DARFO

	Per Cent.
Fe <sub>2</sub> O <sub>3</sub> .....	93.020
MnO.....	0.169
SiO <sub>2</sub> .....	3.790
S.....	0.058
P.....	0.056
CaO, MgO.....	0.500
H <sub>2</sub> O.....	1.720

COMPOSITION OF IRON PRODUCED IN ELECTRIC FURNACE

	Per cent.
Fe.....	99.764
Mn.....	0.092
Si.....	trace
S.....	0.059
P.....	0.009
C.....	0.092

He further reported that a consumption of about 5 h.p.-hours of current was necessary for each kilogram of metal produced, thus obtaining a thermic efficiency of about 60 per cent.

After the tests performed at Darfo I erected on behalf of the War Office in the Artillery Construction Works of Turin a furnace of the rotary type, in order to produce the steel needed for the production of artillery shots by using iron and steel turnings.

and 1 kg. of cinder, to 1900 deg., we are able to ascertain the average thermic output of the new furnace.

CONSUMPTION OF CALORIES IN THE FURNACE.

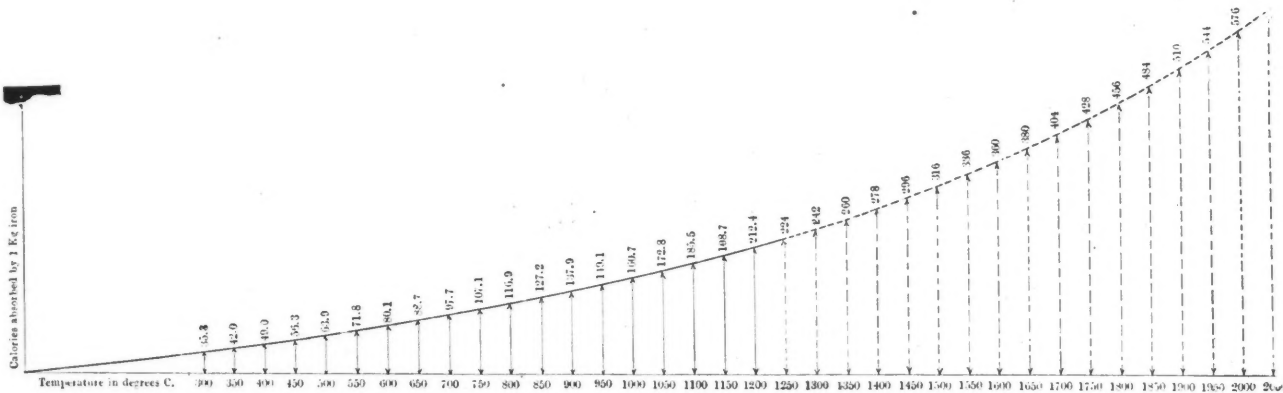
Iron, 600 kg. to 1900 deg.....	306,000 cal.
Slag, 10 kg.....	6,000 cal.
To reduce 29 kg. of ore.....	30,885 cal.
Total.....	342,885 cal.

As the average quantity of energy absorbed by the furnace in every operation was 772 kw.-hours, equal to 667,256 cal., the thermic output of the furnace was:

$$\frac{342,885 \times 100}{667,256} = 51.42 \text{ per cent.}$$

This result, which apparently differs from that obtained by Dr. Goldschmidt at Darfo, in reality agrees perfectly, the difference being due to a greater absorption of heat by the water of the coolers of a three-electrode furnace.

These results show that with this furnace it is possible to obtain: (1) A thermic output above of 50 per cent. of the electric energy used, even with installations of low power, involving greater losses; (2) Malleable iron products di-



## Expenses of Development in Sonora

By F. J. H. MERRILL\*

In a region of new mines the cost of development is an important topic and with the present flow of American capital into Sonora development expenses are of interest at more points than are the expenses of mining.

The so called successful promotor often seems to find it to his interest after raising some ready money, to rush a large shipment of machinery into the field and raise additional funds by selling stock on the show of machinery at the surface, the average small investor being more impressed by the array of machinery which he can see, than by underground details which he cannot understand.

There are, however, many who are anxious to do as much work as possible on a limited supply of funds and to such the following notes may be of interest.

### CONTRACT WORK

It is in general much cheaper to work by contract than by day's labor, because the miner is stimulated by the gambling chance of increasing his earnings by meeting easy ground. Prices of labor vary from \$2 to \$3 (man) per day away from the larger mining camps where rates are higher, and the scale for contract work should be adjusted so far as possible to give the workman the daily wage which he may fairly earn. This requires experience on the part of the employer.

The following is a scale in actual use on the western edge of the Magdalena district: Sinking shaft 5x7 ft. three men with windlass—first 10 ft., \$5 per ft.; second 10 ft., \$6 per ft.; third 10 ft., \$7 per ft.; fourth 10 ft., \$7 per ft.; fifth 10 ft., \$10 per ft., Mexican currency. Below 50 ft. the employer furnishes a whim, a gasoline hoist or a steam hoist. With the whim he furnishes two mules and their feed. With the gasoline or steam hoist he furnishes fuel and an engineer for each shift. The whim is most effective up to about 150 ft. Below 50 ft. the rate for sinking is \$10 per foot. Drifting or cross-cutting 5x7 ft. at all levels is \$7 per foot. This scale would be increased 50 per cent. in some places and under some conditions of hard rock or otherwise. Also if the employer is inexperienced he may have to pay much higher prices. A whim costs at Nogales, Arizona, \$125 gold, timber for bed and head-frame all fitted, \$50. A steam hoist, smallest size, costs about \$600. Buckets and steel cable are, of course, extra.

The labor and expense of erecting the whim and head-frame or installing the hoist must of course be considered. It varies with the character of the surface

and involves the time of two or three men from two or three days to a week.

### SUPPLIES

In general the employer furnishes all tools and timber, the contractor paying for everything except wood and steel. Powder, caps and fuse are sold to the contractor at cost. Labor in timbering is paid for by the employer at the prevailing rate per day. In the present case the rate is 25c. per hour. Tools are sharpened by the contractor in his own time. Charcoal for the forge is supplied by the employer, costing \$1 per sack.

If the mine is at a distance from a source of supply, a mine store must be

Some camps make a pretense of high wages and charge 75 to 100 per cent. profit at the store thus seeking to recover a large part of the money earned.

It seems, however, wiser to pay a reasonable wage and charge only about 20 per cent. profit.

## Mineral Production of Great Britain

Reports have now been received from the quarries, or open workings, as well as from the mines, and the total mineral output of the United Kingdom in 1906 is now stated as follows, in long tons:

SUMMARY OF OUTPUT OF MINERALS FROM MINES, QUARRIES, AND BRINE WELLS IN 1906.

Mineral.	Coal Mines	Metalliferous	Quarries.	Total.
	Acts.	Mines Acts.	Tons.	Tons.
Alum Shale.....	9,454			9,454
Arsenic.....		1,599		1,599
Arsenical Pyrites.....		640		640
Barytes.....	7,199	27,827	719	35,745
Bauxite.....		6,654		6,654
Bog Ore.....			5,425	5,425
Chalk.....		2,902	4,746,408	4,749,310
Chert and Flint.....		4,912		4,912
China Clay.....			656,017	656,017
China Stone.....			57,174	57,174
Clays and Shale.....	242,821	118,521	11,245,646	11,606,988
Coal.....	251,050,809		16,819	251,067,628
Copper Ore and Precipitate.....		7,758		7,758
Fire Clay.....	2,971,173			2,971,173
Fluor Spar.....		36,280	5,569	41,849
Gold Ore.....		17,384		17,384
Gravel and Sand.....			2,354,343	2,354,343
Gypsum.....		196,143	28,884	225,027
Igneous Rocks.....	424	72,722	6,092,604	6,165,750
Iron Ore.....	8,209,880	1,824,415	5,466,111	15,500,406
Iron Pyrites.....	7,342	3,798		11,140
Lead Ore.....		30,226	569	30,795
Limestone.....	32,816	765,718	11,960,054	12,758,588
Manganese Ore.....	22,762			22,762
Mica.....			11,384	11,384
Ochre, Umber, etc.....		4,415	9,795	14,210
Oil Shale.....	2,546,113	409		2,546,522
Petroleum.....	10			10
Rock Salt.....		230,558		230,558
Salt from Brine.....			1,734,593	1,734,593
Sand.....		12,642		12,642
Sandstone, etc.....	126,675	168,077	4,966,398	5,261,150
Silver Ore.....		1		1
Slate.....		126,699	365,964	492,663
Sulphate of Strontia.....			14,112	14,112
Tin Ore.....		6,276	877	7,153
Uranium Ore.....		11		11
Wolfram.....		263	8	271
Zinc Ore.....		22,824		22,824

opened. This is subject to a government tax of 0.5 per cent on the sales. A permit is issued from the district capital. Permits to sell cigarettes and cigars are also necessary.

The stock of the store need not be very varied. Flour, coffee, beans, sugar, potatoes, and cheese are the staples. A few canned meats, and a supply of cheap cigarettes make up the stock. A few articles of clothing are from time to time called for and it is safest to produce these on special order so as not to have much money locked up in uncertain stock.

This of course refers to a store for development work which may turn out unsatisfactorily and from which it may be desirable to break away at short notice.

The Sonoran mine laborer is generally of a happy, indolent type with undeveloped intellect. Usually he is able to do only one thing, is easily managed with kindness and quickly discouraged by harsh treatment.

Coal and iron ore both showed increases in 1906, as compared with the previous year. The gain in coal was 14,938,692 tons, or 6.3 per cent.; that in iron ore was 909,703 tons, or 6.2 per cent.

## An Odd Effect of Unwatering

An odd thing recently happened to dredge No. 2 of the Folsom Development Company while at work in its pond or pit below Folsom, Sacramento county, California. A tunnel, a part of some old mining works, was struck, and within three minutes all the water had been drained from the dredger pond, although at the time water was being piped at the rate of 300 in. per minute. The dredge was not injured to any great extent, although it will be a week probably before operations can be resumed. It will be a difficult matter to make the pond hold enough water to again float the boat.

\*Mining geologist, New York.

### Tool Room Care and Economy

By F. G. DE SAUSSURE

Good tools are as essential to an organization as is good material. The tool room is the very heart of the modern shop. Much attention has been given to material, but the care of tools is woefully lacking in most of our large plants and systems, and yet a saving of expenses in this department is easily accomplished.

#### THE FOUR ESSENTIALS

For the tool-room foreman to care for the tools, it is necessary for him to know at all times the location of any particular tool, whether in service, under repairs or on the rack, and to gain this information a checking system must be installed—one that will cover at least four points: (1) Tools in service; (2) tools under repair; (3) tools ordered; (4) tools to be

is that a better and easier surface for the painter is obtained.

#### LAYING OUT THE SIGNS

An easy method of laying out these tins is as follows: Take a roll of ordinary wrapping paper and saw 2 in. off the end, thus giving a slip of paper 2 in. wide and several hundred feet in length. Stretch these slips across the facing pieces of the rack and mark in lead pencil the size of the tool and space required. It is now easy for the painter to duplicate this upon the tin strips, and allows him to paint with them as a pattern upon a table, insuring a quicker and better job than if he had to do the work with the tins previously nailed upon the racks.

After all tools are thus taken care of, the rules to keep them in their proper places cannot be too strict. The shop management has a choice in the checking system of whether the men shall carry their own checks or have them taken

#### HOW NAMES ARE CHANGED

The continual shift of men in larger plants makes it necessary to keep changing the names from time to time, and that the tool-room foreman may keep posted and have his rack up-to-date, it would be well to adopt a form similar to the following for the men employed:

TO THE TOOL ROOM FOREMAN.—The bearer Mr. . . . . . has this day been employed by the Co.; please give him a tool check number.

Gen'l Foreman.

(Typewrite here name of man employed.)

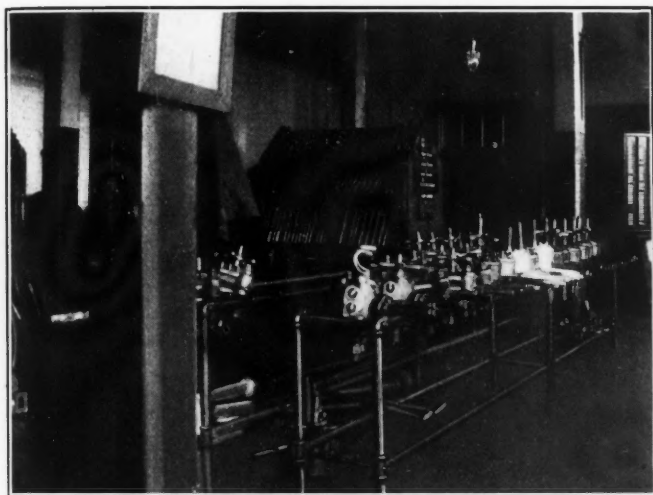
and for men leaving the service:

TO THE TOOL ROOM FOREMAN.—The bearer . . . . . is this day leaving the Co.'s employ; kindly O. K. his checks and return.

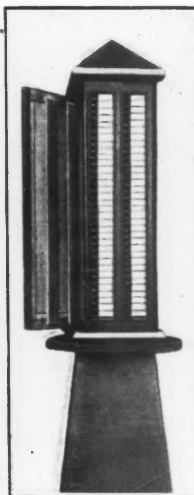
Gen'l Foreman.

Tool Room Foreman.

The object of repeating the name of the man employed is that in the tool room



TOOL RACK



CHECK RACK



AIR-MOTOR RACK

ordered. But, to have a checking system it stands to reason that each tool belonging to the shop must have a separate and distinct place in the tool room and that its name, size or number be clearly stenciled under its place in the rack. There are numerous forms of racks, upon which the smaller tools, such as drills, taps, etc., may be kept, some conical in form, flat shelves or pigeon holes; but, for economy of space and simplicity, the slanting rack, as shown in Fig. 1, is probably the best. These racks are cheap in construction, durable and clean, and can be placed wherever most convenient.

Upon the facing strips of these racks the name and size of the tool should be clearly stenciled, yellow chromine letters upon a black background making a good combination, and to do this, strips of bright tin cut 2 in. wide are lamp-blackened, and the letter then stenciled upon them. The reason for using tin instead of painting upon the board itself

care of in the tool room. Experience compels me to say that, where the checks are carried by the men many complications will arise—checks left at home, lost, borrowed, stolen, and the interchange of check for tool other than at the tool room window. The first cost of taking care of the checks in the tool room is probably a little greater than when every man is given his bunch of checks, but its simplicity and accuracy soon pays for the cost of construction of a check rack. In the check rack illustrated in Fig. 2, the name of every employee is placed opposite a small pigeonhole containing twelve tin checks, say  $5/8 \times 1 1/4$  in. Each check (Fig. 3) has a small hole punched in one end, so that it may be hung upon a brad driven opposite the stenciled size of each tool. The employee's name is typewritten upon heavy paper, and this paper then cut into strips  $3/4 \times 2$  in. and the pieces placed between the edges of the folded tin receivers that are fastened to the name panel.

this lower name may be cut out and placed in the rack.

The racks themselves may be square, hexagonal or octagonal, according to the number of men employed, they should be made of light material and have one side, or face, hinged to act as a door. To remove or replace a name, open the door, turn the thumb catches down, remove panel to the inside of the rack and take out or slip in the name between the edges of the folded tin.

Let us now illustrate the system by following a tool. The employee, John Smith, No. 98, comes to the delivery window and wishes  $3/4$ -in. standard taps. The tool boy takes check No. 98 from the pigeon hole as he passes toward the tap rack, hangs it on the brad opposite  $3/4$ -in. "Standard Taps" and delivers the tools to Smith at the window. When the tools are returned the check is again placed in the pigeon hole opposite Smith's name, or No. 98, and the tools placed on the rack in their allotted space.

SPECIAL CHECKS

To cover the four points enumerated above as being essential to a good checking system, the foreman should have on hand, say, 50 checks of the ordinary size painted blue, 50 red, and 50 painted yellow. A small blue print, framed and hung in the tool room, will explain the use of these colored checks. Thus: John Smith brings back the 3/4-in. standard taps, and one of them is broken. It cannot be used again, and so its place is vacant. If it can be repaired, hang a yellow check in the place of Smith's, again placing his in the pigeon hole, and place the tool under repairs as soon as practicable.

If it cannot be repaired, place a red check and replace the broken taps with a new set from stock, thus keeping the rack full, and check out when called for, just as if the red check were not there. When

It often is the case, especially in the larger plants, that more than one tool room is required. Take, for instance, a manufacturing concern in which the boiler shop is located some distance from the machine department. It would be an utter waste of time for a boiler-maker to be compelled to go to the machine department tool room for every tool that he might require, and it would surely be economy to have a small tool room in the boiler shop and equip it with such tools as are most used in boiler making. But it would be impracticable to give both shops an elaborate equipment, and for this reason some means of interchange between the two places must be established which will avoid the error of having an undue number of toolmakers, and yet provide ample facilities for the proper care of all tools and not complicate mat-

with this exchange check he is entitled to any tool from the main tool room. When he has finished using the tool, he takes it back to the main tool room, receives the exchange check back, which, when taken to the boiler-shop delivery window, will be again changed for his check, which is now replaced in the pigeon hole. This has the double advantage of keeping the men under their own departments, and at the same time protects the main tool room.

BROKEN TOOLS

Although many tools are broken through no fault of the operator, still it is safe to say that there are quite a number damaged through carelessness; and it is another case of the innocent suffering with the guilty. There should be a record kept of broken tools, and this record

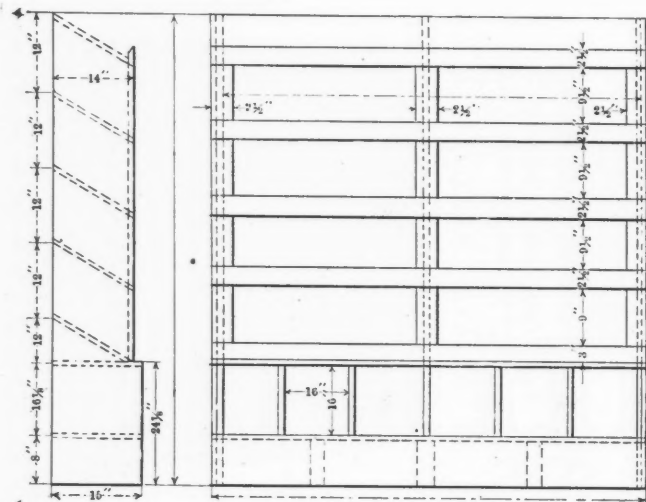


FIG. 1. DETAILS OF TOOL RACK

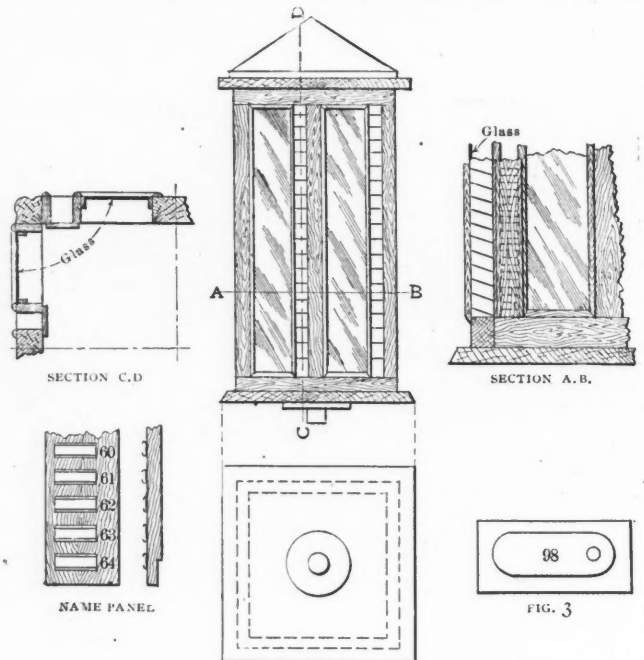


FIG. 2. DETAILS OF CHECK RACK

ordered on either special or regular requisition, place the blue check on the brad. The difference between the "To be Replaced" and the "On Requisition," is readily seen to prevent the same tool being ordered on two requisitions. This method of checking enables the foreman to tell at a glance just where all tools are and what should be ordered to replace those broken or lost.

SPECIAL TOOLS

The tool room foreman should number all air hammers, air motors, jacks and tools of that kind, and a board (Fig. 4) should be placed near the delivery window, and the hammers, motors, etc., checked out in the usual manner, only the checks being hung upon the board, since the hammers are kept in an oil bath and the motors on a rack made of iron pipe, where it would be difficult to have brads opposite the tools.

ters so that it is hard for the workman to secure whatever tool he may desire.

THE MAIN TOOL ROOM

To reduce the number of toolmakers, establish one place as the main tool room and have all tools in need of repairs, or to be made, brought to the foreman of that place, and give that foreman charge over both tool rooms, so that there may be a clearly defined head, and someone to whom all business pertaining to that department may be referred. To prevent the carrying of the boiler-makers' names in the machine department tool room, and the consequently large rack, an exchange check should be used. Thus, a boiler-maker desiring a tool not kept in his department goes to the delivery window, and his check is taken from the pigeon hole and placed on a board in the place of a similar check marked "Boiler Shop Exchange," or simply "B. S. Exc.," and

should be forwarded to the shop foreman and a careful investigation made, for it is only through some such system that the condition of the machine, as well as the carelessness of the employee, may be checked.

NAME OF SYSTEM.

Report of Broken Tools.

Date .....  
 Tool Broken .....  
 Broken By .....  
 Remarks .....

Approved.

T. R. F'man. Gen'l F'man. Mast. Mech.

On some of the larger railroad systems there are many special tools made at the different shops and used locally, but these tools are a long time finding their way into more distant shops, and for the purpose of having them in general service a "Book of Special Devices" should be made up at the head office. Each master mechanic should be fur-

nished with one of these books, and, as a special tool is made, a drawing of it should be made and blue prints from this drawing sent to the master mechanics for their books, and the tool-room foreman should be at once authorized to construct these tools and place them in service.

**MAINTAIN STANDARDS**

But above all is the question of a standard, and the reader will pardon a rather bold statement when I say that there should be no special tools, or, more correctly, no odd thread taps; no taps ranging in sixty-fourths or even thirty-seconds. If it is found that a certain class of engine needs a certain tap for its grease cup or crank-pin nut, then make that into a special device and have it a standard for the entire system. If a hole needs to be tapped in thirty seconds, a shim of tin placed by the tap will answer all purposes. This thing of every shop having its own ideas as to what thread a certain nut should have, and no other shop having the same thread tap, is entirely wrong and very expensive. All taps of a size should have the same size heads (as large as the stock will permit). All reamers of the same

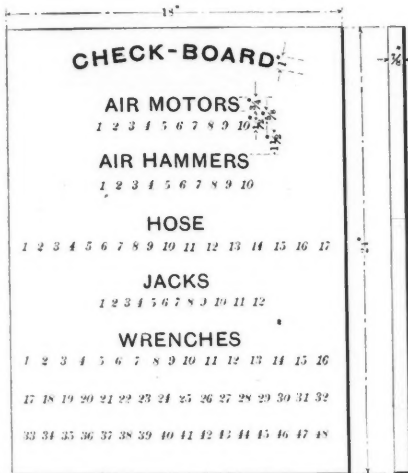


FIG. 4

class should have the same taper per inch, the double- and single-end wrenches should fit the squares; "Morse tapers" should not be ground by hand on an emery wheel, and many other things too numerous to mention, which, if permitted, will make a waste that would bankrupt the best of firms.

The questions of light, heat and size of shop make it impossible to give any definite statements or drawings as regards the tool-room layout; that part of the matter must be governed by local conditions. One thing, however, should always be remembered, and that is that cleanliness is of the greatest importance, and, with this end in view, do not make your tool room into a storehouse nor yet into a junk pile.

**"At the Works"**

By R. W. RAYMOND

I borrow the title of this article from a book which has recently appeared in England<sup>1</sup>, and to which, by reason of both its individual merit and its representative character I desire to call the attention of students of the "labor question." The literature of this subject, voluminous as it is, still fails to furnish the body of clearly observed and accurately recorded data which is necessary to safe inductions of general value. Magazine writers, bound to make impressive, picturesque and readable articles; partisans, seeking to advance their own theories or interests; sentimental philanthropists, to whom every hardship is a wrong, and every radical change of the social order is a remedy; politicians, regarding every wave of popular unrest as an aid to their own private navigation—until the tide changes; governmental committees of inquiry, tabulating assertions as if they were facts, and seeking to draw conclusions which will offend nobody; boards of arbitration, whose object is peace through compromise, rather than justice at any cost—these are too often the sources of our knowledge of the labor-problem. Assuming them all to be sincere and honest (which certainly not all of them always are) they are still affected by the lack of quantitative measurements and the substitution of emphasis for weight in their statements of the fundamental elements of the problem. As a result, we are distracted by the advocacy of impracticable or ruinous remedies for non-existent, unavoidable, transitory or self-correcting features of the industrial situation.

What we want above all is *facts*. Are the poor really growing poorer, while the rich grow ever richer? Is the freedom of individual contract, protected and enforced by law, achieved by so many centuries of struggle and progress, a failure? Is socialism our only refuge from anarchy? These profound questions are daily treated as if they could be settled by eloquence, enthusiasm, or even brute force, without any thorough preliminary inquiry into the facts.

In this hasty and hysterical condition of public opinion, every calm and just, as well as sympathetic, report of the simple facts is most welcome; and to this class belongs the little book to which I have referred. Lady Bell, the author (already known in literature through several works of fancy and criticism, quite unlike this one), is the wife of Sir Hugh Bell, the son of Sir Lowthian Bell, and now the president of the Iron and Steel Institute, as well as lord lieutenant of the North Riding of Yorkshire. Those who know him need not be told how worthily his

<sup>1</sup>"At the Works, a Study of a Manufacturing Town." By Lady Bell (Mrs. Hugh Bell), London, 1907.

wide knowledge, genial sympathies and practical wisdom have enabled him to continue the work of his illustrious father. But, in my judgment, he needs no illumination, and suffers no eclipse, from his father's fame. I regard Sir Hugh Bell as one of the ablest men in England.

The wife of such a man may be (like Lady Lyell) his constant and co-ordinate co-laborer. Or, she may have her own distinct sphere of interest and influence. Lady Bell seems to have pursued a middle course. While reinforcing her husband in the manifold social duties of his position, she has made, for nearly 30 years, a close and sympathetic study of the actual conditions and lives of the operatives in the iron industry of Middlesbrough. Of this she now publishes the result. Her own description of the scope of her book is at once its best definition and its highest merit. She says:

"I have not attempted to deal with the larger issues connected with the subject . . . with the great questions involved in the relations between capital and labor, employers and employed; I have tried but to describe, so far as it is possible for an onlooker to do so, the daily lives of the workmen engaged in carrying on the iron trade of this country in one of its centers of greatest activity."

Let us fervently give thanks for a piece of work so modest, yet so thorough and sincere. However tempted, I shall not, on this occasion, at least, mar my praise of it by using it in support of any views—even my own!—on the "labor question." All I would do now is to recommend the perusal of it to all honest students of the subject.

In successive chapters, the book treats of the Genesis of the Town; the Process of Iron-making; the Expenditure of the Workman; Illness and Accidents; Old Age, Joint Households, and Benefit Societies; Recreation; Reading; the Wives and Daughters of the Ironworkers; Drink, Betting and Gambling. These topics are treated with keen perception and practical wisdom, as well as graphic descriptive power. Lady Bell must be recognized as one of the select company who set forth "things as they are."

Newfoundland has long been known to be rich in minerals, but thus far only copper, iron-ore and pyrites mines are being operated on a large scale. Copper has been worked more or less extensively for about 50 years, and the annual output of late is about 70,000 tons of ore. Iron ore is exported to the extent of about 750,000 tons. Iron pyrites is shipped to the amount of 50,000 tons. The average value of mineral export for the past four years is \$1,377,374, products of barite, slate, talc, etc., being included. For some years past boring for coal under government direction has been carried on over an extensive area in the interior, where the existence of carboniferous deposits has been proved, but thus far no substantial progress has been made locating any of commercial value.



a depth of 50 m. and two levels and 17 crosscuts led out from the shaft. From these developments, it was learned that there were two thick high-grade seams, and between these a somewhat thinner deposit of low-grade ore. But with increased depth this low-grade deposit grows smaller in size while the richer deposits increase considerably. There is therefore a possibility that at lower levels this poor deposit will disappear altogether.

The minerals in the formation consist of copper glance, malachite, azurite, galeana, cerusite, a little zinc blende, calamine, clay and quartz. Analyses show also small amounts of antimony and arsenic compounds.

The distribution of the ore in the deposit is very irregular as is shown by the mine development. On account of the varying ratios of the sulphides and carbonates of lead and copper, an accurate estimate of the average metal contents is not possible. C. James, who opened the mine as far as the 50-meter level, estimated that there are about 293,000 tons of high-grade ore averaging about 12 per cent. copper, 25.3 per cent. lead, and about 191,000 tons of low-grade ore running 2.9 per cent. copper and 4.4 per cent. lead. Recent development work in the western part of the orebody, especially in the extension of the second level at a depth of 70 m., has shown an increase in value of the ore.

#### MINING AND SMELTING

Repeated experiments have shown that a separation and concentration of the lead and copper ores cannot be made by mechanical or wet means, and a complete separation of these ores is out of the question on account of the amount of carbonates present, which are too near each other in specific gravity to allow proper concentration. But the massive character of the ore allows a hand separation and all low-grade material is eliminated, and direct smelting of the concentrate can be carried out. The massive replacement character of the deposit permits a very complete winning of the mineral without loss.

In order to win the high-grade outcrop mineral without excessive underground development there is installed a mechanical equipment for hauling from open cuts along an inclined way. In addition to this system, there is a main hoisting shaft sunk in the hanging wall of the deposit and connected with the surface work by an inclined crosscut and through this shaft a part of the ore is hoisted. By this means, it will later be possible to attain the maximum daily production of 400 to 500 tons.

It is proposed to smelt the ores after sorting and to produce work lead and copper matte containing 40 to 50 per cent. copper, and to refine these products and ship metallic copper, lead and silver

to Europe. Smelting operations are expected to be under way by the middle of 1907.

### Genesis of the Copper Deposits of Yerington, Nev.\*

BY E. P. JENNINGS†

The Yerington copper deposits in Lyon county, Nevada, 40 miles southeast of the famous Comstock lode, present many interesting features. The Mason Valley mountains in which the mines are located are a small north-south range about 25 miles long and three to six miles wide with a maximum elevation of 6500 ft. above sea level and 2000 ft. above the valley of the Walker river.

The core of this range is intrusive granite, exposed in the higher peaks and in the deeper cañons where the erosion has been greatest, but covered by metamorphosed sedimentary strata on both the eastern and western slopes. Late rhyolite flows occur along the eastern base of the mountain. The intrusive granite is a coarse-grained mixture of feldspar, quartz, hornblende and biotite, becoming porphyritic in structure near the contacts.

Resting on this granite are beds of rock several hundred feet in thickness composed of the lime-alumina garnet, grossularite, graduating into andradite by the partial replacement of the alumina and lime by iron. This rock varies in texture from a compact mass to a coarse crystalline aggregate of a cinnamon-brown color.

Thick beds of white to gray crystalline limestones cover portions of the garnet rock, but their original area has been greatly reduced by erosion.

An extensive series of metamorphic rocks also occurs, greatest development being on the west side of the range where the strata have a nearly vertical dip and a thickness of 3000 ft. This series is unconformable with the garnet and limestone on the western slope and separated from them by a fault which has dropped this later series into its present position. These rocks are not as well developed on the eastern side and their relation to the garnet-lime series is obscure. In composition they range from silicified limes to microscopic aggregates of tremolite, lime-silicates and biotite, and probably were lime shales and slates originally.

The eastern foot-hills are covered by late flows of rhyolite that have no connection with the ore deposition. The structure is complicated by a system of folding and faulting older than the granite intrusion, also by faulting after the mineralization.

\*From advance sheets of the *Jour. Can. Min. Inst.*, Vol. X, Toronto meeting, 1907.

†Mining engineer, Salt Lake City, Utah.

#### THE OREBODIES

Copper ore occurs in the garnet rock as an impregnation throughout portions of its mass and as richer concentrations in fractures and shear zones; also as bedded veins in the marbleized limestones. The effect of the folding and fracturing of the strata previous to the granite intrusion has been to localize, in a degree, the deposition of the ore in the garnet rock along these fracture zones, giving the deposits the appearance of fissure veins filled with chalcopryrite disseminated in a garnet or garnet-epidote gangue, which has a laminated structure parallel to the boundaries of the fractured zone. On each side of these fissures the garnet rock is more or less impregnated with chalcopryrite, but separated in some cases by a narrow rib of barren epidote 2 to 3 ft. thick.

The lower boundary of the ore is the granite as shown in the Bluestone mine on the eastern side of the range where the contact is well exposed, chalcopryrite in a garnet-epidote gangue resting directly on the barren intrusive rock. The marbleized limestone which, in places, covers the garnet rock, contains bedded veins filled with oxidized copper ore in a quartz and calcite gangue. At water level, which in one case occurs at a depth of 600 ft., pyrite and chalcopryrite begin to appear, replacing the oxidized ore. The mines have not been sufficiently developed to show the relation of the ore in the limestone with the ore of the garnet shear zones, but that there is some connection is probable.

The original minerals of the ore deposits are chalcopryrite and pyrite which have been oxidized and partly leached, forming in the upper enrichment zone, malachite, azurite and chrysocolla, and covellite as a coating, or chalcopryrite in the upper sulphide zone. Bornite and chalcocite occur as secondary sulphides in a few instances.

These ore occurrences can be classed as contact-metamorphic deposits, but differing from the ordinary type in which the ore occurs as irregular masses near the contact, this difference being due to the preëxisting fissures which confined the ore-bearing waters in channels of great vertical extent; aside from these local concentrations the garnet is impregnated with a low-grade copper ore. Where the fissures were more open they were filled by the molten magna, forming dikes of granite-porphry. It is difficult to avoid the conclusion that in depth the two classes of orebodies will connect, forming a continuous lode, whose lower boundary is the granite and with its apex in the limestone.

#### ORIGIN

If this view is confirmed by later work, the deposits will be of great interest as illustrating the genesis of orebodies due

to the action of intrusive rock masses, the magmatic waters of which have mineralized certain preëxisting fissures, and, together with the heat derived from the molten magna, has converted certain sedimentary beds into garnet rock containing more or less disseminated ore and other beds, in a higher horizon, into marble, and also filling fractures parallel to the bedding of this marbleized limestone with copper ore.

It is not possible at the present time to determine how much of the rock metamorphism is due to the heating effects of the intrusive and how much to the introduction of new compounds by the waters of the molten magna, but we can assume that the ore is due to these waters and that the rock metamorphism was largely caused by the action of heat, supplemented by the chemical action of the water, as the garnet is more or less impregnated with ore, showing its permeability to these solutions which undoubtedly contained other mineralizers that contributed to the formation of the garnet.

The limestones, which occur at a higher horizon, have probably been altered by the action of heat alone, as they contain no ore, except in the fissures.

The district is being developed rapidly and in two years' time it is expected to become a copper producer on a large scale.

### New Silver District in the Temagami Reserve

BY L. H. MATTAR.\*

What bids fair to be a new Cobalt has been discovered up the Montreal river, 45 miles north of Latchford, a town on the Timiskaming & Northern Ontario Railroad. The first finds were made in August, 1906, followed immediately afterward by others in September and October. Few prospectors got into the territory until after navigation closed, but all through January, February and March they have gone in, in great numbers. There are about 2500 there at the present time, most of whom will remain until the ice goes. The matter of transportation is a serious one, and while the best time to move supplies is in the winter, still this spring and summer immense quantities will be required; for as the new finds are reported, more and more prospectors will go in. Plans are on foot to provide naphtha launches for the Montreal river traffic, both above and below Park rapids, with a tramway around Park rapids. This will solve the question unless the rush is phenomenal. If a provision depot could be put in at or near Mountain lake, about where the old Indian camp is, it would help the

\*Civil and mining engineer, Halleybury, Ontario.

prospector and develop the section much more quickly.

#### CLAIMS LOCATED

The country in James township is, practically, all staked now, on both sides of the river, west of the river being in the Temagami forest reserve. The township of Smythe, in the first and second concessions, is also staked; while the tier of lots in the western part of the Tudhope township is staked, the only territory at this writing near James which is not staked is in Truax and Barber townships, lying northeast and southeast, respectively.

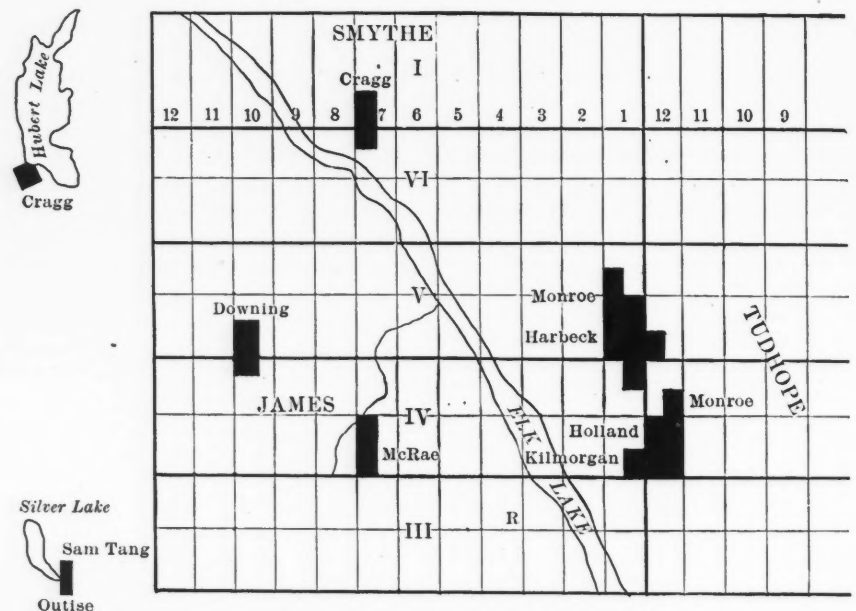
The unsurveyed portion of the Temagami reserve, lying adjacent to James and for three miles back, is staked. The finds of native silver have not been con-

#### WORKINGS

There have been no deep shafts put down as yet, but active development will begin in the early summer. All finds so far made are at or a few feet below the surface. In most cases, a few shots have blown the native silver out with its accompanying calcite.

The deepest shaft I saw was down about 12 ft., and the vein was calcite and smaltite with bloom profusely decorating the rocks, the native silver occurring with the calcite. The formation was diabase. It was a typical Cobalt district vein, the calcite particularly being similar to that in the Timiskaming Mining Company's property in southeast Coleman township.

There is no doubt but that this section will divide laurels with Lorrain township



MAP OF TEMAGAMI DISTRICT

finned to any small area, but are widely scattered. The area so far reported is about six miles wide, north and south, by twelve miles long, east and west. The strike of the formations carrying the veins is, approximately, parallel to the river.

The high ground in James and Tudhope townships, east of the river, is back about one mile, while on the west the high ground of James terminates at the water edge. The veins strike here generally northeast and southwest. The country rock is diabase, gabbro and slate, with diabase predominating.

The country has been well shaken up, the slate dikes intruding from the east. The calcite carrying the silver is the white crystalline variety; in the veins found in the gabbro rocks a reddish quartz accompanies the calcite. In nearly all cases copper and iron sulphides appear. Cobalt bloom invariably accompanies the calcite and in the diabase smaltite is shown very close to the surface in the veins.

and the Larder Lake district, as far as finds and prospecting are concerned. The accompanying sketch map shows the location of the different finds so far made. The claims are forty acres each.

In a paper by M. Frochot, on the South of Angola (*Comptes Rendus de la Soc. de l'Industrie Minérale*, April, 1907) it is stated that there are some analogies between the formations of this region and South Africa. Three diamonds of the first water were found on the border of the plateau of Huilla. At Cassinga there are numerous quartz veins, some containing gold and the others copper and lead. The nearest port is Mossamedes.—(*Min. Journ.*, May 4, 1907).

Greater working strains can be secured by the use of steel chains of the same weight than is possible with the malleable chains. The natural defects and flaws to which malleable castings are subject are avoided in the use of steel.



### Mutual Displacement by Intersecting Veins

By WALTER HARVEY WEED\*

Joints, fractures and fault fissures are all the results of the straining and cracking of rocks under pressure, and though of different magnitude, are closely alike in character. If the fractures be mineralized, they form ore deposits, the familiar fissure veins.

In many regions there are strong veins cut by cross veins, often with displacement. Very generally such displacement is assumed to be due to faulting that has taken place since the formation of the veins, and if the cross fissures carry ore they are taken to represent a later and second period of mineralization. The accompanying illustrations are particularly fine examples on a very small scale of what is sometimes found to exist in workable veins, and show that one set of veins may be displaced by another of exactly the same age.

The illustrations are photographs of specimens of black argillite from the shore of Lake Champlain, near Burlington, Vt. The rock is cut by small fractures filled by white calcite that contains silica in the center of the seams. It is the peculiar relations of these seams to one another that make the specimens of interest, as they represent on a small scale, so that it can be comprehended at a glance, features

stringers corresponding to those which make up the gold veins of Grass Valley and the Mother lode regions, California. Fig. 2 shows the same block tilted to expose the vertical section of the veinlets. This

displacing a second series of veinlets. The photograph does not bring out the details of the spraying out of the filling into both sets of fissures. As will be seen from Fig. 4, the fissures having the same strikes

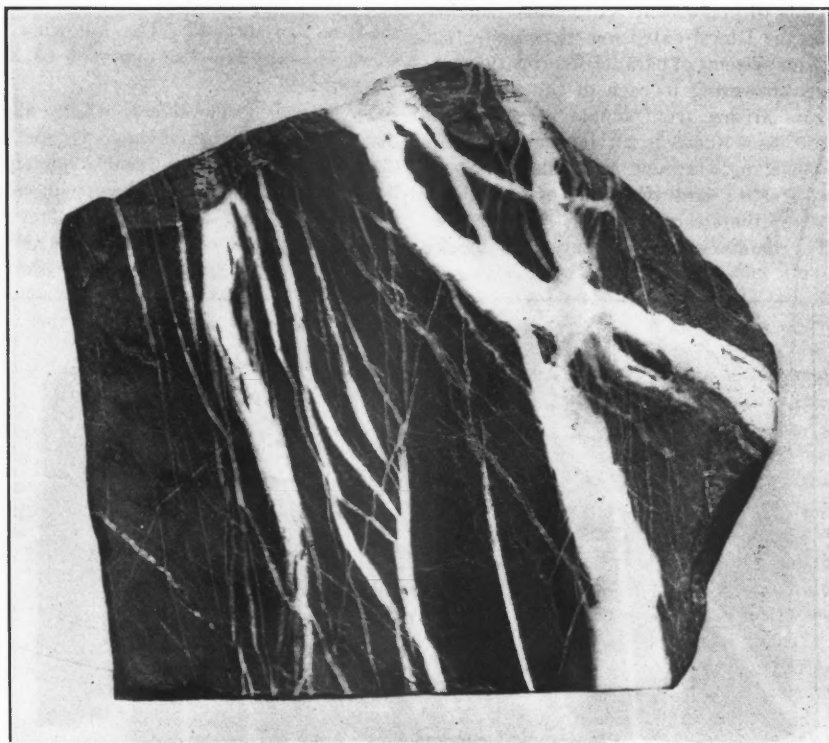


FIG. 1

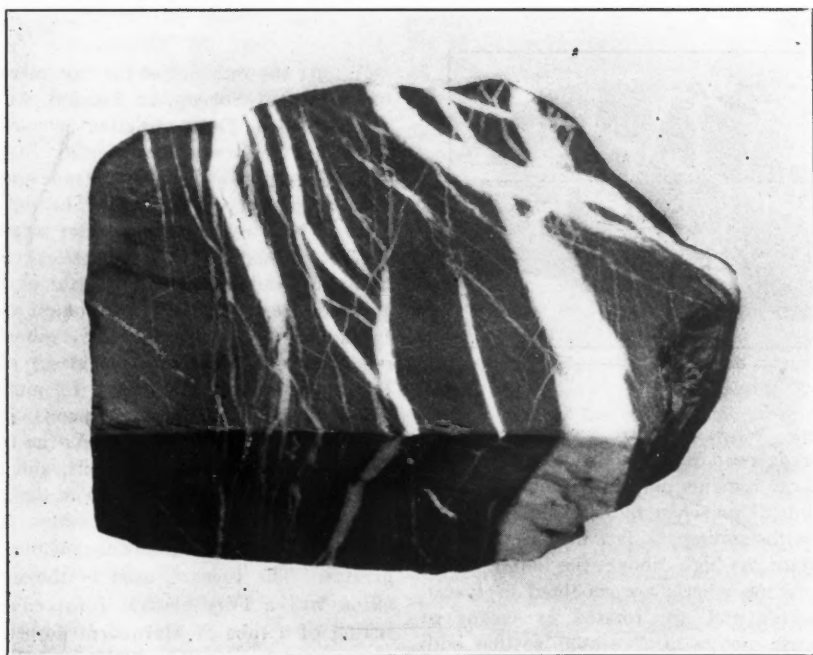


FIG. 2

which are not so easily recognizable when they prevail in large veins whose outcrops are partially concealed.

Fig. 1 shows a cluster of veinlets or

specimen also shows the features seen in the other figures, but they are relatively obscure. The specimen is typical of the ordinary type of vein fracture in slate. Figs. 3 and 4 show a group of nearly parallel veinlets displaced and themselves

are conjugate and show members with opposite dips, a feature common in joints and sometimes seen in the veins of a district. In fact, this illustration is very like the model of the veins of the Ashio copper mines of Japan, exhibited at the St. Louis World's Fair.

The experiments of Daubrée and Becker have shown that such fractures result from compression, that a force acting at right angles to a block of homogeneous brittle material will be resolved into two shearing strains that tend to rupture the block along diagonal lines, each at about 45 deg. to the plane to which the force is applied. In nature many rocks under the action of direct pressure rapidly applied behave as highly elastic brittle masses of great rigidity.

It is possible that many cases of supposed faulting of veins and of two periods of mineralization may prove to be of similar character to the fractures of the specimens illustrated here.

A direct, uniformly distributed pressure of sufficient intensity applied to an elastic brittle mass presenting great resistance to deformation would induce fracture. The ruptures would take place along those lines subject to the greatest tangential strain, since these are the directions in which the material would be first strained beyond endurance. These lines would stand at 45 deg. to the line of the force if

\*Mining geologist, 42 Broadway, New York.

the mass presented infinite resistance to deformation. If this resistance is not infinite, they will stand at greater angles to the line of force. There will generally be more than one direction of rupture and in masses the thickness of which in the direction of pressure is considerably smaller than the lateral extension there will often be four systems of parallel fissures, two systems answering to each of the two equal shears arising from simple pressure. In most cases there is an inequality of resistance and rupture will take place in the greatest and the least of the three axes of the strain ellipsoid. If the pressure continues after rupture, the blocks

### The Brennan Mono-rail System

At the last meeting of the Royal Society, at London, one of the most interesting exhibits was a model of a mono-railway by Louis Brennan, the inventor of the Brennan torpedo. The following account is taken from *Engineering* of May 10, 1907:

The car or locomotive is wholly above the rail level, and yet evinces no inclination to overturn. This result is obtained by the use of two gyroscopes with horizontal axes mounted in the car and rotated at high velocities in opposite direc-

groups, one at each end of the vehicle. Each group is a mono-rail bogie pivoted both vertically and horizontally, the car being thus able to take very small curves, and to travel over uneven ground without fear of derailment. The motive power in the model is derived from accumulators carried by the vehicle itself, current also being drawn from these to keep the gyroscope wheels rotating while the vehicle is standing. While loaded, and with a man on board, this model has been put to many tests. It is calculated that the weight of the gyroscope wheels should be 5 per cent. of the total weight of the loaded vehicle.

The model which Mr. Brennan showed in motion is large enough to carry a man, but was sent round the meeting room at Burlington House unattended. It was made to travel at considerable speed on a track about 8 ft. from the ground, and negotiated sharp curves with the greatest ease. It was also run upon a tight wire rope fixed to a stout timber frame, and the whole frame was turned down through 90 deg. from the vertical to the horizontal position. During this performance the vehicle, unaided, remained upright on the rope, and maintained its upright position till the gyroscope frames were locked, when legs were put out to support it. A wire rope was also coiled about on the platform, and the machine ran over this, taking sharp curves without difficulty.

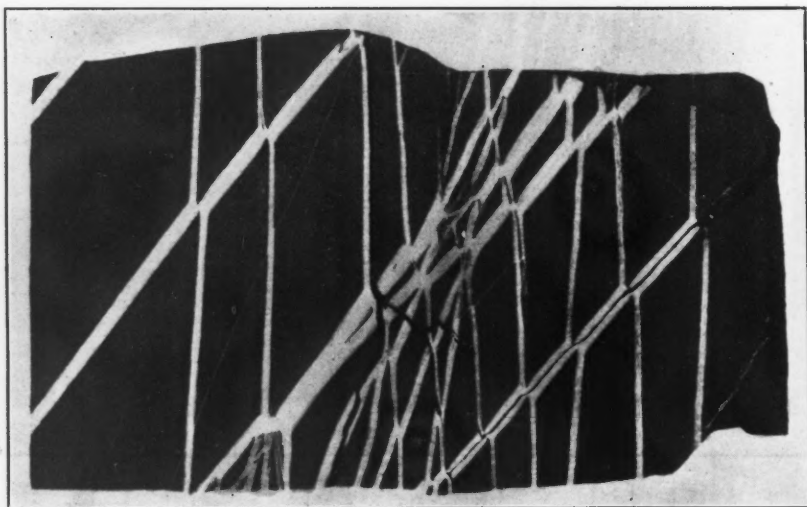


FIG. 3

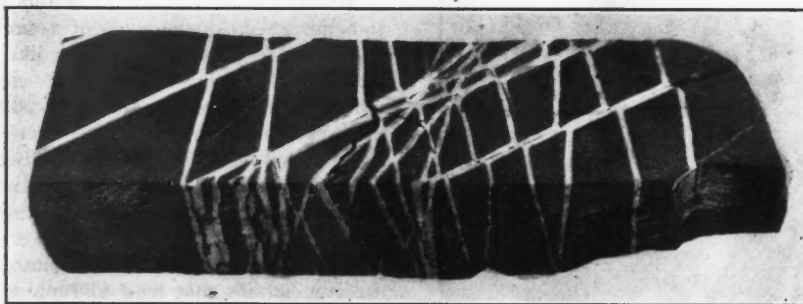


FIG. 4

will grind against each other and produce slickensides.

In nature many rocks under the action of direct pressure rapidly applied behave as highly elastic brittle masses of great rigidity. The range of the planes of maximum strain is practically nil and the systems of fissures are at right angles to one another, and it is not unusual to find such a pair of systems accompanied by a second pair in a plane at right angles to the first.

It is reported that sulphur mining has been commenced in the north of Peru at a place where brimstone mixed with about 50 per cent. of sand occurs as a surface deposit.

tions. When these are running at the required speed their influence is such that the car remains upright, either when at a standstill or when moving along its rail, notwithstanding the fact that its center of gravity is high above the latter. The gyroscope wheels are mounted in special bearings and are rotated by means of electric motors in a vacuum, so that both the bearing and air friction are very small. The energy stored up in the flywheels is sufficient to keep them revolving at the velocity necessary to impart stability to the vehicle for a considerable time after the current is cut off.

The model exhibited, which measures about 6 ft. long, is supported on four small wheels, all power driven, arranged in two

### A New Féry Pyrometer

Among the exhibits at the last meeting of the Royal Society, at London, was a self-contained Féry radiation pyrometer shown by the Cambridge Scientific Instrument Company, which marks a noteworthy advance in Féry pyrometers. The instrument, which resembles in outer appearance the usual Féry pyrometer, permits of direct reading without the aid of any galvanometer. The total radiation of a furnace is focused by a concave gilt mirror (the gold baked into the glass) on a Breguet spiral—a little spiral, 1.5 mm. in diameter, built up of three metals, gold between platinum and silver. As the temperature rises the spiral uncoils, and the pointer of the spiral travels over the dial next to the eye-piece of the short telescope tube, which contains the whole apparatus. The furnace used in the exhibition was a Féry electric furnace, consisting of a tube of Marquardt porcelain, surrounded by a helix of carbon. When the hand was held between the hole of the furnace and the pyrometer, the pointer at once receded. As the whole pyrometer is heated by the radiation from the furnace, the instrument would record too high temperatures; the pyrometer case can therefore be closed by a double shutter, when the pointer will go back to zero.

# Progress in the Use of Aluminium in 1906

Improved Methods of Working the Metal Have Extended Its Use as a Light, Durable Material and as a Deoxidizing Agent

BY JOSEPH W. RICHARDS\*

## PIN HOLES IN ALUMINIUM CASTINGS

E. S. Sperry<sup>1</sup> gives some valuable observations on this subject. These annoying defects are usually just under the surface of a casting, and are in evidence as soon as the casting is machined. They are due to the metal absorbing gases while in the furnace and giving them out as it sets. No harm is done by the material of a graphite crucible, which may be used with safety; but to get absence of gas in the metal, the top of the crucible should project out of the fire and above the top of the furnace, like a zinc-melting pot. The metal absorbs gases in the furnace rapidly if exposed to them, and much faster as the temperature becomes high. Overheating must in all cases be avoided. Mr. Sperry formulates the following general rules:

(1) Use only ingot metal, and put the largest pieces in the bottom of the crucible. (2) Do not allow the ingots or any scrap metal to project above the top of the crucible. (3) Do not fill up with coke around the crucible up to the top. (4) Take the crucible from the fire before the metal gets too hot. (5) The metal must never be heated above the correct temperature for pouring. (6) Have the molds ready before the metal is put into the crucible, so that any possible delays are avoided after the metal is melted. (7) Do not pour too cold, since air may be entangled in the pasty metal and form large blow-holes. Wet sand may also cause similar blow-holes.

For casting plates for rolling Mr. Sperry recommends using a mold having a side runner connected with the mold proper throughout its height by a 3/16-in. slot. Dross remains in the runner, and only clean metal enters the mold. Runners and gates are best cut off by band saws.

Amos Brown<sup>2</sup> recommends using chills at such parts of an aluminium casting as are ordinarily provided with risers. The latter are often a detriment to a fine casting, causing shrinkage cracks and being difficult to cut off. Pieces of sheet copper or brass, rather thick and flat, about 1/16 in. thick, may be used as effective substitutes, being placed so as to cover the part of the casting which it is intended to chill

Note—From advance sheets of *The Mineral Industry* Vol. XV. In deference to the wishes of Professor Richards, his preferred spelling aluminium has been retained in his article, although the regular style of the JOURNAL is "aluminum."—EDITOR.

\*Professor of Metallurgy, Lehigh University, Bethlehem, Penn.

<sup>1</sup>*Brass World*, January, 1906.

<sup>2</sup>*Brass World*, December, 1906.

into shape. They thus can be made to cause heavy portions of the casting to cool off as quickly as the lighter parts which are not chilled, and thus preserve the shape of the heavier parts, avoid unequal cooling and shrinkage strains. The chill should be cleaned from scale or grease by emery cloth. The proper heat for casting the aluminium is a very low red.

## PLATING

A. Giroux claims to have obtained satisfactory results principally by giving great attention to the preliminary preparation. The articles are first cleaned in potassium cyanide solution until the greasy spots are loosened; then cleaned by brushing with powdered pumice until a clean surface is obtained. They are then to be well washed and dipped into caustic potash solution until gas bubbles are evolved, and are then immersed in cold water. They are then dipped into a solution containing 0.2 per cent. of corrosive sublimate and 2 per cent. of potassium cyanide. They are then dipped once into the caustic potash solution and placed at once in the plating bath. The plating must be done slowly and evenly, not at any time showing evolution of gas; only in this way can an adherent plating be obtained.

## SOLDERING

A. W. King, in U. S. pat. 811,725, Feb. 6, 1906, coats the surfaces of aluminium to be soldered with an alloy containing 3 tin, 7 lead, 5 zinc, and 5 to 8 aluminium. The surfaces are cleaned, scraped and heated, then the solder rubbed in until the surfaces are coated. The surfaces thus prepared can then be soldered with ordinary half-tin, half-lead solder.

B. C. Senton (U. S. pat. 809,472, Jan. 9, 1906) patents the solder containing 12 parts tin, 2 zinc and 1 aluminium, which ingredients are melted together, using 1 per cent. of common salt as a flux. Antimony may be added to make it harder.

Of the hundred (more or less) solders which have been recommended or patented since Mourey first essayed the problem in 1855 none has entered into commercial use to anything like the extent of the solder of Joseph Richards (U. S. pat. 478,238, July 5, 1892). This solder contains 29 parts of tin, 1 of zinc, 1 of aluminium and 1 of phosphor tin. It has been manufactured and sold regularly for the last 15 years, the sales in Europe in 1906 being larger than that of any preceding year. Its use is described in Richards' "Aluminium," p. 467.

## WELDING

The art of welding aluminium surfaces together, while heating by the hydrogen blowpipe flame, has increased in its applications considerably since it was first exhibited at the Paris Exposition of 1900. It is used considerably in working aluminium in the United States. M. U. Schoop has made a specialty of this art, and visited the United States early in 1907 for the purpose of introducing his latest improvements. He uses an hydrogen-air blowpipe and a flux, the composition of which is kept secret, which is said to dissolve all grease, oxide, alumina, etc., and enable perfect welds to be easily made. Tests made at the Conservatoire des Arts et Métiers have shown the welds to be equal in strength to pure aluminium. Tubes of any size can be made by spiral welding of sheet.

M. Posno, of Paris, has also made advances in this art, and has founded the Société Française de Brasure de l'Aluminium to operate his methods.

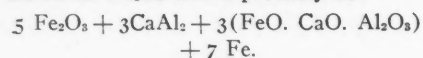
## USES

*Deoxidation*—Aluminium is largely supplanting phosphide of copper as a deoxidizer in brass and bronze, in which it acts by reducing the oxides of copper, zinc or tin with which the metal may be contaminated. A small excess of aluminium does not injure the metal so much as a small excess of phosphorus. Care must be taken, however, not to cast the alloy immediately after using the deoxidizer, since the alumina formed must be given an opportunity to rise out of the metal and enter the slag. If this is not done, the quality of the metal may be injured by the intermingled alumina. With pure copper used for electrical purposes, silicon is found superior as a deoxidizer to aluminium, because the silica formed is less infusible, tends to unite with copper oxide to a fusible slag, and thus gets out of the melted metal quicker and more completely, leaving it with higher electric conductivity.

Dr. Hans Goldschmidt, the inventor of the process of reducing metallic oxides by powdered aluminium, has recently patented improvements in his method of obtaining fluid iron at high temperature for welding purposes. In place of aluminium as the sole reducing agent acting upon iron oxide, producing the difficultly fusible alumina, he uses a granulated alloy of calcium and aluminium, or a mixture of these two metals in granular form. This alloy gives a very high thermal effect,

higher even than aluminium alone, while the heat of formation of the aluminate of lime slag is also utilized, and the slag is much more fusible than alumina alone.

Supposing the alloy of calcium and aluminium to contain 42.5 per cent. of calcium, corresponding to  $\text{Ca Al}_2$ , the reaction on  $\text{Fe}_2\text{O}_3$  would probably be:



In this reaction 70 per cent. of the iron in the oxide used would be reduced to the metallic state, while the resulting slag would be very fluid, and 1.4 parts of fluid iron at high temperature would be obtained per one part of calcium-aluminium alloy used.

*Coinage*—It is again rumored that the United States mint will again try the suitability of aluminium for coinage of cents—a subject which I strongly advocated in 1895.<sup>1</sup>

*Electrical Conductors*—The Niagara, Lockport & Ontario Power Company now transmits power 160 miles to Syracuse and 200 miles to Cleveland. The equipment to Syracuse contains 12,000 miles of heavy wire, in three cables of 19 strands each. The voltage is 60,000.<sup>2</sup>

#### PAINT

The metallic paint of silver-white color made of powdered aluminium has deservedly become quite popular for outdoor work. The analysis of a European paint powder, made by Kohn Abrest, showed: metallic aluminium (trace of iron) 91.20 per cent.; aluminium oxide (alumina) 5.80 per cent.; silica, 1.30 per cent.; insoluble silicon, 0.40 per cent.; carbon, 0.23 per cent.; moisture, 1.07 per cent.; total, 100. The large amount of alumina is due to the incipient oxidation of the powder. These powders are often adulterated by zinc and tin dust; mica and similar "fillers" may be likewise present, distinguishable by the large residue insoluble in acid. The powder is manufactured by forcing gas or air into the melted metal while it is setting, accompanied by vigorous mechanical stirring. This granulates the metal, forming a film of crystalline metal partly oxidized, which is easily pulverized. The powdering of this spongy or granulated metal is done in stamp mills or disintegrators, afterward sieving to different sizes and finally polishing in polishing mills.

The powder was originally suspended in various forms of spirit varnish, but it is now used in thin oil varnishes, such as would be made by warming, mixing and stirring well together the following: turpentine 1.5 gal.; palest copal varnish, 0.5 gal.; palest terebine, 4 oz.; magnesium carbonate, 4 oz. The magnesia is allowed to settle and the clear liquid is drawn off. The metallic powder is stirred into this liquid, about 2 lb. of powder to a gallon

of liquid. The paint shows up better if applied to a warm surface, and a colorless lacquer on interior work or white copal varnish on outside work, protects it well.

*Racing Shoes*—The Bryden Horse Shoe Company of Catasauqua, Penn., makes aluminum racing shoes weighing 2 oz. each and selling for \$1.25 the set.<sup>1</sup> They have a rim of steel set in edgewise, being cold rolled, slotted, and the steel strip inserted by machinery. Racing men say that, "An ounce off a horse's foot is equal to a pound off his back."

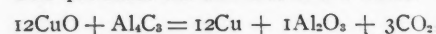
#### MISCELLANEOUS

G. R. Gibbons<sup>2</sup> classifies the various uses of aluminium as those based on its low specific gravity, its chemical characteristics, its color, its electric conductivity, and those based on combinations of these properties. He catalogs the new uses, as follows. *Light durable plates*—sticking up or transfer plates in lithography, for spreading gelatine in colotype work, die plates for supporting dies of embossing machines, cauls for veneering wood, ivory, etc., press plates for book binders, trays for clipped fur in making hats, shipping receipt binders, stub binders, darbies and hawks for plasterers; *parts of musical instruments*—snare and kettle drum shells, xylophone bars, small bells; in pianos and organs, the molding, tops, bushings, action parts, piano-player fingers, air tubes, organ slides, blowers and valve rings; *machinery*—typewriter and adding machine key levers, platencores, frames, graphophone parts; *miscellaneous*—kodak or camera cases, frames for dress-suit cases, traveling bags, trunks and sample cases, eye-glass cases, cost ledger backs, spirit level frames, pans for stearin manufacture, parts of scales, mailing tubes, fishing reels, blocks for forming hats, artificial limbs, gold-washing pans, bowling balls, bench marks, saddle trees, embalming table covers, dowels for stone work, refrigerator linings, beer coolers, dipping baskets (especially for use in nitric acid), aniline evaporating pans, apparatus used in manufacture of gun-cotton, cream of tartar, rubber (mandrels, forms, labels, pans in vulcanizing process), lasts for rubber boots, engine lagging, show-case molding, buckles, telephone diaphragms, mouth-pieces and receiver caps, sounding bars of telephone instruments, electrical meter disks, caps, frames and cases; incubator rheostats, shade roller parts, railway car linings and racks.

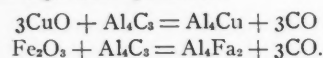
#### ALLOYS

*Production*—J. N. Pring<sup>3</sup> produces aluminium alloys by reducing metallic oxides by aluminium carbide. The latter is made by heating aluminium in a carbon crucible in a Moissan arc-type furnace.

$\text{Al}_2\text{C}_3$  results, chiefly from the action of CO on aluminium. This, heated with CuO produces Cu. and  $\text{CO}_2$  at low heats:



but at high heats produces:



Any excess of oxide present oxidizes aluminium out of the alloy.

*Bronzes*—The strongest is said to be made<sup>4</sup> of 89 parts copper, 10.5 parts aluminium and 0.5 parts silicon, the latter added as silicon copper for the purpose of hardening the alloy. This alloy is not ductile or workable, but must be cast into shape.

According to E. S. Sperry<sup>2</sup> the strongest bronze for bolts, such as are used for anchoring gun carriages, is 9 per cent. aluminium to 91 copper, containing no zinc, tin, or other metal, melted with common salt as flux, cast in a 4x4 in. billet, 40 in. long, and rolled in one heat to 2 in. diameter. Such a bolt will show 60,000 lb. tensile strength per square inch, with 20 per cent. elongation in 8 in. and 20 per cent. reduction of area. Its chief advantage over steel is its non-rusting quality.

E. S. Sperry<sup>3</sup> states that 8 per cent. aluminium bronze will not stand high reductions in rolling. If not frequently annealed it may actually split in rolling into transverse sections. Even if annealed, but reduced too strongly at one pass, it is apt to become overstrained and fatigued, and in course of time, say a year, is apt to develop very pronounced season-cracks. A 4 per cent. bronze is extremely ductile, and draws out splendidly into tubes which develop no season-cracks.

*German-Silver*—E. S. Sperry recommends<sup>4</sup> as a very white alloy, and the stiffest in common use, the mixture of 57 parts copper, 20 nickel, 20 zinc and 3 aluminium. The copper and nickel are first melted together under (borax 2 lb. to 100 lb.), the aluminium then added, the metal cooled considerably by gates, etc., until the zinc can be added without loss. If the ingots thus made are remelted, very sound castings may be obtained. Only the best metals should be put into this alloy, viz., Bertha zinc, Lake copper, best grain nickel and No. 1 aluminium. The castings should have large gates, to prevent cracking in the mold, and the alloy poured at a low heat.

*Silver*—G. I. Petrenko has made a complete fusion-point diagram of the alloys of aluminium and silver.<sup>5</sup> He finds the two compounds  $\text{Al Ag}_2$  and  $\text{Al Ag}$ , occupying maxima on the fusing-point curve. Adding aluminium to silver, the melting point falls to a eutectic (minimum) at 567 deg.

<sup>1</sup>Metal Industry, May, 1906.

<sup>2</sup>Brass World, August, 1906.

<sup>3</sup>Brass World, February, 1906; April, 1906.

<sup>4</sup>Brass World, March, 1906.

<sup>5</sup>Zeit. anorg. Chem., 1905. Electrochem. and Met. Ind., February, 1906, p. 73.

<sup>1</sup>Aluminium World, Jan., Feb., March, 1895.

<sup>2</sup>Metal Industry, Feb., 1906.

<sup>1</sup>Metal Industry, August, 1906.

<sup>2</sup>Metal Industry, January and February, 1906.

<sup>3</sup>Trans. Chemical Society, LXXXVII, 8530-40; Electrochem. and Met. Ind., January 1906; p. 27.

C., then rises with two breaks at 771 and 721 deg. corresponding respectively to Al Ag<sub>3</sub> (7.72 per cent. Al.) and Al Ag<sub>2</sub> (11.15 per cent. Al.) Between these two proportions, the alloys take a good polish. With less than 7.72 per cent. aluminium they show great stability and resistance to atmospheric influences.

**Magnesium**—Barnett describes<sup>1</sup> light alloys in which the aluminium is stiffened and hardened by small amounts of magnesium and other metals. A casting alloy is described containing 1.76 per cent. copper, 1.60 magnesium, 1.16 nickel and smaller quantities of antimony and iron; a soft alloy for rolling into sheet contains 0.21 per cent. copper, 1.58 magnesium, 0.72 lead, 3.15 tin and 0.3 iron. These alloys show 8.5 to 10 tons tensile strength in ordinary castings and turn up well. The description lacks definiteness, contains some improbable statements, and does not offer alloys of very good mechanical qualities, after all.

**Silicon**—E. Vigouroux states that pure silicon and pure aluminium refuse to combine,<sup>2</sup> but in the presence of a third metal double silicides or aluminosilicides are formed. These are definite crystalline substances with metallic luster, dense, hard and brittle; some are attacked by dilute acids, but most of them resist all acids save hydrofluoric; none is affected by caustic alkali solutions. They may be formed either by heating the three substances together, or by the thermite method of reduction, using mixtures of silica, metallic oxide and an excess of aluminium; or by acting on aluminium by a mixture of the metal, its oxide or its sulphide, and potassium silico-fluoride. Clay vessels must be avoided in handling metals which can form aluminosilicides.

**Tellurium**—Cabell Whitehead<sup>3</sup> prepares aluminium telluride by melting aluminium and throwing in small pieces of tellurium from time to time. (The powdered metals, heated together, unite with great violence). The melted aluminium telluride separates perfectly from the excess of aluminium in the crucible.

The telluride decomposes water completely, even in the cold, and a constant stream of hydrogen telluride gas may be obtained by regulating the water supply so that it falls upon the telluride a drop at a time:



**Tin and Bismuth**—A. G. C. Gwyer has studied the alloys of aluminium with these metals.<sup>4</sup> With tin, a eutectic is found at 0.48 per cent. aluminium, melting at 229 deg., i.e., 3 deg. below the melting point of pure tin. With bismuth 3.7 per cent. reduces the melting point of aluminium from 657 down to 652 deg., apparently

forming a saturated solution of bismuth in aluminium; at the same temperature, the excess of bismuth contains 8 per cent. of aluminium, which amount reduces to zero as the temperature of the mixture is reduced toward the melting point of bismuth. There appears to be no chemical combination even at 1200 deg.

**Thorium**—O. Hönigschmid obtains a crystalline alloy of thorium and aluminium by heating the two metals together in a vacuum at about 1000 deg. C., or also by reducing thorium oxide or potassium-thorium fluoride by aluminium.<sup>5</sup> The alloy crystallizes from the aluminium in which it is dissolved in hexagonal needles. It has the color and appearance of aluminium, but is not attacked by aqueous solutions of the alkalis. Analysis shows it to have the formula Th Al<sub>3</sub>.

## Deep Fissuring at Rico, Colo.

SPECIAL CORRESPONDENCE

Although Rico has been a mining camp for about 27 years, and has produced as many millions of dollars as it is years of age, the first shaft ever sunk here to quartzite formation was put down this spring in the Atlantic Cable mine of the United Rico Mines Company. The sinking of this shaft has proved a theory that has been discussed here for a quarter of a century without any previous attempt to demonstrate it, viz., the theory that the vertical veins which intersect the contact orebodies at distances of 150 to 175 ft. apart extend to and through the quartzite and carry values at depth.

The developed mines at Rico are all on the east side of the Dolores river, and are located on Newman hill, Dolores mountain, Nigger Baby hill and C. H. C. hill. Practically all of Rico's production has come from this area. None of the vertical veins in this area has been explored above the contact, while the exploration below the contact only extends for distances varying from 75 to 225 ft. On the opposite side of the river, on Expectation mountain, where there has been some prospecting ore has been found in the verticals both above and below contact.

On Dolores mountain, Newman, Nigger Baby and C. H. C. hills, there is not a shaft that has been sunk on a vein. They have all been sunk through barren ground to the contact, from where drifts have been run to strike the verticals. The reason why these verticals in the developed section were never prospected above the contact, or explored for any great depth below, is apparent at a glance to anyone informed as to the history of mining in this camp. The first body of pay ore was found at the intersection of a vertical vein with the contact. Later it was found that the orebody sometimes was in the

contact and sometimes in the intersecting vertical, but always at or near the point of intersection. When found in the verticals, the high-grade shipping ore would extend to a depth varying from 75 to 225 ft., the maximum depth having been attained in the Jumbo No. 3 vertical, which was the deepest vertical in the camp until the Atlantic Cable shaft was sunk and vertical veins carrying gold were cut in east and south drifts at quartzite.

As high-grade shipping ore was known to exist at or near the intersections of verticals with the contact, everybody looked there and nowhere else for it. It never seems to have occurred to anyone on the east side of the river, and only lately to a few on the west side, to prospect the verticals above the contact or continue to sink to the quartzite and ascertain if they made values at that depth.

Of the \$27,000,000 produced from Rico mines, practically all of it came from the contact and the verticals at or near the place of intersection. The verticals cut by drifts on the third level of the Atlantic Cable at the quartzite, which is 700 ft. geologically below the deepest workings on the hills, are strong veins—3, 5 and 7 ft. in width, of a silicious white quartz, carrying their highest value in gold, together with some silver and highly impregnated with copper. In the strata above the quartzite occur numerous horizontal seams of chalcopryite, and the quartzite bed itself is thickly spotted with the latter mineral at points of contact.

It is too early to state positively (and predictions are of little value) the average grade of these veins, as they have been but recently cut and remain unexploited. The drifts were run for the purpose of catching known blanket veins on their dips, and the discovery of the verticals at that depth was incidental; hence the original work has been prosecuted, and the verticals passed by for future exploration. Grab samples, however, have shown gold from \$4 to \$45 per ton.

It seems possible that Rico may repeat Leadville's history with respect to deep mining. If the verticals at quartzite prove up according to present indications, past experience warrants the belief that hundreds of shafts will go down to quartzite on properties from which the values have been extracted at upper contacts. In other words, the surface mining of high-grade ores here would simply be a preliminary to the real mining which would follow and would rehabilitate many properties on which work was suspended after a season of gophering at or near the contact.

The mining district of the north of Manchuria abounds in mineral wealth, and can be reached by various rivers, principally the Yalu, Sungari, Liao, Huifah. Construction of the Changehum-Kirin railway will facilitate transport and develop the industry.

<sup>1</sup>London Engineering, February, 1906.

<sup>2</sup>Comptes Rendus, 1905, CXLI, 951-3.

<sup>3</sup>Journ. Frank. Inst., April, 1906, 318.

<sup>4</sup>Bull. George Washington University, V, No. 4 (1906).

<sup>5</sup>Zeit. anorg. Chem., 1906, XLIX, 311-9.

<sup>5</sup>Monatshft für Chemie, 1906, XXVII, 205-12. Journ. Soc. Chem. Ind., May 31, 1906.

# Operation and Equipment of the St. Clair Colliery

Outside Machinery Is Driven by Steam While Underground Equipment Is Electrically Driven. Unique Devices at Power House

BY FLOYD W. PARSONS

The St. Clair colliery is one of the oldest operations in the Pottsville region, Pennsylvania, and has passed under the management of several different companies. At one time this mine was practically abandoned, as it was thought unprofitable to continue operations. At present, however, it is being worked with as much success as during any previous period. The Buck Mountain seam is the only bed worked, and from this vein alone there is an output of about 500,000 tons per year. The most striking impression upon a visitor is the simplicity and magnitude of the operation, and the fact that although the conditions are highly diversified, the management has succeeded in adapting methods of mining that are particularly successful.

## HAULAGE

The mine workings are reached by a 24-deg. slope, 3500 ft. long. A steam hoist is used for bringing the two-car trips up this incline, the general plan being to hoist the cars about 100 ft. from the mouth of the slope on a continuation of the incline. When the cars have reached a certain point, after passing through a spring-latch switch, they are dropped back by gravity to a sliding from which point they are hauled to the breaker by Vulcan locomotives. The hoisting rope is 1 $\frac{3}{8}$  in. in diameter, while 60-lb. rails are used on the slope.

Practically the entire outside arrangement is driven by steam, while the underground operations are electrically driven. The present management claims that the use of electricity underground saves 50 per cent. power, as compared with steam. This immense saving is principally due to the fact that the steam had to be carried 3500 ft. to the bottom of the first slope, and 1500 ft. further to the bottom of the second slope.

## VENTILATION

Up to the present time the problems of ventilation have not involved any serious difficulty; although parts of the mine are gaseous, the outflows have been successfully removed. On most of the main gangways there is from 150,000 to 200,000 cu. ft. of air passing per minute. This current is pulled by two 15-ft. non-reversible exhaust fans. Each miner employed underground has a safety light, which is used only to test with, and not for illuminating any working place.

## ELECTRIC HOIST

One of the most interesting installations at the St. Clair colliery is the electric hoist, specially designed by the S. Flory Manufacturing Company, of Bangor, Penn. Fig. 1 shows the construction of this duplex motor hoist. It is of the single-band friction type, equipped with two 100-h.p. motors. The drum is made of cast-iron, turned off smooth and balanced, and revolves freely at high speed. It is loose on the drum shaft and fitted with an improved band friction, and two brake bands of the differential type. The main brake is made of long-fiber asbestos, secured between special flanges on the

compressor is sufficient to throw the friction into or out of contact. The two motors are mounted to admit the compressor equipment to be placed centrally. The two levers shown in the battery operate the brake bands, and the controller, which is not shown, is placed to the left centrally.

## POWER-HOUSE EQUIPMENT

The power-house equipment, shown in Figs. 2 and 3, consists of a Fort Wayne Electric Company's 290-volt dynamo; a McEwen engine, 430-h.p., 22-in. stroke; a 185-h.p. McEwen engine, with a 15-in. stroke, driving a direct-current generator

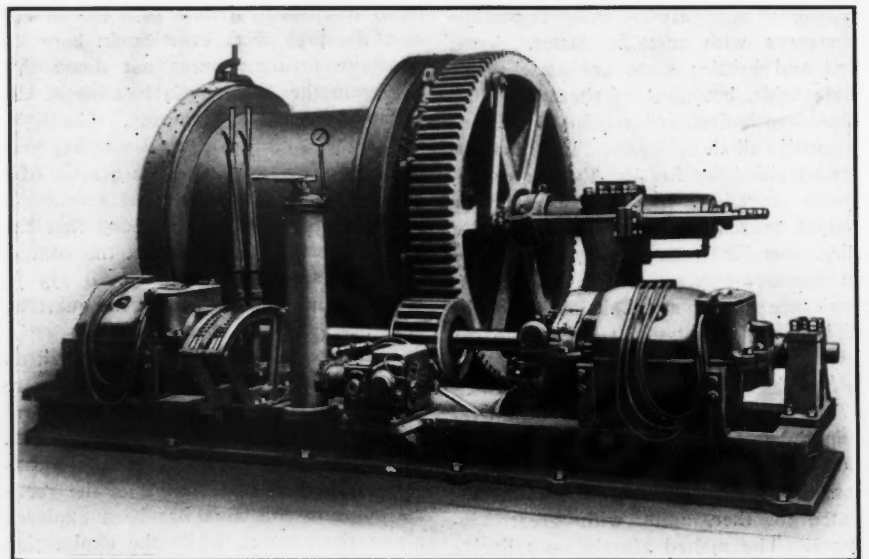


FIG. 1. FLORY ELECTRIC HOIST

drum, over which is fitted a very strong and powerful steel band. The other brake is of the usual type, lined with hardwood blocks and is used as an auxiliary. The advantage of the asbestos brake is obvious from its non-combustible qualities.

The improved band friction, as shown in Fig. 1, has many admirable features. The coggle arrangement is of such form as to produce a vise-like grip on the special rim on the drum flange, and the tests to which this arrangement has been subjected have demonstrated its efficiency and durability.

The hoist here installed is equipped with a Westinghouse airbrake compressor outfit. This arrangement is simple and easy to operate; the air cylinder is secured to the housing, as shown, and the slightest movement of the lever on the

of the class 6-110-280, General Electric Company. There is also a Hamilton-Corliss engine, 36-in. stroke, running 125 r.p.m., and driving a Westinghouse direct-current generator, 450 kw. The fly-wheel is 12 $\frac{1}{2}$  ft. in diameter with a 16-in. face and weighs 20 tons.

## THE LIGHTING UNIT

The unit used for lighting the entire outside colliery plant is an 85-h.p. McEwen engine, running 250 r.p.m., with a 12-in. stroke and a 12-in. bore. This machine carries a 22 per cent. overload when all the lights are on. There are more than 500 16-c.p. equivalents and 25 arc lights; some of the latter are run off the 250-volt haulage system. Lighting by electricity is depended on entirely, and for this reason it is so arranged at the

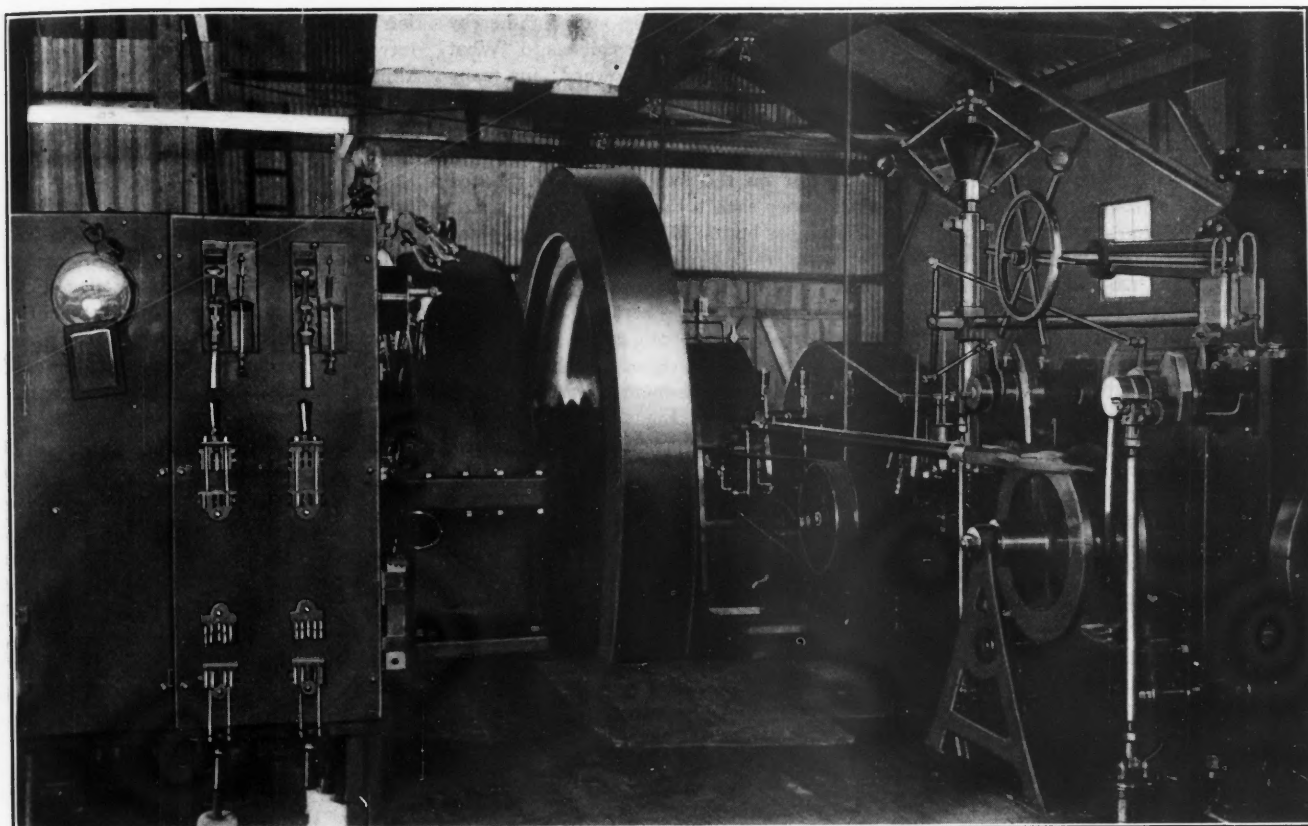


FIG. 2. THE GALVANOMETER HANDS ARE VISIBLE ON THE CABLES ABOVE THE SWITCHBOARD; THE HANDS ARE POINTING TO THE RIGHT SHOWING THAT CONSIDERABLE CURRENT IS BEING USED

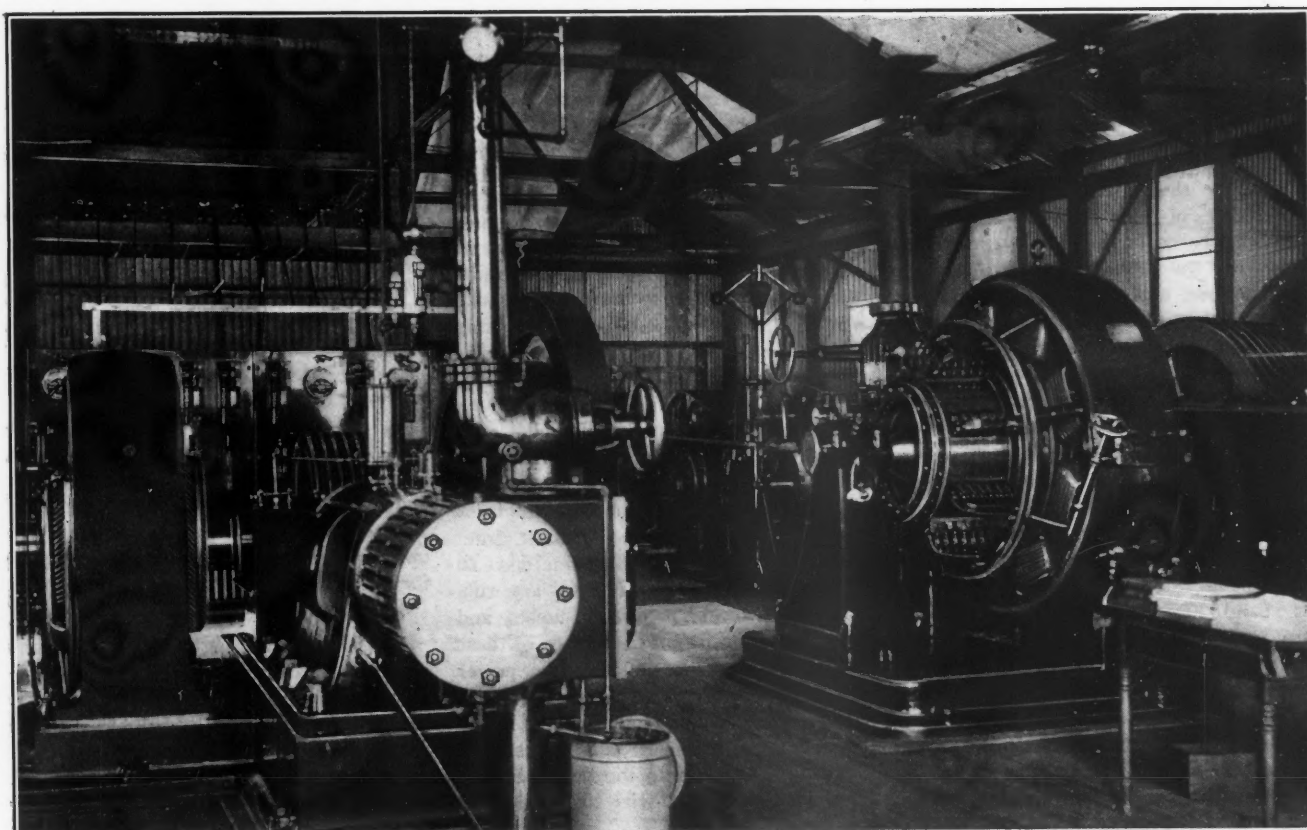


FIG. 3. INTERIOR OF ST. CLAIR COLLIERY POWER HOUSE

power house that in case of any accident to the lighting unit it is possible to change the 110-kw. 250-volt haulage unit into a 110-volt machine by short-circuiting the series winding on the machine, and then using an intermediary switch between the 250-volt switch and the 110-volt switch; fuses are placed on the underside of the switch which is connected to the underside of the 250-volt switch, while the top of the intermediary switch is connected to the top of the 110-volt switch.

If the lighting unit is put out of service a jumper is put across the series winding, and with the machine generating (having both 250-volt and 110-volt switches open) and closing the intermediary switch, the lighting circuits are gradually thrown on. It has only been necessary to do this twice in four years, but in both instances the scheme worked satisfactorily.

UNIQUE ARRANGEMENTS

A simple but rather unique arrangement is an improvised galvanometer on each circuit of the haulage system, which enables the man in charge at the power house to tell how each circuit is being used. This device consists of a piece of

the circuit breaker is thrown out, the bell rings until the attendant stops it, thereby avoiding many telephone calls as to "What is the matter with the power?" for many times a circuit breaker sneaks open. The arrangement is shown in Fig. 5 and consists of having button-head bolts 1/2 in. in diameter on the face of the switchboard just under each breaker and 1 1/2 in. apart. The upper button has a short lip. A piece of brass 1/16x1/4x6 in. long has one end bent over for a heel to rest on the lip of the button; on the other end is riveted a piece of 1/4-in. fiber with a hole in it, which the hand release of the breaker goes through. The hand release is visible on the switchboard, Fig. 2. There is a piece of 1/32x1/4x3-in. copper soldered on the brass and bent to come in contact with the lower button head, when the armature of the magnet is down; this closes the bell circuit, causing the bell to ring and the circuit to open. On the back of the board a circuit of No. 16 wire is run from button to button, connected with the bell, the constant ring and the battery.

THE CABLE CONDUCTORS

There are five circuits of different areas

whom I am indebted for much information here given, has made a number of duty tests. One of these tests on an Aldrich electric pump is given in Table 1.

New King-bolt and Saddle-plate

A. H. Halladay, of Spring Valley, Illinois, has designed an improved king-bolt and saddle-plate, which is now in use at five mines of the Spring Valley Coal Company. The bottom threads are the strongest part of the bolt. This is accomplished by having the area at the bottom of threads slightly larger than the

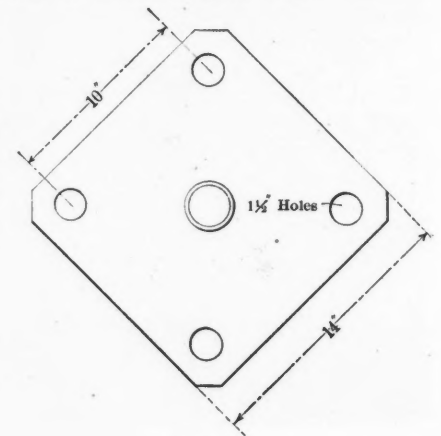


TABLE 1. DUTY TEST ON 11 x 12-IN. ALDRICH HORIZONTAL TRIPLEX ELECTRIC PUMP GEARED TO A C. L. 6-90-470, 220-VOLT SHUNT MOTOR.

Voltage at Motor.	Amp.	Speed of Motor.	Speed of Pump, R. P. M.	Horse-power.	Area Displaced, Cu. Ft.	Gallons Displaced.	Gage Pressure Lb.	Feet in Vertical Height.	Lift of Pump. Feet.
246	35	435	46 1/2	11.5					
204	256	365	40 1/2	69.9	80.0	600	156	377	12
210	250	378	41 1/2	70.4	82.1	615	156	377	12
220	245	390	42 1/2	72.7	84.1	630	156	377	12
224	275	435	47 1/2	82.6	94.0	703	156	377	12
220	305	470	50 1/2	90.0	100.0	750	156	377	12
226	250	397	43	75.7	85.0	637			

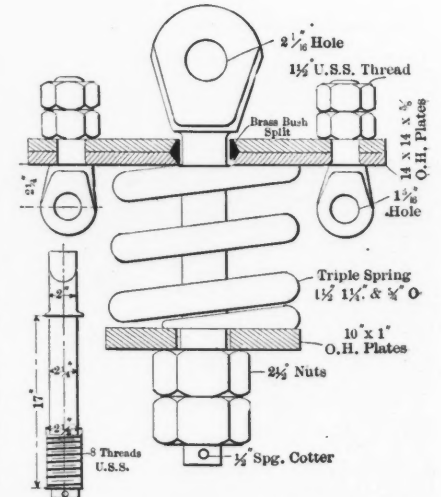
No. 8 bare copper, bent like an L (see A and B, Fig. 4). The long end of this copper is taped vertically on the feed wire in sight above the switchboard; a piece of thin steel 1/2 in. wide and 5 in. long, with a hole in the center and large enough to slip on the No. 8 wire, is also used. For this purpose corset steel or hack-saw blades can be utilized. A piece of No. 20 copper is bent so as to grip squarely the steel at points 1 1/2 in. each side of the center hole (see C and D, Fig. 4). The steel is then magnetized on one of the poles of a dynamo and put on the copper wire about 1/2 in. away from the feed wire; if no current is flowing, the hand should be vertical; if the current is being used, the hand will point to the right or left, depending on which field magnetized the hand; the more current flowing through the wire, the more the hand inclines. By using this device the attendant is able to tell if one or both locomotives on one circuit are working, or if any of the pumps are stopped, etc.

Another unique and convenient arrangement is that of having the eight automatic circuit breakers connected to a large electric bell, having a constant-ring attachment. Provision is so made that if

that go out from the power house. One cable of 400,000 circ. mils. runs 2700 ft. to the bottom of the first slope and supplies a 90-h.p. motor on an electric pump. Another cable of 900,000 circ. mils. runs 1500 ft. and branches into two 500,000 and 550,000 circ. mils. conductors, which run 3350 ft. to the bottom of an inside slope and supply a 90-h.p. electric pump and an 85-h.p. centrifugal pump. Another 900,000 circ. mils. cable runs 3400 ft. to supply the large electric hoist.

Another circuit runs 2700 ft. and supplies two 8-ton electric mine locomotives, each having trolley lines 7200 ft. and 7800 ft. long respectively. Another circuit of bare wires is run on poles 11,000 ft. from where it feeds into a trolley line 6000 ft. long, from which two feeders are run, supplying two 40-h.p. electric hoists, and an 8-ton locomotive. The further of these two hoists is 15,000 ft. from the power house. Rail return is used and at the electric pump the column pipe is used for a return. There are five return wires coming from the rails into the power house; 4/0 grooved trolley wire is used altogether.

In connection with the operation of this plant A. R. Stetler, chief electrician, to



KING BOLT AND SADDLE PLATE FOR A 12-TON LOAD

body of the bolt. There are four chains fastened by clevises to each corner of the plate ready for attachment to the cage. The accompanying drawings show the details of a bolt and saddle-plate adapted for a 12-ton load.

In operating an engine plane it is important that a trip should consist of a reasonable number of cars. In practice, it rarely exceeds 30 cars, and the least grade should be 3 per cent., so as to have an average speed of about 10 miles an hour. On a good track, with empty cars in fairly good condition, the minimum grade the empty trip will run on is found to be 2 1/4 per cent.



## Slope Sinking and Timbering

By M. S. HACHITA\*

Having decided upon a projected slope, the first thing to be done is to build a temporary sinking plant; this usually consists of an old engine and drum placed upon a temporary foundation of crib work loaded with rock. A rough plain house should be built over the engine and one or two tubular boilers are necessary.

The sinking must be carried on as an open cut, and the earth and stone shoveled out by hand, until the roof becomes self supporting and timber can be used to hold up the rock, which by this time has been considerably weakened from weathering. The width of sinking depends first; on the tracking plan; second, on the manner in which the slope is to be ventilated; third, on the size of cars to be handled. If the slope has a pitch less than 18 deg., a traveling-way is necessary; if the pitch is greater than 30 deg., the cars must be specially designed, so that while hoisting, the material in the cars will not be spilled. In case the slope is to have three compartments, the width should be from 16 to 24 ft., and the height at least 7 ft. clear.

While sinking is carried on, the bottom of the slope should be kept in advance of the top, and one corner in advance of the main face to collect the water and give a loose end in blasting. The timbering and track laying are carried down with the sinking, and kept within a few feet of the face.

### TIMBERING

Timbering a slope is in many respects similar to gangway timbering, but the joints are cut with greater care and square timber is more frequently used. On steep dips a heavy foot sill is let into the rib on each side to prevent the roadbed from slipping down the pitch. The distance between each two sets of timber depends upon the character and nature of the roof; it usually varies from 3 to 8 ft., although in some cases it is necessary to place them almost in contact with each other. The manway is often bratticed off and used as an upcast; a small fan being erected near the mouth of the slope and connecting with this by a frame air-way. When the slope is driven to open up a coal seam, an independent air-way is necessary. The ventilation is maintained by cross headings connecting the slope and the air-way. Small movable pumps are used to keep the face free from water until the depth is reached at which the first lift is to be turned off. A sump is then excavated below the level of the gangway, and to one side of this, a permanent pumping plant is erected.

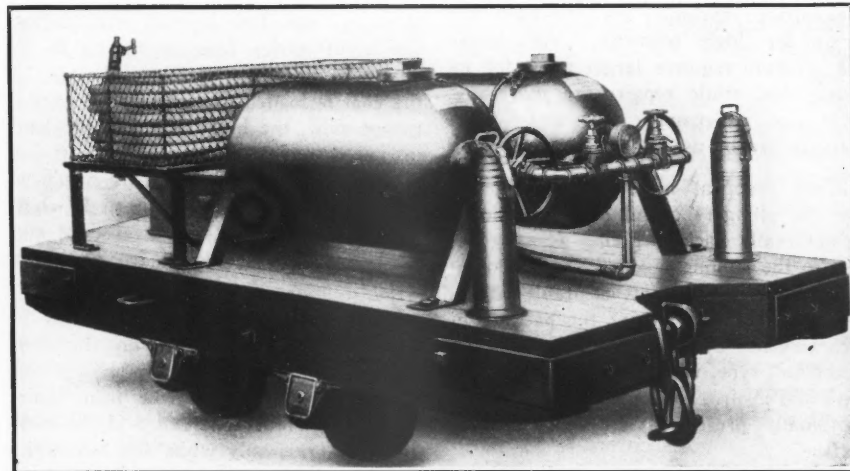
\*District engineer, Lehigh Coal Company, Wilkes-Barre, Penn.

### COSTS

The cost of sinking a slope depends upon the dip, thickness and character of the seam; upon the size of the slope and the character of the roof. Under ordinary conditions, a slope 8x12 ft., including timbering, track, etc., will cost from \$35 to \$50 per linear yard.

## Chemical Engines for Mine Fires

A number of the coal companies in the Northern basin of the Pennsylvania anthracite field have been testing the practicability and efficiency of a chemical fire engine which has been devised by A. G. Morse, of Scranton, and built specially for fighting mine fires. After completing his design Mr. Morse submitted it to the La France Engine Company, of Elmira, N. Y., who built a demonstrating engine, which has answered the test satisfactorily and will no doubt become generally popular. The apparatus is a new



CHEMICAL ENGINE FOR MINE FIRES

and practical application of the old principle of the action of chemicals upon fire as already used by the fire departments in various cities.

Two large tanks of chemicals are mounted on a mine car; the tanks are connected and work through a one-service pipe, while a hose of any required length may be attached. It is so arranged that one tank can be refilled while the other is in use, thereby giving a continuous service. It is not always possible to subdue a fire in this way. Moreover, it is well known that it can at least be held in check by a liberal application of chemicals. This system of fighting mine fires has a decided advantage over the use of water for the reason that when the latter is applied much steam is generated, which retards the work of the fire fighters, while with chemicals but little steam is generated and the heat readily converts the carbonic acid in the solution into gas and the gas quickly smothers the fire.

The officials of the company by whom the engine has been tested speak highly of its practicability.

## Canadian Coal Lands

The new regulations for the disposal of coal-mining rights still vested in the government in the western provinces of Canada have been promulgated. No more coal lands will be alienated, but leases will be granted for 21 years at an annual rental of \$1 per acre, no applicant being allowed to lease more than 2560 acres. The leases will include mining rights only, but lessees may purchase the surface rights at \$10 per acre. Lessees must begin operations within one year after being notified to do so, and must produce the amount of coal ordered, the maximum which they shall be so required to produce being fixed at 10 tons per acre. The leases are subject to cancellation in case of default. Actual settlers are entitled to buy what-

ever coal they may require for their own use at the pit's mouth at a price not to exceed \$1.75 per ton, and a royalty of 5c. per ton is to be paid on the output in addition to the rent.

The number of blades used in an ordinary mine fan depends on the size and capacity desired of the fan. By increasing the number of blades the action of the fan at the circumference may be augmented, the existence of eddies of air at the circumference, which occur when the blades are too far apart, is prevented. The number of blades required for a given purpose may be reduced by increasing the speed and vice versa; however, the number of blades should not be too many, for as the number increases, the resistance of the air also increases. In practice the depth of the blades is from one-half to one-third the distance between any two blades at the outer circumference of the fan.

# Colliery Notes, Observations and Comments

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

## DEVELOPMENT AND MANAGEMENT

An English authority asserts that all coal dust is explosive if pulverized enough. In this same connection it is stated that coal with conchoidal fracture is more liable to pulverization than coals with rectangular cleavage.

Good lime should slake completely in 48 hours; there are, however, some limes which contain particles that will not slake with the bulk, but will continue to absorb water after a long period, sometimes as much as two years. When lime of this sort is used on a wall or ceiling, the plaster is likely to fall off.

As a general rule where conditions are normal, it is advisable in using compressed air for haulage, pumps, drills, coal-cutting machines, etc., to have the air under high pressure. Air under low pressure requires larger pipes for its conveyance, while repairs are more difficult and expensive. Air under high pressure can be used more expansively.

Many practical mine managers claim that the plungers of mine pumps should be externally packed, giving an easy access to the stuffing boxes. This arrangement is said to be most desirable on account of the short life of the packing in such service. The water valves should be of the ball type, which gives clean waterways and insures longer life, because they continually present a different wearing surface.

When deciding on what system of haulage to use underground, it is necessary, first of all, to consider whether the workings are at all gaseous. If such is the case, the use of electricity is likely to be accompanied by considerable danger. Experience has shown that in some cases moisture and dust have penetrated through the insulator surrounding a conductor, and thus caused the wire to become alive. When this condition is true, a fall of roof is likely to cause a flash at any time.

Pumps for sinking shafts and recovering old workings which have been drowned out should be designed to be operated vertically as well as horizontally or at an angle, and should be light, portable and efficient. They should be easily handled, provided with an eye-bolt, to which can be attached a hoist for lowering them as the water is pumped and quickly raising when blasts are fired. The water end should be provided with a removable composition lining which can be replaced at little trouble and expense when worn out.

In England, coal was first used in the twelfth century and was then known as sea-coal, to distinguish it from char-coal. The name was given it from the fact that most people believed coal to be a marine product, since it was gathered from the seaweed and wreckage cast up by the waves on the Northumbrian coast. Later the name was given to coal brought from over the sea. About the year 1200, the English began to dig coal for the use of smiths and lime burners. In 1281 the entire coal trade of Newcastle was about \$500 per year.

In the bituminous coalfields, as a general case, the height of the head-frame above the ground, measuring to the center of the sheave wheel, is from 34 to 50 ft. where the shaft has but one landing; the height varies from 50 to 90 ft. for shafts landing on a trestle or bridge. If the coal is loaded on the railroad cars as run-of-mine, the height of the tippie landing need not be more than 25 ft. If three or four sizes of coal are produced, the landing should be about 30 ft. above the ground. When coke ovens are supplied, the height should be from 35 to 40 feet.

In the operation of compressed-air locomotives, it is best to run the compressor at uniform speed, pumping continuously into the reservoir from which the locomotive is charged. If the compressor is run only while the locomotive is being charged, an unnecessarily large compressor is required, while the wear and tear are greater and more steam and fuel are wasted. In building an air reservoir, pipe lines are preferable to stationary tanks, as the former give more charging stations at different points, besides permitting two or more locomotives to be charged at the same time in different localities.

As a general rule for the construction of tall brick chimneys, it may be stated that the thickness of the outer wall of the chimney for the first 25 ft. from the top should be one brick (8 or 9 in.); for the second 25 ft., it should be  $1\frac{1}{2}$  brick and so on, increasing one-half brick for each 25 ft. from the top downward. If the inside chimney diameter exceeds 5 ft., the thickness of the first 25 ft. should be  $1\frac{1}{2}$  brick, and the thickness of the next 25 ft. should be two bricks. If the inside diameter is under 3 ft., the first 10 ft. may be  $\frac{1}{2}$  brick thick. The batter should not be less than 1:36 to give stability. The inside core may be 4 in. thick for 25 ft. from the top, then 8 in. for 50 ft.

The capacity of belting to transmit power depends upon the width and thickness of the belt, the arc contact with the pulley, whether the belt is horizontal, vertical, or at an angle, and upon the speed. The greater the velocity and the thicker the belt, the more power transmitted. An inclined or vertical belt will not transmit as much power as when running horizontally, although in figuring the horse-power capacity of a belt it is usually the custom to consider only the velocity, width and thickness. For single belts, multiply the width in inches of the belt by the speed in feet per minute, and divide this result by 1000; the quotient will be the horse-power. For double belts, multiply the width by the speed and divide by 700 to get the horse-power.

The advantages of oil over coal, coke or wood as a fuel, may be summarized as follows: A petroleum fire can be controlled by one man of ordinary intelligence by the mere turning of a valve, the fire can be increased or decreased at will, and steam can be maintained at any desired pressure. The heat generated by a petroleum fire is much more uniform than that produced by coal or wood. Roughly speaking, 1 lb. of oil evaporates about 18 lb. of water at 212 deg. Fahr. as against 7.5 lb. of water for average quality of coal. Economy in labor, cleanliness, and a complete combustion of oil are secured. The absence of sulphur in the oil makes its effect on the flues less destructive than coal; the flues remain cleaner and in better condition to absorb heat. Oil has no ash or refuse and requires less space than coal for combustion.

The amount of foreign matter brought into steam boilers is considerable. A 100-h.p. boiler uses on an average, about 1.5 tons of water per hour, or about 400 tons per month, steaming 10 hours per day. With water as pure as that from the Croton dam near New York, the boiler receives 90 lb. of mineral matter per month. In many instances where spring water is used, a ton of mineral matter is deposited per month. It has been estimated that hard scale,  $1/16$  of an inch in thickness, on the heating surface of a boiler, will cause a loss of about one-eighth of the boiler efficiency; the waste increases with the square of the thickness of the scale. Water containing more than five parts in 100,000 of free sulphuric or nitric acid is liable to cause serious corrosion of the boiler, as well as the pipes, cylinders, piston, and valves of engines and pumps.

## A Move against the Anthracite Coal Roads

A petition was filed by the Government in the United States Circuit Court in Philadelphia on June 12, to dissolve the combination which is said to exist among certain railroads in New York and Pennsylvania and the leading anthracite coal companies.

An official statement given out by the Department of Justice says that the petition is "aimed at the anthracite coal monopoly," and goes on as follows:

"The Reading Company, a holding corporation; the Philadelphia and Reading Company, the Lehigh Valley Railroad Company, the Delaware, Lackawanna and Western Railroad Company, the Central Railroad of New Jersey, the Erie Company, and the New York, Susquehanna & Western Railroad Company, comprising all the railroads that tap the anthracite regions, save the Pennsylvania, the New York, Ontario & Western and the Delaware & Hudson (which last does not extend to tidewater), are made defendants, together with their subsidiary coal mining companies. As yet no evidence of sufficient probative force to connect the three last named railroads with the alleged unlawful combination and monopoly has been found. Should such evidence be forthcoming in the progress of the trial they may and of course will be joined with the other defendants.

"In brief, the petition recites that the defendant railroads control all the means of transportation between the anthracite mines and tidewater, except the lines of the Pennsylvania Railroad and the New York, Ontario & Western Railroad, which have only a limited number of collieries; that they transport annually at least 78 per cent. of the total anthracite tonnage; that in their own name or through coal companies whose capital stock they own they control about 90 per cent. of all the anthracite deposits and produce about 75 per cent. of the annual supply; that independent operators, although owning probably little more than 5 per cent. of the anthracite deposits, yet produce about 20 per cent. of the annual supply, which would be sold in competition with the output of the defendants were it not for the restraints imposed by the latter.

"The petition then charges that the defendants have conspired to silence competition among themselves in the transportation and sale of coal and to prevent the sale of the independent output in competition with their own, thereby establishing a monopoly, and in support of this general allegation it specifies:

"(a) That the defendant railroads agreed among themselves upon a uniform contract to be entered into by them or their coal companies with the independent operators along their respective lines under which the railroads would be able to

control the sale of the independent output, and that by virtue of their control of all the means of transportation from the anthracite mines to tidewater save the lines of the Pennsylvania company and the New York, Ontario & Western Railway Company the defendant railroads were able to force and practically did force the independent operators along their lines into making these contracts.

"(b) That the Erie Railroad Company has exchanged shares of its own capital stock for a majority of the shares of the New York, Susquehanna & Western Railroad Company, a competing line, thereby uniting under a common source of control the two competing railroad companies and their subsidiary coal companies.

"(c) That the Reading company, which already held all the shares of the Philadelphia & Reading Company, has exchanged its own shares and bonds for a majority of the shares of the Central Railroad Company of New Jersey, a competing line, thereby uniting under a common source of control the two competing railroads, and their subsidiary coal companies, which together transport about 35 per cent. of the annual anthracite tonnage and control about 60 per cent. of the anthracite deposits.

"(d) That twice in recent years the defendants have defeated the construction of projected independent railroads from the mines to tidewater which would not only have introduced competition into the transportation of anthracite coal but would have permitted the output of the independent operators to be sold in the markets in competition with that of the defendants.

"The petition prays generally that the defendants be enjoined from further carrying out their combination, and specifically that the above described contracts be canceled and that the mergers between the Erie Railroad Company and the New York, Susquehanna & Western Railroad Company and their coal companies and between the Philadelphia & Reading Railroad Company, and the Central Railroad Company of New Jersey and their coal companies be dissolved."

A deposit of glass sand of remarkable purity is reported from the Arbuckle mountains, Oklahoma, by Prof. C. N. Gould, the geologist of the State University at Norman. The material which was analyzed in the university laboratories shows 99 per cent. silica with no trace of iron. The glass plants recently established in southern Kansas obtained the greater part of their sand from Illinois. The deposits just discovered are within a few miles of the recently developed gas fields of Oklahoma. This fact is of more economic importance. If the sand continues to exhibit the purity so far indicated this should become one of the most important glass sand localities in the United States.

## Aerial Tramway of the Famatina Mines, Argentine

An unusual example showing the development of the modern wire ropeway is the system built by Adolf Bleichert & Co., Leipzig-Gohlis, in the Argentine Andes. It runs from the town of Chilecito to the Famatina mines, at a height of about 4600 m. above the level of the sea, and may be said to form a continuation of the State railway. This wire ropeway is not only the most elevated railway plant of the world at its upper end, but nowhere else has a steam engine ever been erected at such a great elevation as here. The track has a length of about 35 km., with a difference in level between the two terminals of about 3500 m., and the construction presented unusual difficulties.

The system is not designed for one material, but must deal with general traffic. Not only is the ore brought down from the heights to the railway and the smelting works, but all building material for the mines and the necessaries of life for the workmen must also be carried up. It is also employed for carrying the mails and the officials even use it for passenger traffic.

The introduction of this plant, with a capacity of 40 tons down traffic and about 20 tons up traffic, reduced the cost of transport from about 50s. per ton to about a tenth of this sum. Other Bleichert ropeways have been erected at neighboring mines in Argentina and also in Chile. Similar conditions prevail in Japan, where the same firm has also built several plants for working copper mines in mountainous regions. These are several kilometers long, with considerable differences in level, and have spans of from 400 to 600 meters.

## The Price of Cadmium

The world's supply of cadmium is derived chiefly from Silesia, where the zinc smelters produce it as a by-product. The metal is sold in the form of small bars, which are guaranteed to be 99.5 per cent. pure. At the beginning of 1906 the price was 725 marks per 100 kg. It advanced to 1500 marks, owing to a constant and very strong demand, during May, 1906. Since then quotations have been moving in a rather quiet market between 1200 and 1300 marks, but recently a very active demand for large quantities has again arisen, and 1250@1325 marks (according to the quantity bought and to the terms of delivery) has been freely paid.

The use of steel pan conveyers, in place of cast-iron pans has largely increased within the last three or four years. This type of conveyer possesses many distinct advantages over those composed of cast-iron pans.

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\*Illustrated.

## The Haywood Trial

Public attention is centered upon the trial which is now going on at Boise, Idaho. It is not merely, Moyer, Haywood and Pettibone who are at the bar, but also the Western Federation of Miners as an organization. The latter comprises many honest, hard-working miners, to whom assassination is as repulsive as it is to other civilized persons, but they have permitted themselves to be led by men of the type who are now on trial for their lives, and if it be proved that they are guilty of the fearful crimes with which they are charged, not only they but also the whole organization will bear the odium. Orchard's amazing confession discloses a record of cold-blooded crime that is without parallel. It is so extraordinary that the judgment of public opinion is properly reserved until it be supported by satisfactory confirmatory evidence. There is no question as to the fairness with which the trial at Boise is being conducted. That is admitted by the partisans of the labor unions which have united in the defense of the prisoners at the bar.

The Haywood trial is distinctly a mining case, in which the names of important mines and well known mining men figure prominently. It is a matter of history that during the last 20 years there has been a succession of outrages against life and property in many mining districts of the country west of the Rocky mountains. Beginning at Butte, the trail of maltreatment, assassination, and incendiarism led through the Cœur d'Alenes, Cripple Creek, Leadville, Telluride, and finally to Goldfield, which has been the focus of the latest disorder. Whether or not these crimes are due to the direct instigation of the Western Federation of Miners, or have been committed with its connivance, the present trial will serve, as nothing else would, to direct public attention to this festering sore; and if the Western Federation of Miners passes through the present trial with clean skirts, it will nevertheless be compelled to use its influence to quell the turbulence that has existed among its adherents, and render life and property as secure in the mining districts as they are elsewhere.

In the face of the charges that are made by the State of Idaho, which are supported by the appalling testimony of Orchard, it is a great descent from the crucial to the comparatively petty to refer

to minor crimes that have been disclosed. However, Orchard's testimony as to the practice of "high grading" throws an interesting side-light upon that evil of mining in the West. If the Western Federation of Miners is ever to regain esteem, it must use its influence to put down that crime against property as well as the crimes of violence.

## Some of the Present Problems in Coal Mining

Never in the history of coal mining has there been such earnest endeavor to solve the many difficult problems that confront the operators, managers and engineers of collieries as at the present time, when the demands of great industrial activity strain efforts to the utmost, while competition is still so keen as to keep attention fixed upon all possible improvements and economies. In general, the development and operation of coal mines is the most dangerous branch of the mining industry, this condition being due principally to the inflammability of coal dust, the presence of dangerous gases, and the generally unsafe nature of the overlying strata that act as the supporting roof. In its endeavor to assist the coal-mining industry, the JOURNAL is attempting to secure the cooperation of colliery managers and engineers in an effort to eliminate the ignorance and uncertainty with which so many of the more common phases of mining are attended.

Some of the more important problems whose urgent solution can be furthered by a discussion by those whose practical experience enables them to give evidence and valuable opinion are as follows:

1. What is the cause of the upheaval of bottom in a coal mine? (Some claim occluded gas, some say reservoirs of contained water, other say simply pressure of overlying strata.)
2. Will coal dust cause an explosion in the absence of gas?
3. Is there any definite relationship between atmospheric pressure and outflows of gas into mine workings? If there is, what precautions should be taken to reduce the dangers brought on by atmospheric changes?
4. What is the advisability of having specially appointed shot firers? What has been the result of the legislative action in that direction in certain States?
5. Should there not be laws limiting the

use of explosives to those that have been officially examined and placed on a permitted list?

6. Is it the better plan to have the miners set their own proprs, or to employ a corps of experienced men to set proprs?

7. Why, does West Virginia produce more coal per man employed than any other State? Why does Ohio produce the least tonnage per man, while at the same time it produces the largest percentage of machine-mined coal?

8. What is the merit of the plan adopted in certain localities, whereby day men (track-layers, drivers, timbermen, etc.) are paid according to the tonnage produced in the district where they work?

9. What connection is there between periods of seismic disturbance and coal-mine explosions?

The above are some of the live questions of the day. They are worthy of careful attention on the part of colliery engineers, and a discussion which will tend to elucidate the points upon which definite conclusions cannot be immediately formulated. Our columns are open to such discussions. We hope that our readers will offer their views.

### Prospecting in the Joplin District

The question that is most often asked in the Joplin district (it is not an unusual question in other mining districts) is where may ore be found? There is but one way to answer it. Drill for it. Twenty years ago there was no ore (at least, that was the opinion then) on the Lyon-Dougherty land, in Richland valley, southeast of Webb City. Recent drill prospecting has demonstrated some of the richest deposits found in the valley underlying the lime that in former years was believed to shut out the possibility of ore. In those days there was no ore known to exist under the lime. However, the ore is there today, and must have been there 20 years ago. But even if it had been known to exist under 120 to 140 ft. of lime no one then would have thought of sinking for it. The miner would have been foolish to sink through that much lime when zinc ore was worth only \$12 to \$16 per ton. It could not have been mined at a profit; so why sink for it, or even drill for it? Only 11 years ago it was thought that if zinc ore ever reached \$30 per ton, it would bring an era of great prosperity to the Joplin district, and it did; but it passed that

point inside of three years, reaching \$55 per ton in April, 1899, receding again to \$35 the following year. Since then zinc ore advanced by easy stages to the present high plane, and today it is conceded that ore cannot be mined at a profit for less than \$40 per ton in the "sheet ground" section of the district. Actual mining confined to the "sheet ground" alone is of recent origin. The Yellow Dog mine is in reality the first to demonstrate that the sheet vein would produce profits. The question of where ore may be found is answerable at the point of the drill. In the language of the old miner "the ore is where the ore is, and that is where the ore is."

### The Price of Antimony

The recent decline in the value of antimony has been as spectacular in its rapidity and extent as was the advance. In January, 1907, ordinary brands were quoted at 24 $\frac{1}{4}$ c., and a few weeks ago this metal was worth 23c. per pound. Since then there has been a steady decline; this week the price has dropped to 12@13 cents.

The chief reason for this remarkable decline is the increase in the supply, stimulated by the high range of price throughout 1906. For example, the United States, which did not produce any antimony ore at all in 1905, produced about 295 tons in 1906, while New Brunswick also became a producer again. Other countries made far greater increases, particularly China, Chile and Australia. The imports of antimony ore into Great Britain in 1906 amounted to 8443 long tons, against only 2482 tons in 1905; while the imports of regulus and crude metal in 1906 were 5153 tons, against 3481 tons in 1905. It is needless to look further to account for the recent decline in the value of the metal. However, it may be remarked that some dealers apparently misunderstood the condition of the market and accumulated rather large stocks of material, which recently have not been easily salable. It is an interesting feature that during the recent great demand for antimonial lead the shortage in the supply of that product was such that one concern, at least, bought antimony ore and smelted it with lead ore in order to produce antimonial lead, something which was never previously done in metallurgical practice, so far as we are aware.

### Mining in the Philippines

From the time that the Philippine Islands were first acquired by the United States there have been reports of great mineral resources in them. The little work that had been done under Spanish rule, it was said, had revealed promising deposits of gold, copper and coal; while the possible existence of other deposits in the large unexplored areas of the islands was pointed out. Under American rule a mining department was organized and began systematic work on as large a scale as the limited means assigned to it permitted. Necessarily its work has been slow, as it was possible to employ only a small force; though as far as it has gone the results have been creditable to those in charge. So far it has revealed the existence of coal and iron ore in considerable quantities, but the copper deposits of Luzon have not yet been reached. Some work has been done in the districts where gold was said to exist, and this work has been supplemented, in Masbate and elsewhere, by a number of American prospectors, who have engaged in the search for the precious metals.

It cannot be said, as yet, that the indications point to the Philippines as a great mining country of the future. Enough has been found, however, to show that further explorations are warranted, and that it is quite possible that a mining industry of respectable proportions may grow up in the future. For this purpose capital and intelligent direction will be needed. The former supplied, the latter can be found without difficulty. So far, however, American capital has been very slow in finding its way to the East, and little has been done to overcome the general ignorance of the possibilities there which exists at home.

THE LABOR SITUATION in the Black Hills, which caused much unfavorable anticipation a few months ago, has cleared itself up in a very satisfactory way. All the mines of the district are now working on eight-hour time, but it has been found that the cost of labor has increased by only an insignificant amount. The explanation of this is, of course, that the men do about as much work in eight hours as they used to do in 10 hours. It was the claim of the men that this would be the result, and it is gratifying to note that their promises have been borne out.

# Views, Suggestions and Experiences of Readers

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

## CORRESPONDENCE AND DISCUSSION

### Utilization of Black Sand

I have read the editorial on the "Utilization of Black Sands," which appeared in the JOURNAL of April 13, 1907. This editorial contains matter which is news to us on the Pacific coast, and who claim to know something of conditions as they exist. You state that "there are many places on the Pacific coast where black sand exists in large quantities." I should be pleased to have one of the places indicated, that is, where the black sand is found in large concentrated bodies. Your correspondent also states that "one place is so attractive that I have located two miles of it. In another place I found a six-inch streak for two miles which averages 13 oz. of gold per ton, together with some platinum."

However, I am open to conviction and will make a personal examination of any large deposits of concentrated sand that may be specifically mentioned. It is to the interest of the Pacific coast to develop our mineral deposits, and I for one would be glad to assist in their development by giving proper publicity, etc.; but there has been so much misrepresentation on the black-sand subject by companies organized for the purpose of fleecing the public, and as this department has thoroughly investigated the subject in California, and I have made personal investigation outside of this State and could find no workable deposits, I thought best to call the matter to your attention.

I desire to call your attention to Bulletin No. 45 of the California State Mining Bureau on "Auriferous Black Sands of California," in which will be found matter pertaining to this subject which I trust will prove satisfactory.

L. E. AUBURY,  
State Mineralogist.

San Francisco, Cal., May 14, 1907.

Our statement as to the existence of black sand in large quantity on the Pacific Coast was based partly on information that has been published by the U. S. Geological Survey, and partly on private information that we consider equally authoritative. We have already published a full abstract of Mr. Edman's interesting paper, and if Mr. Aubury will refer to previous issues of the JOURNAL he will find that we have been fully alive to the various misrepresentations that have been made respecting the black sands possibilities and have corrected them by statements of the facts and conservative opinions. On the other hand we have warmly

recognized the promise of valuable commercial results from the investigation inaugurated by the Geological Survey, which is evidenced by the fact of an already increased production of platinum from this source. Our information on this point is based on reports of persons who are producing the platinum—not as companies which have stock to sell, but as private producers for the sake of the profit in securing and selling platinum. It is well-known that the Geological Survey considers that the black sands of the Pacific Coast are of promise not merely as sources of platinum, but also as sources of iron ore, which of course is evidence as to its opinion as to the quantity available. However, we have several times called attention to the diffuseness of many of the beach deposits and the engineering problems involved in the collection of the sand, a subject not entered into in the report of the commission of the Geological Survey, on which there have been several interesting communications published recently in the JOURNAL. With respect to occurrences of black sand on the Pacific Coast, we are permitted to quote from a recent letter from Dr. David T. Day, as follows:

"In regard to the location of gravels particularly rich in black sand, there is a long continuous range of low mountains extending from the southern end of Trinity county up through Del Norte and taking in part of Siskiyou, California, and on into Coos and Curry, Josephine and Jackson counties, Oregon. This ridge is made up largely of serpentine. The Pacific beaches which are made from the wash from this serpentine are very heavy and black, contain much chrome iron ore (as shown usually in the wash from such serpentine ridges), much magnetite, and some gold and platinum. The Coos and Curry county beaches have been good hunting grounds for platinum. These beach sands are black sands straight. Frequently the beach has been elevated; frequently 50 or 60 ft, occasionally several hundred feet, and sections of these hills show alternating layers of black and light sand. In addition to the mining on the present beach itself, the Sixes mine, in Curry county, Oregon, near Denmark, and various other placer mines, have been worked in these old elevated beaches. The elevated beach on Leonard's place, at Aptos, Monterey bay, is another good example of a solid black sand layer.

"Away from the beach, black sands are simply accumulations of placer mining,

usually small in amount, except where the wash comes from such serpentine ridges as the one spoken of, or from the serpentine ridge in Butte and Plumas counties, where the proportion of black sand leads to an inordinate amount, and discourages placer mining. No one therefore, looks for black sands occurring naturally, away from the beaches, but considers simply what percentage of black sand a given gravel will yield. Where the black sands reach a considerable proportion mining has been abandoned in a great many places. This is true of the Trinity and Klamath rivers, and Old Cherokee, Butte county, Cal., and particularly in Josephine and Jackson counties, Oregon. Here there are many placer properties in a rather wild, undeveloped country, which have been neglected because of the considerable amount of black sand which they contain. Before any one is going to develop these formerly objectionable placers, they must be encouraged by the successful use of such concentrating machinery as we have recommended in utilizing the black sands thrown away by the present miners.

"The important future of this work seems to be that companies (one or two now operating) will buy up the small batches of black sand, and as the saving of black sand thus gradually becomes an object to the placer miner, the extension of placer mining to the gravels where the black sand was formerly a nuisance, will become an important feature in placer mining in California. If you will take up tables on pp. 6 to 48 and figure the amount of black sand which can be obtained by dredging and hydraulicking on many of the samples there mentioned, you will see that the aggregate is very great, although widely scattered."

Among the places we had in mind in making the statement in our editorial of April 13, to which Mr. Aubury refers, was the mouths of certain rivers, including the Columbia, as to which we have had affirmative reports from several sources. Referring to this, we may quote from another letter from Dr. Day, as follows:

"It is well to insist upon the very evident distinction between the *small* batches of heavy sands obtained in placer-mining operations in the interior regions of California, Oregon and Idaho, as contrasted with the low-grade black sands in *very large* quantities constituting great patches on the Pacific sea beaches. These patches are particularly large, and the sands particularly rich in magnetic iron ore at the

mouthing of rivers. Thus, at the mouth of Grays Harbor, both on the north and south shores, the proportion of magnetic iron ore is high—on the north shore frequently 40 per cent. is obtainable on a large scale. At the mouth of the Columbia river we examined five carloads, all of which showed over 30 per cent. magnetite. Equally high percentages were found at various points on the Coos and Curry county beaches of Oregon, and a particularly inviting deposit is characteristic of an elevated beach some 60 ft. above tide in the outskirts of the village of Aptos, on Monterey bay, Cal. This elevated beach is of very great extent. Naturally the sands which we selected from these beaches were most frequently concentrates and containing more magnetite than the average beach sand, a selection which it is perfectly legitimate for the operator to carry out. Nevertheless, taking into consideration these concentrates and all others examined by us on the reach to the extent of more than 60 samples altogether, the average of those examined (not the average of the beach for the reason above stated) from Cape Flattery to San Diego, showed 12 per cent. magnetic iron. The large amount of material thus represented (and considering the fact that these iron ores characterize repeated strata to a depth of 400 ft. at least in one locality), cannot be overlooked as a supply of iron for the Pacific Coast, provided the quality of the magnetite is favorable. In determining this it should be noted that at the mouth of the Columbia river (where 33 per cent. of magnetite was found at Hammond for example) we also found 17 per cent. of ilmenite (titanic iron ore). This was easily separable by ordinary magnetic concentration, but the examination of the grains of magnetite as separated by a magnetic separator also usually showed titanium. In fact, at this locality, after passing the magnetite repeatedly over the magnetic separator, the magnetite still contained 5 per cent. of titanium. . . . The press comments made previous to our report, have extended far beyond any intention of ours, but in so far as they have awakened interest on the Pacific coast to supplies of iron which Birkinbine and others have already predicted, they must be taken into consideration in the future, and these newspaper reports also must be looked upon as helpful rather than detrimental to the interests of the West."

### The Cost of Oil Burned in Wolf Safety Lamp

On page 960 of May 18, 1907, issue of the JOURNAL there is an article on the Wolf safety lamp by L. H. Hodgson. Near the end of the article is an evident error. The article states that a 5/8-in. flat wick while burning nine hours will consume 16.88 drams oil during five days, and with naphtha at 14c. per gal., it states that

the cost will be 92c. per lamp for a week of five shifts, and that with a round wick this cost is reduced to 74c. per lamp for five shifts.

I do not understand how 16.88 drams can be worth 92c. when a gallon is worth only 14c.

S. J. OETTINGER.

New York, May 18, 1907.

The omission of decimal points before the figures 92 and 72 is the cause of this apparent rise in the cost of naphtha. The figures should have read 0.92c. and 0.74c., respectively.

### Iron and Steel in Great Britain

The British production of pig iron and steel has been heretofore reported. The production of wrought or puddled iron is now given by the British Iron Trade Association at 938,558 long tons in 1905 and 1,010,346 tons in 1906, an increase of 71,788 tons. The number of puddling furnaces in existence in 1906 was 1536, of which about 1275 were in operation.

The estimated consumption of iron ore in Great Britain for the year was as follows, in long tons:

	1905.	1906.	Changes.
British production.	14,591,168	15,034,295	I. 443,127
Iron ore imported.	7,344,786	7,823,084	I. 478,298
Pyrites refuse.....	698,746	759,324	I. 60,578
Total supplies....	22,634,700	23,616,703	I. 982,003
Exports.....	14,148	13,204	D. 944
Ore used.....	22,620,552	23,603,499	I. 982,947
Avg. per ton of pig.	2.36	2.33	D. 0.03

The exports are insignificant. The chief source of imports is Spain, which furnished 5,949,361 tons in 1906, or 76 per cent. of the total.

Imports of manganese ore were 238,700 tons in 1905 and 338,423 tons in 1906, an increase of 99,723 tons.

### Unusual Feat in Transportation

The Elwood Tinworkers Gold Mining Company, of Elwood, Indiana, a few months ago contracted for the construction of an aerial tramway from Camborne, Fish River camp, northern Lardau, B. C., to its Silver Dollar mining property, situated six miles from Camborne. The construction of this ropeway involved considerable difficulty, since the only way of communication between town and mine was by packhorse up a mountain trail, in places rough and steep. Much trouble had already been experienced in getting up to the mine an air compressor and machinery for a stamp mill. However, E. J. Branford & Co., a local freighting firm, undertook to deliver the tramway cables at their respective destinations, the lower and upper terminals. The following will give an idea of the undertaking:

This firm first conveyed on nine pack-horses about six miles up the trail to the site of the upper terminal, the altitude of which is about 2000 ft. above Camborne, a

traction cable weighing 1814 lb. On the two days following two 5/8-in. cables, length 6900 ft., weight 4900 lb., were taken on 20 horses, also to the upper terminal. On the fourth day 23 horses took 3400 ft. of 1-in. cable, weight 5000 lb., to the site of the lower terminal. On the fifth day 3600 ft. of cable, weight 5700 lb., was taken to the upper terminal on 25 horses. The sixth day's work was the delivery at the lower terminal of 3400 ft. of 1 1/8-in. cable, weight 7200 lb., carried on 27 horses. On the last day a pack train of 31 horses conveyed 3600 ft. of 1 1/8-in. cable, weighing 7600 lb., to the upper terminal. All these cables were delivered in good order, without a kink in them.

### The Geological Survey's Confidential Information

The employees of the United States Geological Survey are apt, in the course of their work, to become possessed of information in regard to properties or regions examined that may be of a confidential nature, and such as would not have been acquired had they not been engaged in such work. This is particularly true of geologists who make investigations relating to mines and mining districts. Property owners usually communicate freely all the geological facts in their possession to the examining geologist, because they realize that, although part of the information is confidential, such data will not be published by the geologist without the consent of the proper parties, except as a basis for conclusions and generalizations.

Those who have their property examined by officers of the Geological Survey will be interested to know that all scientific employees of the Geological Survey are requested to sign an agreement, in which the geologist pledges himself to bear in mind the fact that his position may enable him to learn facts that are not known to the general public, and that when such facts are of a confidential nature he will refrain from any mention of them that would tend to violate such confidence. He further pledges himself not to testify in any mining litigation before the United States, State, or Territorial courts during his employment on the survey, and for three years after the termination of such employment not to act as expert in mining litigation concerning properties in any district in the United States upon which he has made any report or part of a report under the employ of the survey, provided that this restriction shall not apply in any case where 10 years shall have elapsed since the completion of the field work upon which any such report was based.

The use of steel elevator boots has largely increased. They are lighter, more durable and possess many advantages over cast-iron boots.

## New Publications

- THE CORNISH TIN-MINING MANUAL.** By H. A. H. Russell. Pp. 65, with map. 3¼x7 in.; cloth, 1 shilling. London, 1907: Effingham Wilson.
- ELEKTROMETALLURGIE DES EISENS.** By Bernhard Neumann. Pp. 176; illustrated. 6½x9½ in.; paper, 7 marks. Halle a. S., Wilhelm Knapp.
- DESIGN OF A RAILWAY BRIDGE PIER.** By Charles Derleth. Pp. 24; illustrated. 7x10 in.; paper, 50 cents. New York, 1907: Engineering News Publishing Company.
- ANNUAL REPORT OF THE DEPARTMENT OF MINES, NEW SOUTH WALES FOR THE YEAR 1906.** Pp. 195; illustrated. 8x13 in.; paper. Sydney, N. S. W., 1907: William A. Gullick, Government Printer.
- THE UNDERGROUND WATER RESOURCES OF ALABAMA.** By Eugene A. Smith. Prepared in coöperation with the United States Geological Survey. Pp. 388; illustrated. 6x9 in.; cloth. Montgomery, Ala., 1907: Geological Survey of Alabama.
- INVESTIGATIONS OF KEROSENE OILS AND GASOLENES.** By E. J. Babcock. School of Mines Bulletin, University of North Dakota. Pp. 15. 6x9 in.; paper. Grand Forks, N. D., 1907; School of Mines, University of North Dakota.
- CENSUS OF MANUFACTURES: 1905. ELECTRICAL MACHINERY, APPARATUS AND SUPPLIES.** Bulletin 73, Dept. of Commerce and Labor, Bureau of the Census. Pp. 73; illustrated. 9x12 in.; paper. Washington, 1907: Government Printing Office.
- REPORT ON THE EXPERIMENTS MADE AT SAULT STE. MARIE, ONT., UNDER GOVERNMENT AUSPICES, IN THE SMELTING OF CANADIAN IRON ORES BY THE ELECTRO-THERMIC PROCESS.** By Eugene Haanel, Superintendent of Mines. Pp. 149; illustrated. 6½x10 in.; paper. Ottawa, Ont., 1907: Mines Branch, Department of the Interior.
- MARYLAND GEOLOGICAL SURVEY. REPORT ON THE PHYSICAL FEATURES OF ST. MARY'S COUNTY.** By G. B. Shattuck, B. L. Miller, J. A. Bonsteel, C. F. Von Hermann, N. C. Grover and L. A. Bauer and C. D. Mell. Accompanied by large scale topographical and geological maps. Pp. 209; illustrated. 6½x10 in.; cloth. Baltimore, 1907: The Johns Hopkins Press.
- POWER TRANSMITTING MACHINERY.** Catalog B of the Geo. V. Cresson Company. Pp. 349; 8x9½ in.; cloth. Geo. V. Cresson Company, Philadelphia and New York.

This volume is the regular descriptive catalog of this manufacturer of transmission machinery, but it has value as a work

of reference, for it contains quantities of standard information of value to the engineer and millman.

**ANNUAL REPORT OF THE DEPARTMENT OF MINES, NEW SOUTH WALES, FOR THE YEAR 1906.** Pp. 195; 8x13 in.; paper. Sydney, N. S. W., 1907. William Applegate Gullick, Government Printer.

This is more than the conventional annual collection of statistics. It contains in addition to full data concerning production and the state of the industry, a mass of information valuable to those interested in mining. Notes and matters of use to the practical miner range in character from instructions for prospecting and acquiring titles to an explanation of the rules for the installation and use of electric current underground.

**MESSAGE OF THE PRESIDENT ON THE PANAMA CANAL,** communicated to the two Houses of Congress December 17, 1906. Pp. 29; 9½x11½ in., with map, and ornamental binding. With compliments of The Bucyrus Company, South Milwaukee, Wis.

This beautifully printed and illustrated publication is issued by the company which has furnished all the steam shovels ordered by the Isthmian Canal Commission up to the date of issue, May 1, 1907. It contains the text of the President's message in full, and the only advertising matter is found in the full-page illustrations of scenes along the canal, in which Bucyrus machinery figures naturally and properly. As an example of art in advertising it has seldom been surpassed.

**OPEN-HEARTH STEEL CASTINGS.** By W. M. Carr. Pp. 118; illustrated. 5½x7½ in.; cloth, \$1.50. Cleveland, Ohio, 1907: Penton Publishing Company.

Contents. Melting stock for acid practice. Fuels and alloys. Molding materials. Materials for basic practice. Open-hearth furnace construction. Fuels and accessories. Manipulation of heats in acid practice. Manipulation of heats in basic practice. Order of charging. Melting. Charging cold stock. Chemical analyses and physical tests. Relation between composition and physical properties. Blow holes in steel castings. Discussion of the causes of cracks in steel castings. Heat treatment and annealing. Repair of steel castings with thermit. Cost of equipment for open-hearth steel foundries.

Arrangements are reported to have been made for working the deposit of asbestos in the Minusisk district, near the village of Battenei, Siberia. The deposit is reported to be rich, and all the local conditions favor its development. It lies in the midst of a populous district about 10 to 15 versts from the Yenissei river. This will be the first asbestos enterprise established in Siberia, although Russia proper has been a producer of asbestos for a long time.

## Carbonado in Brazil

Albert R. Morawetz, American consul at Bahia, Brazil, reports that the firms engaged in the business of purchasing carbons at that place either are branches of French houses or they ship to firms in London and Paris on joint account. Carbons are not brought to Bahia for sale, but are bought in the interior of Brazil by agents of the dealers, the latter advancing to the former large amounts of money at the several places in the producing districts.

There are no companies engaged in mining or searching for carbons, that work being done by the natives, individually or in small parties working together. Prices are not controlled by any trust, but are governed by supply and demand and are subject to frequent changes. The carbon region begins about 257 miles from Bahia and can be reached in four days, viz: Bahia to Cachoera, 45 miles by water, one day; Cachoera to Bandeira de Mello, 158 miles by rail, one day; thence to Andarahy, 64 miles, on mule back, two days.

Owing to the facilities with which carbons can be smuggled out of the country, exporters are compelled to pay a tax for doing business, as follows: Firms exporting up to \$150,000 annually, \$1500; exporting above \$150,000, \$3000. In addition to this tax there is an export duty of 7 per cent. ad valorem.

## Mining Stock "Sucker Lists"

The JOURNAL recently called attention to the fact that the sellers of fake mining stock make use of lists of names similar to the "sucker lists" used in the patent medicine business. A law suit tried in New York recently brought out the fact that the collection of these names of the gullible has grown to be a well defined industry.

The method of the collection of names is to buy a small block of stock in a mining company, legitimate or otherwise, and then, being a shareholder, to demand the right to examine the stock books and obtain extracts under section 53 of the New York corporation law. This section provides that the books of all foreign stock corporation doing business in the State shall be open to the inspection of stockholders. The law also provides a penalty of \$250 against the corporation and another against the officer making the denial, in case the right to examine the books is denied.

The right to make extracts gives an opportunity to copy the list of names. The law sets the limit of three hours for the examination of the books, but in that time it is possible to copy a list of names that, it is said, will bring \$100 or more in the market.



## Personal

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

J. H. Williams, of Oaxaca, Mexico, is visiting New York.

Allen H. Rogers has returned to New York from a six months' trip to South America.

J. P. Hutchins, mining engineer, of New York, has been visiting Washington on professional business.

H. F. Fay, president of the Centennial and the Allouez mines, is at Lake, inspecting the properties.

W. H. Horton, of Providence, R. I., has been looking after mining interests near Central City, Colo.

Albert Fries, of New York, president of the Richmond-Eureka Mining Company, sailed June 1 for Europe.

William Busby, president of the Great Western Coal Company, McAlester, I. T., is in the East on business.

C. S. Desch, operator in the Silver Plume, Colo., district, has gone to Baltimore, Md., on mining business.

Horace V. Winchell, chief geologist for the Great Northern Railroad Company, is spending a few days in Butte, Mont.

Frederick Hobart, associate editor of the JOURNAL, was married June 12 to Miss Charlotte A. Clarke, of Brooklyn.

W. E. Thorne, mining engineer, East Auburn, Cal., has been appointed field assistant to the State mineralogist of California.

R. H. Allen, engineer for the Sierra Plata Mining Company, Parral, Mexico, passed through New York on his way to Boston.

Sewell Truax is now manager and consulting engineer for the Granadena Mining Company, Santa Barbara, Chihuahua, Mexico.

Dwight E. Woodbridge, mining engineer, of Duluth, Minn., is visiting the west coast of Mexico on professional business.

Carl Scholz, president of the Rock Island Coal Company, Chicago, is inspecting the mines of the company in Indian Territory.

W. Loach, manager of the Boulder County mine, Cardona, Colo., has returned from an extended trip to Nevada and California points.

Dr. Franklin R. Carpenter, of Denver, returned there from Copper Mountain district, Wyoming, and is at present in southern Mexico on professional business.

R. H. Channing, general manager of the Cerro de Pasco Mining Company, of Peru, returned to New York this week on business in connection with his company.

Dr. J. Bonsall Porter, professor of mining at McGill University, Montreal, spent two or three days at Victoria, B. C., toward the end of May, before returning East.

A. A. Hassan, consulting engineer of New York, has gone to examine the mineral areas of Cobalt and Larder lake, and will embody the result of his researches in a book.

Hudson H. Nicholson passed through Denver on his way from Chicago to Goldfield, Nevada, where he expects to go after making a short professional trip to Boulder county.

H. E. Collbran, of Seoul, Korea, a graduate of the Colorado School of Mines, is in Colorado for the summer months, being in charge of valuable mining interests in Korea for Americans.

Frank Klepetko, consulting mining engineer, of New York, has opened an office at Lima, Peru, which will be his headquarters for some time to come. He expects to visit New York about Sept. 1.

Professors L. C. Hodson and T. A. Williams, of the Iowa State College, with about 15 students, are spending a couple of weeks at Idaho Springs, and will thence proceed to Pueblo, Cripple Creek, and Leadville.

William S. Mann, formerly cyanide manager for the Montezuma Mines, Inc., at Miramar, Costa Rica, Central America, has resigned to accept the management of the Boston & Oaxaca mines, Tlacolulu, Oaxaca, Mexico.

F. F. Sharpless, mining engineer, of New York, is examining mines near Silver City, Idaho. After the completion of that work he will go to Denver, and probably will return to New York in the course of four or five weeks.

R. A. Wood and T. M. Thackwaite, mining engineers, of London, England, are in Cobalt, inspecting the property of England's Premier Cobalt Mining Company and the Badger location, recently acquired by British capitalists.

John C. Brydon, who recently resigned as general manager of the Davis Coal and Coke Company, has been appointed vice-president of the West Kentucky Company, an affiliated corporation of the North American Coal Company.

Dr. Alfred Stansfield, professor of metallurgy at McGill University, Montreal, after accompanying the McGill Summer Mining School, on its western itinerary, visited the Tyee Copper Company's smelting works at Ladysmith, Vancouver island, B. C.

George B. Foster, formerly in charge of the Wagner-Bullock sales agency in Chicago and recently sales manager of the Allis-Chalmers Company, is now connected with the Chicago office of the Power Improvement Company, Milwaukee.

W. C. Thomas, resident general manager for the Dominion Copper Company, operating copper mines and smelting works in the Boundary district of British Columbia, recently examined copper properties in the Similkameen district of that province.

Dr. G. C. Hoffmann, of Ottawa, Ontario, has resigned the offices of assistant director, chemist, and mineralogist to the Geological Survey of Canada. He has been in that service nearly 35 years, of which 24 were devoted to the duties he now relinquishes.

T. J. Vaughan-Rhys, formerly in charge of the Van Anda Copper and Gold Mines Company's Cornell and Copper Queen mines, on Texada island, B. C., and now operating mines in Mexico, lately visited British Columbia, in which province he is also mining, on Valdez island.

J. W. Campbell, of Toronto, Ontario, manager of contract sales for the Canadian General Electric Company, has resigned to accept the position of managing director for the Alberta Portland Cement Company, of Calgary, Alberta, Canada. He assumed his new duties on May 15.

Robert R. Hedley, late manager of the Hall Mining and Smelting Company's lead-silver smelter at Nelson, B. C., has been appointed to collect data in British Columbia, Alberta, Saskatchewan, and Manitoba, relating to mines, reduction works, etc., for a full report on the mining industry of Canada.

A. J. Gullberg, for some time past engineer in charge of construction of the Cerro de Pasco mines in Peru, arrived in New York last week. He sailed from New York, June 6, and will spend two months in Europe. On his return to New York in August, he will enter into practice as consulting engineer, taking the offices formerly occupied by Frank Klepetko.

J. Anste Bancroft, assistant to Dr. Frank D. Adams, professor of geology at McGill University, Montreal, has been given charge of the Dominion geological survey party assigned to continue the work of examining the coast line of British Columbia commenced last year by O. E. LeRoy. Mr. Bancroft, with his assistant, R. Graham, is now on the coast making arrangements for working north from Powell river.

## Obituary

William Ball, for several years superintendent of the Lower Mammoth mine, in the Tintic, Utah, district, was killed by an electric shock May 30, while showing some guests through the mine. He accidentally touched a live wire with his candlestick.

George L. Moats, manager of the Latham Mining and Smelting Company, operating in the Spruce Mountain, Nev., dis-

trict, was killed May 29 in the Four Metals mine, in the Deep Creek, Utah, district. A ladder gave way precipitating him to the bottom of the shaft, a distance of about 85 feet.

### Industrial

The DuBois Iron Works, of DuBois, Penn., has established agencies at Baltimore, Reading, Scranton, Pittsburg and Buffalo, where a line of its engines will be carried for exhibition and demonstration purposes.

At the recent annual meeting of the Ridgway Dynamo & Engine Company, Ridgway, Penn., the sales department was reorganized. H. A. Ottersen, formerly assistant superintendent, has been appointed sales manager with R. C. Eccleston as his assistant.

At a special meeting of the directors of the Joseph Dixon Crucible Company, held May 31, to take action on the death of Vice-president and Treasurer John A. Walker, Geo. T. Smith was elected vice-president, Geo. E. Long treasurer, and Harry Dailey was elected director and secretary.

The Chrome Steel Works, Chrome, N. J., is distributing circulars describing the wearing parts of crushers, rolls, mills, pulverizers and other crushing and grinding machinery made of "Canda" tempered and "Adamantine" chrome steel. The steel is rolled, cast or forged, according to the requirements of the parts designed to resist wear.

The Sprague Electric Company, New York, has opened a district office in the Hennen Building, New Orleans. This office is under the management of F. V. L. Smith, and will cover the territory included in the States of South Carolina, Florida, Alabama, Georgia, Tennessee, Mississippi, Louisiana, Arkansas, Texas, Oklahoma and Indian Territory.

The Boston branch of the American Manufacturing Company, makers of American transmission rope and manila, sisal and jute cordage of all sizes and for all purposes, has outgrown its original quarters in the Postoffice Square building and has taken larger offices in the Ames building. W. F. Morgan, previously engineer of the transmission-rope department of the company, is manager of the Boston office.

F. E. Butcher, until recently manager of foreign sales for the K. & J. Company, became general manager for the American Concentrator Company, June 1. In his new position he will have to do with the manufacturing part of the business as well as with the sales. Guy H. Elmore, of the American Concentrator Company, will hereafter be free to attend to the engineering side of the business, the designing of plants, etc.

The H. W. Johns-Manville Company is planning to make an interesting exhibit at the International Electric Light Association convention, which will be held in Washington during June. Among other interesting features, it will exhibit a "transite" asbestos fire-proof door for high-tension transformers and switches. These doors, which are fire proof and excellent insulators as well, are designed for the protection of apparatus from short circuiting; also to prevent persons coming into contact with the live parts.

### Trade Catalogs

Receipt is acknowledged of the following trade catalogs and circulars:

W. L. Beel, Elyria, Ohio. The Beel Prospecting Core Drill. Pp. 24, illustrated, paper, 6x9 in.; 1907.

Charles E. Sholes Company, New York. "Things Chemical." Pp. 20, illustrated, paper, 7x9½ in.; April, 1907.

Sullivan Machinery Company, Chicago, Ill. Coal Mining by Machinery. Pp. 17, illustrated, paper, 3½x6 in. 1907.

Hendrie & Bolthoff Manufacturing and Supply Company, Denver, Colo. The King Screen. Pp. 19, illustrated, paper, 5x7 in. 1907.

Adam Cook's Sons, New York. "Lighten Your Machinery Loads with Albany Grease." Pp. 10, illustrated, paper, 3½x6 in. 1907.

Brown & Sharpe Manufacturing Company, Providence, R. I. Machinery and Tools. Pp. 499, indexed, illustrated, cloth, 3½x6 in.; 1907.

Mussens, Ltd., Montreal, Canada. Bulletin No. 12. Double Cylinder, Single Drum Mine Hoists. Pp. 4, illustrated, paper, 5½x9 in.

Sullivan Machinery Company, Chicago, Ill. Catalog No. 58. Modern Practice in Air Compression. Pp. 112, indexed, illustrated, paper, 6x9 in.

Pratt & Whitney Company, Hartford, Conn. Catalog No. 4. Small Tools. Standards and Gages. Pp. 215, indexed, illustrated, paper, 4½x7 in.; 1907.

Allis-Chalmers Company, Milwaukee, Wis. Instruction Book No. 5009 for Direct Current Motors and Generators. Pp. 16, illustrated, paper, 6x9 in.; Jan., 1907.

Geo. E. Woodbury, 238 Townsend street, San Francisco, Cal. Bulletin No. 1. The New Woodbury Concentrator. Pp. 19, illustrated, paper, 7x10 in.; May, 1907.

Jeffrey Manufacturing Company, Columbus, Ohio. Bulletin No. 12. The Care of Electric Mine Locomotives in Service. Pp. 80, illustrated, paper, 8x10 in.; March, 1907.

Wagner Electric Manufacturing Company, St. Louis, Ill. Bulletin No. 76. Single Phase Variable Speed Ventilating Fan Outfits. Pp. 4, illustrated; paper, 6x9 in.; 1907.

Indestructible Fibre Company, 26 Cortlandt street, New York. Car Headlinings and Steamboat Panels made of Fibrite, Durite and Kantlite. Pp. 4, illustrated, paper, 4x9 in.

Golden-Anderson Valve Specialty Company, Fulton building, Pittsburg, Penn. Catalog No. 8. Steam and Water Specialties. Pp. 56, illustrated, paper, 5½x8 in.; May, 1907.

Ph. Bonvillain & E. Ronceray, 9 & 11 Rue des Envierges, 17 & 19 Vills Faucheur, Paris, France. The Universal System of Machine Moulding. Pp. 96, illustrated, paper, 6x10 in.; 1907.

Chrome Steel Works, Chrome, N. J. Chrome Steel Wearing Parts for Cement Grinding Mills. Pp. 13. A Tempered Steel Jaw Plate for Blake Type Crushers. Pp. 8. All illustrated, paper, 5x7½ in.; April, 1907.

Monongahela Manufacturing Company and the Hoshor-Platt Company, 10 Liberty street, New York City. Hoisting Engines, Mine Haulage, Gravity Railways, Industrial Railways, Steel Cars, Wood Cars, Revolving Screens and General Coal Handling Machinery. Pp. 119, illustrated, 9x1 in.; 1907.

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### Construction News

*Rollinsville, Colorado*—The Opa Mining Company will install a plant of steam machinery on its mine near Perigo. J. W. Koons, Rollinsville, is manager.

*Wall Street, Colorado*—The Gold Run Mining and Milling Company, it is reported, will build a cyanide mill on its Tambourine property near Wall Street. E. A. Austin is president and general manager.

*Bald Mountain, Colorado*—The Uranus Mining Company contemplates installing a heavier gasolene plant of machinery for the Kirk mine, Gilpin county, Colo. L. G. Nesmith, Bald Mountain, Colo., is manager.

*Isaac's Harbor, Nova Scotia*—The Beaver Hat Gold Mining Company is preparing to build a 10-stamp mill and amalgamating plant, to replace its old mill. S. C. McLean, Isaac's Harbor, N. S., is manager.

# Special Correspondence from Mining Centers

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

## REVIEWS OF IMPORTANT EVENTS

### San Francisco

June 5—The committee of the Grass Valley Miners' Union, which has had the matter of an advance in wages under consideration for some weeks, has issued a statement that all trouble over the matter is past; an amicable agreement having been reached with the Mine Operators' Association. There will therefore be no strike. The basis of agreement has not yet been made public. This camp is the most important gold-mining one in the State, and two of the most productive gold mines of California are located there. Those two mines, the North Star and Empire, might have stood the proposed advance in wages, but some dozens of other mines nearby could not have done so. The members of the Mine Operators' Association seem to have stood together in the matter so that an amicable adjustment has resulted.

The desert camps of Daggett and Vanderbilt, once prosperous, are both being revived. At the former place the Daggett-Belleville Mining Association has been formed to engage in spreading the fame of the Daggett and Belleville mineral section, which only needs capital to become again productive. Daggett was formerly a very important silver-producing region. It is on the line of two great transcontinental roads—the Salt Lake and Santa Fé—but for some years has lain neglected. The Belleville region near by has also been overlooked by capital. An advertising committee has been appointed which will soon begin operations. G. B. Myers is president and Irving Garringer, secretary.

The old town of Vanderbilt, near Lead-stalk, which has been virtually dead since the shutdown of the mines, about 10 years ago, owing to litigation, is again coming to life. Where two watchmen employed to guard property have been the sole inhabitants, numbers of people have arrived within the last thirty days, in consequence of the reopening of the Hale mines, acquired by the Big Five Mining Company, a company recently organized. Ore is being shipped from time to time from this district to the Needles smelter. From the old Copper World property, at Ivanpah, three cars a week are being shipped.

Now that the bunkers on the branch railroad to the Hornet mine, Shasta county, are completed, it is expected that this mine of the Mountain Copper Company will be as important a source of copper ore for the Keswick smelters, as was the Iron Mountain mine of the same company in years past. The new boarding house at

the Hornet mine has been completed, and the force of miners is being increased as rapidly as possible.

Numerous strikes in the mining counties are responsible for a lower tax rate this year. Members of the State board of equalization have been through the northern counties investigating the tax rolls of the assessors. No increase in valuation will be reported. The dropping of the valuation in several counties necessitates a higher assessment. In the case of small prospects, undeveloped, and only held by annual assessment work, the tax is already excessive. Upon a small prospect in Calaveras county, entirely undeveloped, the valuation was placed at \$800, when nothing at all was known as yet of the actual value of the claim.

The transfer of the Orleans Bar Gold Mining Company's property to the California Mining and Dredging Syndicate, in Humboldt county, is notable, in that it is expected that the new company will probably do some dredging in the bed of the Klamath river, at that point. The Klamath has for over half a century been receiving the accumulated tailings from hundreds of mines, and as they have now been concentrated it would seem reasonable to expect that profits could be secured from dredging. The river has paid well at many points where river-bed mining has been carried on by means of wing-dam and Chinese pumps, but this class of work has been mainly confined to bars. There are many stretches of the river which have never yet been mined.

The old, and once highly prosperous hydraulic mining camp of You Bet, in Nevada county, which has been virtually left to itself since the legal edict against unrestricted hydraulic mining, is being revived. This time the gravel, which is more or less cemented, is to be drifted, and then crushed in a mill which is being built. Of course, a much smaller quantity can be worked daily than when whole banks were washed away by the stream from the nozzle; but on the other hand the drifting system contemplates only handling the lowest and richest portion of the deposit.

The law passed recently fixing a license tax on mining and other corporations works something of a hardship in the small mining companies of the State which are not productive. The tax for a corporation of \$10,000 capital stock or under is \$10 to the State each year; over \$10,000 and up to \$20,000 the tax is \$15 per year, and above \$20,000 and under \$50,000, \$20 per year. The license tax

gradually increases until in some cases \$100 is reached. This amount will pay the assessment work, and it is the opinion that within a short time many of the small corporations will take action to reduce their capital stock. The license tax is in addition to the annual assessment required by the Federal laws.

### Salt Lake City

June 1—Articles of incorporation of the Iron King Consolidated Mining Company have been filed, and the company will operate in the East Tintic mining district, Juab county. The headquarters will be at Provo, and the officers are: C. E. Loose, of Provo, president; Reed Smoot, vice-president; these, with O. J. Salisbury, Frank Knox, and A. A. Noon are directors.

The Markham Gulch mill, in Bingham, is in regular commission, and is treating about 200 tons of ore daily from the Utah Apex mine. The initial dividend of the Lower Mammoth Mining Company has been paid to shareholders, the amount being \$9500.

More than two-thirds of the members of the Salt Lake Stock and Mining exchange have agreed to discontinue that organization, and to form an association believed to be more advantageous to the members of the organization. The price of seats on the exchange is now about \$1300.

According to a statement from the management of the Utah Copper Company, the month of May was the banner one of its career. An average of a little more than 800 tons of ore was treated at the Copperton plant, in lower Bingham cañon and it is hoped to increase this to 1000 tons during the present month. A portion of the new Garfield plant has been in operation, and it is expected that by June 10 the entire initial unit will be in commission. Eastern parties have been negotiating for the purchase of the mine owned by the Jennie Mining Company, at Gold Springs, Iron county. Several small deals were consummated during the month of May, in which ground in this district was involved.

Practically all the shareholders of the Bingham Standard Mining Company have deposited their stock with a local bank to be transferred for stock in the new organization to be known as the Bingham Central Standard Mining Company. Bingham Central shareholders have not been as prompt in turning their stock, and for that reason the consum-

mation of the deal to amalgamate the two mines has been somewhat delayed.

The filing of deeds of conveyance to the Silver King Coalition Mines Company, was the closing chapter in the deals whereby the Silver King, Keith-Kearns and a number of other contiguous mining properties are to be operated under one management. The new corporation will have more than 2000 acres of ground in the best portion of the mineralized section of Park City.

### Denver

June 7—It having become apparent that the evidence in the case of the Portland Gold Mining Company against the Stratton Independence Company, Limited, in which the charge was made that the latter had crossed the Portland line and extracted a large amount of valuable ore, was not sufficient to support a charge of trespass, the Portland attorneys introduced evidence under grounds of conversion, which was objected to by the other side, and Judge Lewis, of the Federal court, directed a verdict for the defense. The case will be appealed to the higher court. About half a million is involved.

The Union Pacific Coal Company and the Central Coal Company, operating at Rock Springs, Wyoming, whose mines have been idle for several days on account of labor troubles, posted notices a few days ago to the effect that an advance of 10 per cent. in wages would be paid to all who reported for duty at a certain time. The companies are determined to work the mines, but do not propose to recognize any organization. A large number of non-union men have arrived there.

The Consolidated Mines Selection Company, Limited, of London, has purchased the Japan group of mines, near Telluride, which has produced in the neighborhood of a million dollars' worth of ore, although until now only operated in a small way. During the past year a large amount of development work has been done.

President Richards, of the American Mining Congress, has appointed a committee to draft a vertical side-line law, doing away with extra lateral rights. The committee consists of Charles J. Hughes, Jr., of this city; Curtis Lindley, of San Francisco; John A. Church, and James D. Hague, of New York, and R. A. F. Penrose, of Philadelphia.

### Toronto, Ont.

June 7—The Provincial Bureau of Mines has completed arrangements for exploration work in northern Ontario during the summer. Three parties will be sent into the field, one in charge of Prof. Willet G. Miller, provincial geologist. C. W. Knight, of Kingston, will go up the Montreal river, and make a geological and topographical survey of the adjacent district. To Prof. R. W. Brock is assigned the Larder Lake district, and a third party

in charge of A. Niven and A. L. Parsons, of Toronto University, will explore and mark out the boundary between the Algoma and Thunder Bay districts, north of the Canadian Pacific Railway, a country concerning which very little is known. The parties will start from Toronto about the end of June.

The Ontario Government has decided to construct a wagon road to afford access to the Larder Lake district, running from Boston on the Temiskaming & Northern Ontario Railway, situated 153 miles, north of North bay, to the lake, a distance of 14 miles. The difficulties in the transportation of supplies and machinery for want of a road have been so great that development has been much retarded. A preliminary examination of the ground has been made.

### London

May 25—About a year ago I gave some particulars of the flotation of the Great Cobar copper mine in London. The doings of the London company have been followed with keen interest, and the circular just issued to shareholders has received special attention. The company was formed in May, 1906, but it was not until September that the working of the properties was entirely taken over. Since that time until the beginning of May, 119,287 tons have been smelted, producing 3217 tons copper, 7595 oz. gold and 47,300 oz. silver. This is an average monthly output greater than that estimated in the prospectus.

Developments at the mine during this time have increased the ore ready for stoping, which now represents eight years' supply at the present rate of extraction. In one part of the mine opened up during the past few months a strong body of copper ore averaging 2 oz. gold per ton has been found. The new main shaft has been sunk 500 ft. and, at the rate of 140 ft. a month, the thousand feet should be reached in about four months from now.

Considerable difficulty has been met with in erecting the new smelter plant. Six months ago a contract for its supply was entered into with the Allis-Chalmers Company, but for some unexplained reason the latter company did not go on with the contract, so the plant has been bought from other makers, some in the United States, and some in England. Some of the plant has already been shipped and the remainder is practically ready for despatch, so that by the end of the year the plant should be nearing completion.

### Johannesburg

May 13—We are in the midst of the most serious strike known on the Rand. The trouble broke out on the Knights' Deep last week. At this mine the wages earned by the miners working on contract

were high, the average being over \$9.60 per 8-hr. shift. Some men were actually earning \$19.20 per shift in stopes.

The management proposed another arrangement. The price paid per fathom was reduced from \$16.80 to \$14.40, and instead of running two machines in a stope the contractors were asked to take on another machine. In this way it was hoped to increase the efficiency of the men, without reducing their income. But the men took up the cry of three machines. The miners' union plus a few labor agitators, came to their assistance, and the fight commenced in earnest.

The men were not quite clear why they struck, but in a general way the trouble is about the idea of one white man superintending three rock drills. The men declare that this is only the beginning, that the scheme of the capitalists is to do with less white labor, by compelling each white man to "boss" more Chinese and Kafirs.

The strikers have carried the fire brand to other mines, so that today there are nine or ten mines officially on strike. Some of these properties have been held up by the strikers marching *en masse* to the shafts, and employing more than moral suasion to prevent the men from going underground. The three-machine idea is not enforced on most of the mines, but the men declare they are striking in sympathy. Several mines are still undecided.

The men claim that by running three machines fewer white men will be required. The demand to run three machines is not universal; on some mines it is not practicable for a miner to look after more than two machines. In some mines, however, like the Knights Deep, there are some large open flat stopes, where three machines can be worked to advantage. The action of the miners in the past is contrary to their present avowed solicitude to protect and increase the white skilled labor employed on the mines.

Their next cry is that to run three machines will shorten their lives. This question of health has appealed to the general public, but the three machines will only be placed in large open stopes, and if the operator will take sufficient pains there need be no more dust than with two machines. There is a law that machine men must use sprays to lay the dust, but the men as a class will not use the appliances provided for them.

Although the outlook is not bright, the general feeling is that the strike cannot last long. Great inconvenience is being experienced on the mines where the strike is in force to keep the mills running, but the managers and their staffs, together with a few loyal workmen, are doing all in their power to keep their flags flying. Police are located on all the mines where the strike is on. It is not anticipated that the trouble will affect the May output to any great extent.

# Mining News from All Parts of the World

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

## THE CURRENT HISTORY OF MINING

### Alabama

#### CLAY COUNTY

*Southern Mineral Development Company*—This new company has been organized by Robert R. Zell, N. H. Sewall, Wm. H. Thorpe and J. Rosenbaum, with offices at Birmingham. The Chambers property, located one-half mile west of the Standard mine, has been purchased, and the company has begun work upon two openings, one on each 40 acres. The property contains 80 acres carrying the Chalcopyrite lead, and has been thoroughly prospected with the diamond drill. The property had been tied up in litigation for years and was recently sold by decree of the United States District Court of Appeals. The ore will be hauled by tram to the Standard tippie to be prepared for shipment.

*Standard*—The slope reached the 200-ft. level on June 1. During May, 40 ft. was made in the opening 10x12 ft., showing an orebody 8 ft. wide and having a dip of 42 deg. Drifting has been begun on the 200-ft. level.

### Arizona

#### YAVAPAI COUNTY

*Knight Copper Company*—It is reported that this company has made a discovery of good ore, the deepest workings being only 40 feet. The properties are in the Big Bug mining district, about one mile from the Humboldt smelting works.

*Marschall Group*—J. K. Miller, the new owner of this group of mines, states that with every foot of work more ore is exposed, and that he is considering placing a small reduction plant on the property. This group is in the Eureka district about 60 miles southwest of Prescott, and on the Santa Maria river, the nearest railway station is Hillside, distant 14 miles.

*Mount Tritle Copper Company*—This company has made a new strike of  $4\frac{1}{2}$  ft. of ore carrying silver and gold and copper. The management states that more machinery will be installed.

*New England and Arizona*—This company has been pushing development work at its mines in the north end of the Big Bug district, and has constructed one of the best plants in the county. The engine-room is equipped with a 70-h.p. boiler and a 9x10-in. Hendrie & Bolthoff geared hoist, capable of a depth of 700 ft. The shaft is an incline at a pitch of 68 deg. An air compressor will be installed

in a short time. A one-ton skip is used for hoisting both the ore and water. Numerous holes and shafts have been sunk on the property, all of which show ore.

### California

#### CALAVERAS COUNTY

*Chapman*—Exceedingly rich ground has been struck in this mine at San Andreas.

*Smelter*—The smelter of the Union copper mine has been started up at Copperopolis, and more men are being added to the force of miners as fast as they can be secured.

#### EL DORADO COUNTY

*Gold Bug*—S. G. Sturman has leased a portion of this mine and will commence operations at once.

*Josephine*—C. B. Cleveland, superintendent, expects to reopen this mine shortly.

*Pilot Knob*—This mine, near Shingle Springs, has been sold to Goldfield, Nevada, men. There is a small mill on the property. The vein is small, but of high grade. The mine will now be extensively developed.

#### HUMBOLDT COUNTY

*Orleans Bar Mining Company*—This company at Orleans has a large force of men running a pipe line through the property, where a new cut is to be put.

#### INYO COUNTY

*Greenwater*—About 15 gasolene hoists are now lifting ore. Several mines have reached depths of 500 ft. and crosscuts are being made. More miners are at work than heretofore.

*Willow Creek*—At this new camp, five miles southwest of Greenwater, high-grade ore has been found in the Baltic. The hills are full of prospectors.

#### LOS ANGELES COUNTY

*San Gabriel Mining Company*—This company at San Gabriel cañon has leased the north half of its 160 acres to D. D. Nice & Co., of Bowen, Ill. The property extends along the San Gabriel river bed for about two miles.

#### MARIPOSA COUNTY

*Pocahontas Copper Mining Company*—This company, 16 miles from Le Grand, J. G. Roberts, superintendent, has started shipping copper ore to Tacoma, Wash.

Only the highest grade ore is shipped. The property shows a large ledge of ore.

#### MODOC COUNTY

*Fort Bidwell District*—The gold mines 10 miles south of Fort Bidwell, recently discovered, are attracting numbers of prospectors. The ledges are large and of a fair grade.

#### NEVADA COUNTY

*California Copper*—This mine, near Spenceville, is taking out high-grade ore and shipping it to smelters in Shasta county. The mine has recently been reopened.

*Gold Mound Mining Company*—This property, near Grass Valley, owned by Spokane men—H. B. Dennis, superintendent—has its double-compartment shaft down to the depth of the old one. Quartz has been found of high value.

*Richland Gold Mining Company*—This old hydraulic mine, now operated as a drift mine, is approaching the old Manzanita channel at the end of its 1900-ft. tunnel.

#### PLACER COUNTY

*Asbestos*—W. S. Haworth and T. E. Morgan, Alta, have filed several deposits of asbestos near Green Valley. On one of these considerable work has been done and a good quality of the mineral has been found.

*Herman*—This mine is pushing the work of grading for its 40-stamp mill and has contracted for 3000 cords of wood. The orebody is large.

#### PLUMAS COUNTY

*Plumas-Mohawk Gold Mining Company*—M. H. Bernheim, manager of this company, whose property adjoins the Plumas-Eureka mine, will begin the erection of a 10-stamp mill as soon as the weather and road conditions permit. The company owns several quartz locations, also about 40 acres of virgin gravel ground.

#### SAN BERNARDINO COUNTY

*Blue Jacket*—This property, east of Crackerjack, recently purchased from Moore and Tomlinson, for \$50,000, is soon to be operated on a large scale by the Goldfield, Nevada, and Portland, Oregon, men who bought it.

*Crackerjack Gold Mining Company*—This company at Crackerjack district has made a strike of gold ore in the course of development work.

## SAN DIEGO COUNTY

*Dewey*—At this mine, Grapevine district, 16 miles southwest of Warner Springs, a contract has been let to drive 1000 ft. of tunnel.

## SHASTA COUNTY

*Midas Mining Company*—The machinery for the new hoisting plant of this mine, Knob, has arrived, and will soon be put in operation. Fifty men are now employed at the mine.

## SIERRA COUNTY

*Bonanza King*—This mine in Alleghany district has been bonded by C. L. Crane and the lower tunnel will be extended.

*Dead River Mining Company*—Work is to be resumed on this gravel mine in the famous Blue Lead of the county.

## SISKIYOU COUNTY

*Cyanide Plant*—Gillett & Sons have secured the Lewis mill in Oro Fino for crushing ore from their claim, and are making preparations to install a cyanide plant.

*Highland*—This mine, 18 miles from Etna, L. H. Cory, superintendent, is being equipped for summer work. Rich ore has been taken out.

## YUBA COUNTY

*Marysville Gold Dredging Company*—A. B. Strock, superintendent of this company, is preparing to build one more gold dredge. The company already has two in operation.

## Colorado

## CLEAR CREEK COUNTY

*Buffalo-Colorado Mining Company*—The Fraction mine in Spring gulch has been sold for \$35,000 to Buffalo and Colorado parties. New machinery is to be installed and George A. Sanborn, Jr., Idaho Springs, is to have charge of the property.

*Coulter*—Denver and Idaho Springs people have purchased this group, situated on Leavenworth mountain, near Georgetown, for a consideration of \$25,000, and a company is to be formed for its operation.

*Diamond Tunnel*—This group in Griffith district has been sold to C. S. Desch, representing Eastern people, for a consideration of \$32,400, and a new company is to be formed. C. S. Desch, of Silver Plume, will be manager.

*Humboldt*—It is reported that a controlling interest in this mine, near Idaho Springs, has been sold to W. F. Wallace, and A. R. Wells, of Grand Junction, Colo., and that a reorganization will take place at the next stockholders' meeting in Denver.

*United Hydro Electric Company*—It is reported that the property of this company, plant of which is located at Georgetown, has been sold to the Eastern Colo-

rado Power Company, which is an auxiliary of the Central Colorado Power Company recently organized, and that the consideration is \$750,000.

## GILPIN COUNTY

*Clifton Bell*—Southern capitalists have become interested in the King Bee G. M. & M. Company, operating in Russell district, and A. H. Heller, formerly of Cripple Creek, is manager, with headquarters at Central City. New machinery is being installed.

*Gower Mines Syndicate, Ltd.*—A good strike is reported in the 14th level at a depth of 1250 ft. on the east side of the shaft in the Running Lode mine, near Black Hawk. The exploration work on the east side shows that the orebody is a good one. T. Dunstone, Black Hawk, Colo., is superintendent, and British capital is interested.

*Guardian Mining Company*—Articles of incorporation have been filed, showing capital stock of \$10,000, with Denver people interested, they having secured a lease and bond on the East Pewahie property in Russell district. Heavy developments are planned as soon as the new machinery is installed. C. T. Austin, Russell Gulch, Colo., is manager.

*Naragansett Mining and Milling Company*—A deed has been recorded showing consideration of \$50,000, conveying from G. P. Goodier, of Denver, to this company the Carr group on Bobtail hill, the Randolph mill, aerial tramway and improvements. Rhode Island capitalists are interested and they will install an air-compressor plant and carry on increased operations.

## LAKE COUNTY—LEADVILLE

*Bartlett Tunnel*—Since the Halycon Mining Company took hold of this property, Sugar Loaf, in the spring it has begun to pay. The original owners sank a shaft 280 ft. and were driven out by water; a tunnel was then driven 1300 ft. Some ore was shipped when work was stopped. This spring the Halycon Mining Company took possession, deepened the shaft and is now shipping regularly from a well defined body, about 25 tons daily of ore carrying both gold and silver. The shaft will be sunk another lift of 80 feet.

*Boston-Arizona Mill*—This plant at the foot of Harrison avenue treating lead-zinc-iron sulphide ores will be enlarged to increase the capacity to 200 tons daily. At present 150 is the daily tonnage. The plant recently made a successful run on the Iron Mask zinc ore from Gilman.

*Boulder Shaft*—This shaft, Little Evelyn Mining Company, South Evans gulch, is down 425 ft. and the streak of gold ore found at the 400-ft. mark continues. Drifting will probably be begun north and south on this vein to catch the main orebody.

*Buckeye*—The body of lead carbonate ore recently opened in this property, Fryer hill, holds good and is widening with development work. The ore shoot continues to the north, which proves that the orebodies extend north across Big Evans gulch and into Cumberland mountain. The Buckeye shoot is on the edge of Big Evans gulch.

*Hoffer Shaft*—Work on this property, lower Big Evans gulch, is still being carried on at the 300-ft. level. The work is at present in the blue lime, but a shaft will be sunk to the white lime where it is believed the main orebodies lie.

*Ibex Mining Company*—At present about 450 men are employed by the different sets of lessees and the ore shipments amount to 8000 tons per month. Some of the ore shipped is of high grade, the principal shippers of this class of ore from No. 4 shaft are the Hahnwald brothers shipping an average of 25 tons weekly of ore that nets \$1000 per ton. The lessees in the copper belt are also shipping a good grade of ore.

*Long & Derry*—Operations have been resumed on this property by the Anona Mining Company and a tunnel is being driven into the hill. A portion of the ground has been leased and this will be worked for the iron. This property in the early days was a large producer of gold and silver. The tunnel will be driven past the old workings and into new territory.

*Pawncos*—This property adjoining the Mammoth, Big Evans gulch, will resume operations in a few days.

## Louisiana

## CALCASIEU COUNTY

*Union Sulphur*—The mines of this company, 12 miles west of Lake Charles, on May 30 suffered considerable damage from the season's floods, which were more than usually severe this year.

## Michigan

## HOUGHTON COUNTY—COPPER

*Calumet & Hecla*—Work on the foundations of the recrushing mill and boiler house is progressing rapidly. The recrushing mill will be approximately 340x125 ft. and will contain 48 Chilean mills and Wilfley tables, all to be operated electrically. This mill is to treat the tailings from the other mills and to work over portions of the present stamp sands. The boiler house is to contain 20 Babcock & Wilcox water-tube boilers of 510-h.p. capacity each and the building is to be equipped with stoker, coal and ash conveyers and all modern facilities. The company is also changing the gage of the railroad track to the standard gage, necessitating the change of about 20 miles of track and the rebuilding of 14 locomotives.

**Centennial**—The concrete pillars for three additional heads have been laid for the Centennial-Allouez mill. At the present time there are three heads operating, one, compound, continuously on Centennial rock, and the other two during the day and one at night on Allouez rock.

**Mohawk**—A streak of Mohawkite ore has been struck at the thirteenth level.

**Osceola**—Work has been resumed at No. 1 North Kearsarge shaft, after a shutdown of several months on account of fire.

## Missouri

### ST. FRANCOIS COUNTY

**Doe Run Lead Company**—Grading for the new 1200-ton mill has begun at Elvins. It is to be built on strictly modern lines and with the latest improvements; the old 900-ton mill at Doe Run will also be operated, so that the output of this company will be doubled in about a year. The new shaft at Mitchel is completed at a depth of 460 ft. and the railroad has been extended to it. The option on the 590 acres of the Columbia lands at \$690,000 has been exercised, so that with the earlier acquisition of the Union Lead Company's lands nearly 1500 acres additional land have been secured and their position greatly strengthened. The old No. 1 mine at Flat river, which was drowned out about 15 years ago, is being reopened. It was found to have been drained by the neighboring mines; it is one of the richest mines in the district.

**Federal Lead Company**—The new 2500-ton mill on the Central land is about finished and two sections are now in successful operation. This is the largest and finest mill west of the Mississippi river and cost about \$1,250,000. John Hays Hammond, Chester A. Beatty and Pope Yeatman have been making their annual inspection of the Federal properties.

**Herculaneum**—At the St. Joe smelter the Savalberg pot-roasting method of desulphurizing the galena concentrates has been under experiment for several months; it has proved so satisfactory that three more pots are being installed.

**St. Joe Lead Company**—The labor situation is quieting down and all danger of a general strike seems to be over. The men were given a sweeping advance of 10 to 12½ per cent. on the first of the year and the house rents were reduced 50 per cent., yet they demanded another advance of 10 per cent. on May 1. This was refused, the 20 diamond drills were called in and laid up, and other preparations made for shutting down. This had the desired effect and the men abandoned all further talk of a strike.

### WASHINGTON COUNTY

**St. Joe Lead Company**—This company has six diamond drills in operation near

Big river, where it has about 2000 acres under option.

## Montana

### BUTTE DISTRICT

**Anaconda**—The shaft on the High Ore is down 2800 ft. and will have 50 or 75 ft. added for sump purposes. The sump finished, an immense station will be cut at the 2800. Crosscutting from the 2400 of the Neversweat to catch the south vein is still in progress. All mines of the company, with the exception of the Galatin and J. I. C., are in operation. The two latter yield about 300 tons of ore a day when running and were closed down on account of a strike of teamsters. Anaconda is not feeling the loss of ore from this source.

**Boston & Montana**—The ore reserves are now greater than ever before and are becoming more extensive each week. The daily yield is about 3300 tons, which is the capacity for the smelter. Sinking continues in the West Colusa, now about 1800 ft. deep. The Badger State opening is 370 ft. deep and that on the Greenleaf 750 feet.

**Copper Exploration**—This company, which began developing the Six O'clock group on the east side about a year ago, has suspended operations temporarily at least. It deepened the old shaft to 1000 ft. and crosscut and drifted on veins, but failed to find commercial ore. The company worked under lease and bonds, which will expire in August, and was backed financially by Paine, Webber & Co., Hayden, Stone & Co., and Richardson, Hill & Co., Boston, with the Leopolds, of Chicago.

**Parrot**—The company is sinking its main shaft from the 1800-ft. level to an indefinite point, possibly only the 1900-ft. line for the present. The lifts in this mine are only 100 ft. apart. The yield is about 300 tons a day, but the company also hoists ore from the Nipper vein for the Coalition Company.

**Raven Mining Company**—Development work has been resumed on this property, consisting of the Raven and Snoozer claims. The old incline shaft on the former, now 700 ft. deep, will be taken to the 1000-ft. mark. The capitalization has been increased from \$500,000 to \$1,000,000. The directors have authorized Manager Berkin to buy a larger hoisting engine.

### DEERLODGE COUNTY—ANACONDA

**Washoe Smelter**—About 108 ft. of the roof of the flue leading to the big stack of the Washoe smelter fell in on June 5, suspending operations in all departments except the concentrator for one or two days. According to the engineers in charge, expansion and contraction of the steel supporting beams sheared off the bolts holding them in place.

## Nevada

### ESMERALDA COUNTY—GOLDFIELD

**Atalanta**—The Precious Metals Company, Chicago, Ill., has purchased the Duquesne lease on the Black Bear claim, and is erecting a plant to send a shaft down to the 150-ft. level with the greatest possible speed.

**Combination**—An orebody has been cut in the 120-ft. level. The vein appears to strike toward the famous Reilly lease, and there are indications that the new find will develop into a great gold producer. The vein at present is 25 ft. in width. The body is being developed so that regular shipments can be made. During the past month two carloads were sent to Salt Lake. During May the production in this property amounted to \$150,000.

**Mohawk Florence**—This property is shipping 60 tons of high-grade ore to the smelters daily. Arrangements have been completed for shipping several hundred tons daily. Increased shipments will be made next week. Several of the recent shipments averaged \$300 per ton. The shaft is down 250 ft., and the workings are being developed rapidly.

**Mohawk Consolidated**—The east drift on the 200-ft. level is now over 200 ft. out from the shaft, and has encountered a change of country with every indication of the proximity of the orebody. This portion of the mine is being worked by the Mohawk Consolidated Leasing Company, of San Francisco.

**St. Ives**—Drifting has been started at the 300-ft. level. Some trouble is being experienced with water, but this will soon be remedied and ore-breaking will be started in the course of a few days. The vein is from 3 to 7 ft. in width, and carries high-grade shipping ore.

### NYE COUNTY—MANHATTAN

**Big Four**—Shaft-sinking has been resumed on this property, and work is being carried on in the tunnel which has been driven in a distance of 200 ft. Arrangements are being made to drift on the vein in the tunnel face.

**Breyfogle**—The shaft has reached a depth of 60 ft., and a power hoist is about to be erected. When the 150-ft. level is reached cross cuts will be run to catch the Thanksgiving vein.

**Independent**—Preparations have been made to resume sinking the shaft another 100 ft. The country rock at the bottom of the shaft at present is a granular quartz, which is full of vugs filled with sulphur and volcanic ash. The vein continues to look well.

**Mustang**—The north crosscut at the 260-ft. level is now out a distance of 50 ft., and has proved the vein to be 40 ft. in width. Sulphide ore is showing. Parts of the vein give high assay returns. There are immense reserves of milling grade ore opened up for mining as soon

as the mills now in course of erection are in operation.

**Mustang Extension**—The Thangsgiving and Brey-fogle veins both strike into this property, and a shaft has been started to cut them at depth. As the surface prospecting work resulted in exposing a number of ledges which are being profitably developed in adjoining mines, the management has determined to make the shaft of large dimensions.

**Verde**—The shaft has been sunk to the 160-ft. level, and has struck water. The north cross-cut at the 150-ft. level has cut a 12-ft. vein carrying free gold and assaying well.

#### WHITE PINE COUNTY—ELY

**Boston Ely Development Company**—This company has taken up its options on several promising groups of properties in this district, the final payments having been made within the last two weeks. It now has title to the Bon Ton, Sunset, Imperial, Fairbanks-Morse, Sevastopol, Emma No. 2, Standard, Mineral Chief, Ivanhoe, Thelma, Bellevue, Julian and Victor Hugo mines.

**Ely Consolidated**—The rich strike of copper on the Rising Sun claim two weeks ago, continues to develop well and shipments will soon be made.

**Ely Witch**—The shaft is down 230 ft., and a body of ore averaging well has been uncovered at the 210-ft. point. Sinking is progressing at the rate of 5 ft. a day.

**Giroux Consolidated**—The workings continue to develop well, and regular shipments of ore are being made from the Alpha shaft.

**Wide West**—Operations will be resumed at once. Foundation for a new power plant is being laid and machinery has been ordered.

#### WHITE PINE COUNTY—ROSEBUD

**Brown Palace**—Development work is progressing rapidly. Tunnel No. 1 is in about 190 ft., and the big ledge will probably be cut in about 60 ft. Tunnel No. 2 is also going ahead rapidly and a number of rich stringers have been encountered.

**Dreamland**—The old shaft is down 58 ft, and a drift was run from the 140-ft. level for 68 ft. Shipping ore is being sacked from the drift.

**Golden Anchor**—The tunnel is in about 275 ft., and will be driven 75 ft. further, at which point it is expected to cut the main ledge. From the lower shaft drifts have been started each way to catch the orebody.

**Mollimac**—Some good looking quartz has been uncovered in trenching on claim No. 7.

**Rattler**—Work is progressing satisfactorily. The crosscut is now in about 80 ft., and it is expected to cut the ledge within 75 ft.

#### EUREKA COUNTY

**Richmond-Eureka**—About 150 tons of ore daily are now being produced at the Eureka Consolidated mine, and the Richmond mine has also been reopened, and will likewise become a steady producer. Over \$500,000 has been expended during the last year and a half in reopening these mines. The company still has over \$100,000 cash available, besides 49,500 shares in the treasury. The total capitalization is \$3,600,000, divided into 360,000 shares. In a report made on the property in 1905 it was recommended that the main shaft be sunk 400 ft. deeper. It was also stated that several hundred thousand tons of ore, formerly regarded as too low grade for treatment, were available and can now be treated at a good profit.

#### New Mexico

##### SOCORRO COUNTY

**Mistletoe Mining Company**—This company, at its mine in the Magdalena district, entered the ore chute June 4. The tunnel is 1100 ft. long. The ore is a good grade of galena and blende.

#### Oregon

##### BAKER COUNTY

**Eagle Mountain Mining Copper Company**—This company, George E. Alexander, superintendent, on Goose creek, about 25 miles east of Baker City, is driving two tunnels.

**Power Plant**—T. R. Berry, of the Eagle River Electric Power Company, and crew of men are at work at the power-house site on Main Eagle to the Virtue mine for the transmission line.

**Sawmill Gulch**—J. T. Miller will begin sinking on his claims on Goose creek.

**Sovereign Group**—The control of this group of copper claims on Goose creek and the Poorman group, 25 miles east of Baker City, including 18 claims on Goose, Coin and Balm creeks, has been acquired by an Eastern syndicate for \$250,000, through its representative, W. B. Gleding. Development work will begin at once under the direction of C. H. Knight.

**Trade Dollar**—This company, Dewey, Idaho, has placed an order for a new power plant at Swan Falls with the Baker Iron and Supply Company. This local house is also supplying the machinery for the large water wheel on Snake river, which is to generate power for Nampa and Caldwell, and also for the Boise Interurban.

**Teddy Group**—A shaft is being sunk on this group which shows good ore.

#### Pennsylvania

##### ANTHRACITE COAL

**Philadelphia & Reading Coal and Iron**—This company's statement for April and

the 10 months of its fiscal year from July 1 to April 30 is as follows:

	April.	Ten Mos.
Earnings.....	\$4,121,378	\$32,010,461
Expenses.....	3,901,151	30,319,880
Net earnings .....	\$ 220,227	\$ 1,690,581

For the 10 months there was an increase of \$4,014,939 in earnings; an increase of \$3,876,937 in expenses, and a resulting gain of \$138,002 in net earnings.

#### BITUMINOUS COAL

**Pittsburg Coal Company**—This company's financial statement for the four months ended April 30 is as follows:

	1906.	1907.	Changes.
Earnings.....	\$1,398,427	\$1,522,832	I. \$124,405
Depreciation, etc..	604,885	560,045	D. \$ 44,840
Interest.....	393,778	372,426	D. 21,352
Total charges....	\$ 998,663	\$ 932,471	D. \$ 66,192
Net balance.....	\$ 399,764	\$ 590,361	I. \$190,597

Depreciation charges in 1907 were \$223,718 for decrease in value of coal lands, and \$336,327 for depreciation of plant and equipment.

#### Utah

##### BOX ELDER COUNTY

**Lakeside Copper Company**—Churn drills are used for prospecting on the property of this company on Promontory point, near the north end of Great Salt lake.

##### JUAB COUNTY

**North Scranton**—This new company will shortly begin the development of mining property adjoining the Scranton lead-zinc mine in the North Tintic district.

**Tintic Ore Shipments**—The mines of the Tintic mining district were the last week of May represented by 130 carloads of ore, the contributing mines and amounts being: Ajax, 2; Bullion-Beck, 9; Beck Tunnel, 12; Carisa, 6; Colorado, 10; Centennial Eureka, 42; Du Pue, 6; Eagle & Blue Bell, 4; Eureka Hill, 2; Grand Central, 2; Lower Mammoth, 7; Godiva (concentrate), 7; Scranton, 6; Swansea, 1; Uncle Sam Con., 8; Yankee Con., 5; Victoria, 2.

#### Washington

##### OKANOGAN COUNTY

**Olentangy**—The vein was encountered in a double-compartment shaft over a year ago, at a depth of about 75 ft. After several months idle, work was resumed about the middle of last February, sinking the shaft on good gold ore. There is a good wagon road to the railway, about three miles distant. This property is owned principally by Ohio people.

**Wehe Consolidated**—These claims in Golden camp, on Palmer mountain, have been sold to a Milwaukee, Wis., company by the original owners. A. M. Wehe reports having interested some Eastern



people in a plan to build a smelter near Oroville.

**Kimberley**—The steam hoist, boiler and compressor have been delivered. As soon as they are installed, sinking will be resumed in the shaft from the 100-ft. level.

#### FERRY COUNTY

**Gwin**—The main vein, 20 ft. wide, has been intersected in the lower tunnel, 345 ft. from the portal, at a depth on the pitch of about 500 ft., the vertical depth being about 300 feet.

**Meteor**—The tunnel, now in 630 ft., will be driven about 40 ft. farther. The company will also drift each way on the ore vein already cut in the tunnel. A new ore house has been built for sorting.

**San Poil Mining and Exploration Company**—This company has been incorporated under the laws of Washington with \$1,500,000 capital, divided into 1,500,000 shares. The directors are Chas. E. Skiles, John W. Mickle and Mr. Hannaford, of Philadelphia; Caspar Howarth, of Chester, Penn.; A. L. Wright and S. L. Boyer, of Spokane, Wash. Philadelphia will be the principal place of business. This company has purchased three groups of claims, which will be known as the Philadelphia, Empire and Last Chance groups, the last named consisting of 10 silver-lead claims at the head of Nine Mile and the south fork of Bridge creek. S. L. Boyer is the manager. The ore brought to the surface is gray carbonate of lead. The vein is a contact between porphyry and lime.

**Seal Mining Company**—The directors of this company are the same as those of the San Poil Mining and Exploration Company. The company has bought six claims 1½ miles north of the Congress mine, on Bridge creek. The vein is a contact between porphyry and diabase. A tunnel 57 ft. long has intersected the vein at a depth of 30 ft. A new tunnel will be driven on the hanging wall.

#### STEVENS COUNTY

**Nellie S.**—A shaft was sunk 200 ft. on a 4-ft. vein. Recently an 8-ft. vein was uncovered in a shaft 15 ft. deep, about 200 ft. west of the main shaft and dipping toward it. A crosscut will be driven from the bottom of the working shaft to intersect the newly discovered vein.

**Oriole**—In the lower tunnel, Metalline district, 320 ft. from the portal, a vein of silver-lead and copper ore was cut at a depth of 175 ft. Drifts will be driven on it and the tunnel will be continued about 100 ft. to intersect another vein which was opened at the surface.

**Trojan**—Work has been resumed.

**Trophy Gold Mining and Milling Company**—This company has been organized to operate the Wild Rose and Buckeye claims on First Thought hill.

**Viking Copper Mining Company**—This company has been incorporated by Frank P. Milkark, G. H. Walters and J. A. Maicil, of Spokane, Wash., to operate a gold-copper property of three claims.

### West Virginia

#### KANAWHA COUNTY

**Cardiff Coal Company**—The lands and operations of this company on Armstrong creek in the lower edge of Fayette and the upper edge of Kanawha counties, have been sold to the Tyree interests. The company purchasing was the M. B. Coal and Coke Company, composed of the same persons as those composing the Black Betsy Coal Company, of which Frank L. Tyree is general manager. The transfer covers several thousand acres of land and four plants in operation.

### Canada

#### ALBERTA

The provincial government has appointed a commission to investigate and report on all phases of the coal-mining industry. The members are: Chief Justice Sifton, chairman; Lewis Stockett, general manager of the Pacific Coal Company, Bankhead, representing the coal-mine operators; and William Hasom, president of the Coleman Miners' Union, representing the coal miners.

#### BRITISH COLUMBIA—BOUNDARY DISTRICT

The output of ore from Boundary district mines during the first four months of 1907 was as follows: January, 60,003 tons; February, 53,965; March, 100,219; April, 117,907; total, 332,094 tons.

The April tonnage was made up as follows: The Granby Company's mines, 70,518 tons; British Columbia Copper Company, 22,890; Dominion Copper Company, 13,289; Snowshoe mine, 11,030; sundry small mines, 180; total, 117,907 tons.

**British Columbia Copper Company**—A new record of ore treated in one month at this company's smelter was made in April, 34,239 tons being smelted in two blast furnaces. The hearth area of these furnaces is 48x240 in.

#### ONTARIO—COBALT DISTRICT

**Ore Shipments**—Shipments of ore from the Cobalt camp during the week ending June 1 were made by the following mines: Coniagas, 179,300 lb.; Nipissing, 185,670; O'Brien, 65,200; Trethewey, 63,200; Timiskaming, 55,500; total, 548,870 pounds.

**Beaver**—A plant comprising a one-half Duplex Rand 14x22 compressor and an 80-h.p. boiler has been installed, and is in operation. A depth of 60 ft. has been reached in the main shaft, Cobalt, which will be put down to the 125-ft. level, where drifting will be undertaken, as well

as at 75 ft. Seven veins in all have been found, a new discovery being made last week, when a 5-inch cobalt-calcite vein was struck about 300 ft. from the main shaft.

**Big Ben**—A 30-in. vein carrying calcite and galena, has been struck in No. 2 shaft, Cobalt, at 55 ft. The new vein from the Green-Median has been encountered at No. 5 shaft. Ore is being taken out for shipment.

**Big Pete**—A new drift has been started at the 115-ft. level, Cobalt, ore taken out at this depth showing as good values as at the higher level.

**Bluebell Mining Company**—A staff of 25 men in charge of Consulting Engineer Hobson is at work sinking test pits on the company's claims at Larder townsite, Larder Lake area. Some samples of free-milling quartz have been obtained. Native silver has been found on an island in the lake owned by the company.

**Nipissing**—A big chute of high-grade ore has been struck in vein No. 49, Cobalt, by a cross-cut, driven south, 200 ft. from shaft 25. The strike was made at a point 250 ft. southwest of the original strike of high value in the vein, and at a depth of 30 ft. The vein is 3 ft. wide, with a streak of native silver ore 18 in. in width, and is in the Huronian formation, the first discovery in the vein being in the greenstones. A drift is being run to the new deposit from the foot of the 125-ft. shaft sunk at first on the vein. Additions are being made to the working force which now numbers 350. A subsidiary camp is to be established on the Nipissing property, north of Cobalt.

**Timiskaming**—Smelter returns for the initial shipment of ore amounting to 27 tons less a fraction have been received, the sum being about \$90,000. The main shaft, Cobalt, is down 82 ft., and will be sunk to a depth of 300 ft. At the 75-ft. level drifting has been done for over 250 ft., and from the drift at 113 ft. from the shaft a winze has been sunk for 35 ft., the vein for the greater part of this distance being 2 ft. wide. The ore is calcite and silver, with some niccolite but less than 4 per cent. cobalt. Some huge nuggets have been taken out weighing from 200 to 600 lb., and carrying over 18,000 oz. silver to the ton. A new vein has been found in the cross-cut at the 75-ft. level carrying native silver. It has been found impossible to put in the machinery for some time under contract on account of the condition of the roads.

### South America

#### BOLIVIA

**Incahuara Gold Mining Company**—A railway, 120 km. long, is being built across the Andes to assist in the working of the gold deposits of the Rio Kaka belonging to this company. Dredges will be employed, and the new railway will serve for their transportation.

# Metal, Mineral, Coal and Stock Markets

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

## QUOTATIONS FROM IMPORTANT CENTERS

### Coal Trade Review

New York, June 12—The western coal trade is steady, with no special incident. Warmer weather seems slow in coming, and the demand for domestic coal keeps up to an unprecedented degree for the season. Steam coal continues in steady demand. The trouble in the Pittsburg district is to be settled by arbitration after all, as briefly noted last week. Some minor troubles in Indiana have been settled by a conference. The lake trade is not specially active, though shipments from Lake Erie ports exceed those of last year to date.

The eastern bituminous trade is rather active, demand for steam coal showing up well. The coastwise trade is hampered by a shortage of vessels available, and consequent high freight rates.

The anthracite trade is steady, May shipments, as given elsewhere, being close to 6,000,000 tons. There is still a strong demand for small or steam sizes, which is most apparent in the city trades.

The New York, New Haven & Hartford Company has given to the New York Central & Hudson River Company an option on the controlling interest which it holds in the New York, Ontario and Western Railroad, and its coal properties. The New Haven surrenders this property, which it bought over a year ago, in return for certain traffic arrangements, and in consideration of the withdrawal of opposition to its purchase of the Boston & Maine system. The option will doubtless be exercised, and will bring into the anthracite combination the only independent company having its own line to tidewater.

#### COAL-TRAFFIC NOTES

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

	1906.	1907.	Changes.
Anthracite.....	1,686,117	2,337,056	I. 650,939
Bituminous.....	13,308,987	15,638,517	I. 2,329,530
Coke.....	5,370,805	5,877,542	I. 506,737
Total.....	20,365,909	23,853,115	I. 3,487,206

The total increase this year was 17.1 per cent.

Shipments of Broad Top coal over the Huntingdon & Broad Top Railroad for the year to June 8 were 444,173 tons.

The Southwestern Interstate Coal Operators' Association publishes the following statement of coal production for

the three months ended March 31, in short tons:

	1906.	1907.	Changes.
Missouri.....	1,026,221	784,480	D. 241,741
Kansas.....	1,898,078	1,620,399	D. 277,679
Arkansas.....	619,438	563,345	D. 56,093
Indian Territory....	1,001,553	685,325	D. 316,228
Total.....	4,545,290	3,653,549	D. 891,741

This shows a total decrease of 19.6 per cent. this year.

Shipments of anthracite coal by Lake from Buffalo for the season to June 1 were 770,430 tons.

Shipments of coal and coke over the Chesapeake & Ohio Railway for the 10 months of the fiscal year from July 1 to April 30 were as follows, in short tons:

	Coal.	Coke.	Total.
New River.....	4,600,564	183,257	4,783,821
Kanawha.....	3,013,515	84,022	3,097,537
Kentucky.....	150,372	.....	150,372
Connecting lines...	346,625	104,695	451,320
Total.....	8,111,076	371,974	8,483,050
Total, 1906..	7,595,273	408,643	8,003,916

The total increase was 479,134 tons, or 6 per cent. Deliveries of tonnage originating on the road this year were: Points west of mines, 3,536,117 tons coal and 198,728 tons coke; points east, 1,487,560 tons coal and 68,551 tons coke; tidewater, 2,740,774 tons coal.

Shipments of anthracite coal in May were 5,994,272 long tons, an increase of 2,740,042 tons over May, 1906. For the five months ended May 31 the shipments, by companies were, in long tons:

	1906.		1907.	
	Tons.	Per Ct.	Tons.	Per Ct.
Reading.....	3,959,424	20.0	5,451,068	20.2
Lehigh Valley....	3,327,306	16.9	4,551,318	19.9
N. J. Central.....	2,461,274	12.5	3,503,635	13.0
Lackawanna.....	3,375,058	17.1	4,303,237	16.0
Del. & Hudson....	2,019,960	10.2	2,664,918	9.9
Pennsylvania....	1,725,523	8.8	2,498,216	9.2
Erie.....	1,996,082	10.1	2,859,568	10.6
N. Y., Ont. & W....	854,656	4.4	1,128,375	4.7
Total.....	19,709,783	100.0	26,960,335	100.0

The total increase this year was 7,250,552 tons, or 36.8 per cent. The light tonnage in 1906 was due to the suspension of mining in April and a part of May.

### New York ANTHRACITE

June 12—There is very little change to report in the anthracite-coal market. The demand for small sizes continues to be sharp, with a fair demand for other sizes. The backward season has had a small effect in stimulating demand. The slow improvement in the car supply continues, but conditions are not yet normal. We quote prices as follows: Broken, \$4.45; egg, stove and chestnut, \$4.70. Quotations on small sizes are as follows: Pea, \$3.10; buckwheat, \$2.60; rice, \$1.95; barley, \$1.60; all f.o.b. New York harbor.

### BITUMINOUS

The improvement in the Atlantic seaboard soft-coal trade continues, and there seems to be a fairly general demand for coal, which transportation facilities, especially by water, are not large enough at this time to take care of. Producers, however, are careful not to send coal to tide in quantities sufficient to produce blockades, as the lesson of a few weeks ago in that direction had a good effect.

Throughout the trade there has been a general complaint that the main-line railroad transportation superintendents have been over-zealous in their efforts to discharge cars at tide promptly, the complaints being that it interferes with the transaction of business in a legitimate manner.

Trade in the far East is still demanding considerable amounts of coal and orders from this territory seem to be accumulating in the hands of shippers. The great scarcity of vessels does not permit the coal to go forward as promptly as desired.

Trade along the Sound is quiet, probably because consumers have fair stocks of coal on hand. New York harbor trade seems to be taking care of all of the coal which is offered. Prices are somewhat lower, and good grades of steam coal are now selling around \$2.60 f.o.b. New York harbor shipping ports.

All-rail trade appears to be pretty well supplied with coal, and there are a good many suspensions of shipments to avoid congestion; this will probably continue until stocks are reduced. Transportation from mines to tide is up to schedule. The car supply is fairly good, although the quick action of main-line transportation superintendents in shutting off mine-car supply on the slightest appearance of accumulations at tide interferes greatly with the proper handling of business.

Coastwise vessels are scarce, and in great demand, and quotations are unchanged from last week as follows: Philadelphia to Boston, Salem and Portland, \$1.05@1.10; Providence, New Bedford and the Sound, \$1; Lynn and Bangor, \$1.30; Portsmouth, Gardiner and Saco, \$1.15; Bath, \$1.10; with towages where usual.

### Birmingham

June 10—Coal operations in Alabama show no change. The miners are getting out a large quantity of coal and there is a demand for every ton. No apprehension is felt as to the outcome of the

annual meeting of the district organization of the coal miners which began today and is to continue for a week. The iron and steel companies do not deal with the union miners except the Alabama Consolidated. The commercial coal companies in Jefferson, Shelby and St. Clair counties sign contracts with the union men. It is hardly believed there will be any change made in the contract which has been in effect for the past three years, in which case the operators will sign willingly. Almost all of the miners are doing well and very little trouble is heard of in this State. New men are being brought into the State right along and are being given employment. The operators report that there will be no need for cutting off any of the work at the mines this summer and a steady output is looked for through the entire year.

The coke situation is a little better. The demand is picking up. Prices are inclined to be weak. The production is being held up, the operators declaring that it will be a profitable move when the demand is again normal.

### Chicago

June 10—The wholesale coal market continues strong for both Western and Eastern coals. It is probably the best market, for early summer, that the trade has seen for several years. All kinds of coal are in good demand, prices are fair though not high, and there is not the usual summer accumulation of coal on tracks to be sold at a sacrifice because of demurrage.

Of Illinois and Indiana bituminous, which constitutes the bulk of the local supply, this is especially true. Fine coals are increasing in demand and value; lump coal is being sold at the low prices usually prevailing at the beginning of summer, June business, both in city and country, promises to average well, as the railroads are laying in stocks of storage coal.

Quotations on Illinois and Indiana coals remain practically unchanged; lump and egg sell for \$1.60@2.55, run-of-mine for \$1.50@2.25, and screenings for \$1.55@1.75.

Anthracite is in good demand for immediate and future deliveries, the demand for immediate deliveries being larger than usual on account of the continued cool weather. Smokeless is a trifle weak; the supply is large and the demand, while good, does not increase so fast; run-of-mine listed at \$3.35 sells for \$3.15 in some cases. Hocking is in steady demand and firm condition at \$3.15 for lump. Youghiogheny and Pittsburg are a little more plentiful and bring \$3.15@3.25 for ¾-inch.

### Cleveland

June 11—The Cleveland Chamber of Commerce issued the following report of receipts and shipments through Cleveland for May:

Receipts: Anthracite coal, 14,340 tons; bituminous, 420,742 tons; coke, 49,824 tons; iron ore, 3940 gross tons, by lake, 897,768 tons; pig bloom and railroad iron, 68,807 tons, by lake, 1956 tons; other iron and castings, 48,032 tons; manufactures, 63,819 tons, by lake, 87 tons. Shipments: Bituminous coal, 6770 tons; by lake, 355,486 tons; coke, 2828 tons; iron ore, 645,887 gross tons; pig bloom and railroad iron, 23,964 tons; other iron and castings, 65,580 tons; manufactures, 42,817 tons, by lake, 20,499 tons. All movements are by rail unless specified by lake.

### Indianapolis

June 10—The Indiana mines are now working on an average of four days per week. The continuous demand to date for coal for present use never occurred before at this season, and the increasing demand for Indiana coal by the manufacturing and interurban industries is very much greater than for any previous year. The contract business is taking on a brisk tone and operators are unusually cheerful. No mines have been abandoned, but a number of new shafts are being opened.

The expected reduction on railway rates and other provisions of the law recently enacted, puts the retail and wholesale dealer in a hopeful mood. The operator also expects to profit by that provision of the law that requires the railroads of the State to keep a uniform order book at all stations for registering all orders for and deliveries of cars. The law requires each carrier to furnish to the operator cars within forty-eight hours after 6 p.m. of the day of making the application.

After an all-day session at Terre Haute June 6, the joint board of mine workers and operators of Indiana agreed on all differences, and the strike which threatened to involve about 5000 miners was averted. Both sides made concessions and the terms of settlement are satisfactory to both miners and operators. The trouble started over the discharge of men at the Union mine of the Consolidated Coal Company over a trivial matter.

### Pittsburg

June 11—There is but little change in conditions, prices remaining the same on a basis of \$1.20 a ton for mine-run coal at the mine. Cars are not so plentiful and some mines are idle today on this account. The demand is good and the outlook is encouraging. Lake shipments are going forward satisfactorily. The rivers are still navigable and coal is being sent to Southern ports almost as fast as it is mined. There are plenty of empty coal boats and barges and the river mines will be operated in full for months.

Connellsville Coke—Coke is firmer this week, although spot prices continue low. A number of inquiries have been received

for last half and for the first half of next year. Contracts were made for furnace coke for shipments through the last half at prices ranging from \$2.35 to \$2.75 and for spot at \$2.25 to \$2.50. Foundry coke for spot and last half is held at \$2.85 to \$3.25. The *Courier* in its summary for the week gives the production in both regions at 406,422 tons. The shipments for the week aggregated 14,626 cars, distributed as follows: To Pittsburg, 4795 cars; to points west of Connellsville, 9022 cars; to points east of Connellsville, 800 cars.

### Foreign Coal Trade

The report of the Crow's Nest Pass Coal Company in British Columbia gives the tonnage shipped for the year as follows:

	1905.	1906.	Changes.
Coal.....	831,249	806,901	D. 24,348
Coke.....	257,702	213,295	D. 44,407
Total.....	1,088,951	1,020,196	D. 68,755

For a large part of the year tonnage increased. The loss in the total was due entirely to the strike of the miners in September and October of last year.

The production of coal in the Donetz basin in Russia for the quarter ended April 30 were, in metric tons:

	1906.	1907.	Changes.
Anthracite.....	371,985	522,686	I. 150,701
Bituminous.....	2,822,438	3,868,192	I. 1,045,754
Total mined.....	3,194,423	4,390,878	I. 1,196,455
Shipments.....	2,355,444	2,912,020	I. 556,576

Conditions were much better this year, 111,968 men having been employed in 1907, against 81,045 last year.

### Iron Trade Review

New York, June 12—So far as new business is concerned, the market has been quieter in some directions. In pig iron there is no longer a rush, though there appear to be a good many people who have not yet contracted for their supplies for the third and fourth quarters.

They have been holding back possibly in the hope of lower prices; but they are now looking for supplies.

In finished material matters are also a little quieter in most lines; probably for the reason that consumers are generally supplied, or else have made up their minds to wait and see what turns up next.

The event of the week has been the throwing into bankruptcy of Milliken Brothers, of New York, an incorporated company which has been doing a large business as a contractor for buildings and similar work, and which recently established large structural works on Staten Island, New York. The cause of the trouble seems to have been expansion to a point where the banks refused to furnish the money needed for working capital.

It is reported that the Delaware & Hud-

son Company is negotiating for the sale of the stock of the Chateaugay Ore and Iron Company which it owns—carrying the control of the company—to the United States Steel Corporation. The property is in the Adirondack region in northern New York, including a blast furnace and appurtenances. The chief value of the property, however, is in the extensive body of iron ore owned by the company. This is rather low grade, requiring concentration, but the quantity of ore known to exist is large.

**Lake Superior Ore Shipments**—Shipments of Lake iron ore reported for the season to June 1, by ports, were as follows, in long tons:

	1906.	1907.	Changes.
Escañaba.....	923,744	1,014,339	I. 90,595
Marquette.....	404,397	376,873	D. 27,524
Ashland.....	632,062	495,194	D. 136,868
Superior.....	868,187	1,101,183	I. 232,996
Duluth.....	1,524,404	1,937,830	I. 413,426
Two Harbors..	1,399,546	1,326,842	D. 72,704
<b>Total.....</b>	<b>5,752,340</b>	<b>6,252,261</b>	<b>I. 499,921</b>

The increase this year was 8.7 per cent. The gain was all made in May, the shipments up to May 1 having been considerably behind those of last year.

### Baltimore

June 11—Imports of spiegeleisen for the week were 100 tons; of ferromanganese, 1539 tons; of ferrosilicon, 200 casks. Receipts of iron ore were 11,100 tons, from Cuba. Other arrivals included 3954 tons iron pyrites from Spain and 772 tons chrome ore from London.

### Birmingham

June 10—While the iron market in this section has been a little quiet recently it has lost none of its strength, and what selling is going on is at a higher quotation than has prevailed. Southern furnace companies have been selling some iron for delivery during the fourth quarter of this year at \$21.50 per ton, while a few sales are still being booked for delivery during the first three months of 1908 at \$18.50 per ton. The production in Alabama has been increased recently and during the present month further improvement will be noted. The new furnace of the Alabama Consolidated Coal and Iron Company at Gadsden and one of the Tennessee Coal, Iron and Railroad Company at Ensley were blown in during the last few days. The Sloss-Sheffield Steel and Iron Company will blow in their two furnaces now under repairs by July 10. Every ton of iron is in demand.

Some complaint is heard as to ore supplies from a few companies. Others report supplies sufficient for all needs. The Sloss-Sheffield has completed a large ore-washer in the Russellville field.

No change in conditions is reported on steel, finished-iron and steel, steel products and cast-iron pipe. All plants are in full operation and the transportation facilities are all that could be asked for.

### Chicago

June 10—There is a livelier tone to the iron market, but sales are not large and indications are for a quiet, firm market indefinitely. The melters are well supplied for the year up to the end of the third quarter, except for the emergencies arising out of larger business than had been contracted for in supplies of raw material. These emergencies have made the dealing in quick-delivery lots of pig iron somewhat larger in the last week than in previous weeks, and maintain the tone of spot deliveries firmly.

Sales continue to be chiefly quick delivery, with a sprinkling of orders for delivery in the last quarter of 1907 and the first quarter of 1908. Quotations for the fourth and first quarters are variable, beyond the usual figures for a corresponding time, but may be averaged at \$21@21.50 Birmingham for Southern (\$25.35@25.85 Chicago), and \$25@25.50 for Northern, the quotations being for No. 2 iron. There are reports of lower prices on Southern, and for the first quarter of 1908 prices are 50c.@\$1 lower—in some cases, depending on the conditions of delivery and the size of the order.

Quick-delivery business is more active with Northern than Southern furnaces. This business, as heretofore, is in small lots, chiefly for piecing out requirements.

Coke is fairly firm, the local supply being well regulated to the demand, and escaping demurrage charges. Connellsville 72-hour sells for \$5.85 and other cokes for 25@50c. less. The demand for contract coke is increasing, but is not heavy.

### Cleveland

June 11—The strike of Cleveland's machinist trades union for the nine-hour day and advance in wages has not assumed a serious aspect during the week. The strikers were but half organized, and in consequence have not made much of an impression, all of the shops affected operating with reduced help. In consequence a number of the men have become discouraged and returned to work, and it is expected that the end of the week will see the strike broken up.

The coal and iron markets are reported at the same prices as last week. There is a slight tone of betterment noticeable in the pig-iron market. Orders do not appear heavy, but furnaces are reporting a good demand for last-half delivery, with some orders from Lorain mills and the valley for delivery during the first part of 1908. The movement of pig iron, as well as all other ores, has been exceptionally heavy during May. Prices are quoted as follows for last-half delivery: No. 1 foundry Northern, \$24.50; No. 2, \$24; No. 3, \$23.50; Bessemer, \$23.90; No. 2 Southern, \$24.35; Gray Forge, \$22.50.

The coke market is quoted quiet with no change in the following prices: Fur-

nace—\$2.15 to \$2.25 last half, foundry, \$3.15 to \$3.25 same; spot furnace coke is bringing \$2.10@2.15.

### Philadelphia

June 13—The pig-iron market appears to have finally entered upon a dull period which some makers believe will continue into mid-summer. The suspension of demand in a large way is welcomed. Buyers who have purchased heavily for forward requirements incline to the opinion that the incoming capacity in the Central West will indirectly bring about easier prices. The opinion of pig-iron makers is exactly the reverse. They believe, that while prices may not advance, the largest production will be anticipated by demand. The fact that foreign stocks have declined over one-half is also kept in sight. A good many small consumers in this territory have decided to do nothing more at present with reference to fourth-quarter requirements. The bar mills are well supplied with forge for this summer but not beyond. Special foundry grades in small lots have been under negotiation this past week. Low phosphorus is quoted \$28, mill irons, \$23@23.50. English No. 3, \$22.50 and Scotch, \$25. Basic, \$24 autumn delivery.

**Steel**—A large volume of business has been done in extension of old contracts and the making of new ones. Purchasers keep themselves well provided and as the mills are taxed, prices keep at the highest point. Just as fast as business comes in, contracts for material to cover are placed. Quotations continued at \$32.50@33.

**Sheet Iron**—Contracts are renewed as old ones are filled and at the same figures. Consumers of sheet are crowded with work and some of the larger concerns have understandings with manufacturers that amount to a continuous supply. Light sheets are just now particularly active.

**Bar Iron**—A number of renewals of contracts will be made this week and next on the old basis. Early deliveries are still at a premium. All bar-iron users show anxiety to keep contracts going. The store demand all over this territory is even stronger than in May.

**Pipes and Tubes**—Merchant pipe is not quoted higher in this market but early deliveries are at a premium. The heavy western demand is reflected here. The tube situation is about the same, and deliveries are insisted upon according to terms of contract. All work calling for tubes is abundant. The boiler plants are extremely busy.

**Plates**—The announcements of the purpose of some railroad companies to largely increase their steel-constructed rolling stock has not taken our plate-mill interests with surprise. Parties representing railroad interests have been personally conferring with plate-mill interests at both ends of the State, and it is believed that

capacity will be engaged in the early summer for some of the new steel cars. Small early-delivery orders are being taken care of.

**Structural Material**—Small, urgent orders are more numerous. Prices for such business are on a premium basis. The local and near-by building demands are quite a feature. Officials say that the requirements for large bridge building will be heavy during the summer. Special efforts are made to accommodate the small builders.

**Steel Rails**—Negotiations are hanging fire for large lots of rails, but no immediate action is probable. A few weeks of comparative quiet are expected. Makers admit railroad managers are looking into the open-hearth rail subject with serious intent.

**Scrap**—The corner in steel scrap still continues and every prospective source of supply is picketed by dealers. Consumers want scrap due them and are not getting it promptly. Other kinds of scrap are moving slowly.

**Pittsburg**

June 11—One of the largest producers was forced to admit today that there is a decided falling off in new business in all lines of finished iron and steel. Orders for small lots which have been unusually heavy since the opening of the year have been remarkably light during the past few days. Specifications have also fallen off, but despite the dullness all the mills are busy and there are enough orders on the books to keep them running for several months. The railroads are not canceling contracts and it is believed they will take all the steel ordered. No new business in steel rails has been recorded for two weeks by the Carnegie Steel Company, but there are a number of inquiries for 1908 delivery which may result in contracts later. The Union Railroad of the Carnegie Company has placed a contract with the Pressed Steel Car Company for 1500 steel gondolas which are to be delivered by October. This company also booked during the week orders for 100 steel gondolas and 200 steel underframe box cars for the Richmond, Fredericksburg & Potomac Railroad. Early in the year it was announced that the steel-car concerns had enough business to keep their plants going steadily all year. The fact that the leading producer can take on a big order for October delivery would indicate that delivery on some of the business has been postponed.

The market for crude steel shows some improvement as deliveries are better. This is accounted for by the fact that the Lackawanna Steel Company and the Cambria Steel Company are diverting steel from their structural mills and putting it

into billets. This indicates a slight lull in demand for shapes and there is therefore more profit in billets. There has been an abatement in the demand for steel bars as most of the agricultural implement makers have covered for their requirements for the year beginning July 1. These interests usually take about 200,000 tons of steel bars annually and so far, it is estimated, contracts have been placed for fully 75 per cent. of the material needed. The large plate mills are filled up for the year and the demand has fallen off, but for prompt shipment no difficulty is experienced in getting a stiff premium.

Interest is centered in the wage conferences this week. The Amalgamated Association representatives met the Western Bar Iron Association in Toledo last week and after a session lasting four days adjourned without having reached an agreement. The conference with the Republic Iron and Steel Company opened in Pittsburg yesterday. It is not likely a settlement will be made unless the workers recede from their demands for an advance. The conference with the American Sheet and Tin Plate Company will be held here next Tuesday and it is also certain that the demands of the workers will be refused.

**Pig Iron**—The pig-iron market shows some evidence of weakness, as sales of bessemer iron for spot shipment in small lots were made at the maximum price of \$24, Valley furnaces, and a number were at 50c. a ton less. About 7000 tons of bessemer iron for June shipment are recorded at \$23.50, Valley furnaces. This may be regarded as a low price when it is known that some sales have been made at that figure for fourth-quarter delivery. The most important transaction of the week was the sale of between 3000 and 4000 tons of No. 2 foundry iron for equal deliveries through the first half of 1908 at \$20.75, Valley furnaces. This price is considered low from the fact that sales have been made at \$22 to \$22.50 for deliveries in the last half of this year. An offer of \$23.75 was made today for 200 tons of bessemer for June and the deal may be closed this week. W. P. Snyder & Co. have closed a deal with the Republic Iron and Steel Company for 5000 tons of bessemer for June delivery, payment to be made in ore. Spot bessemer is quoted at \$23.50 to \$24 and No. 2 foundry at \$24.50 to \$25, Valley.

**Steel**—There is a better supply of bessemer billets which are quoted at \$30 to \$30.50. Open-hearth billets are still scarce and are quoted nominally at \$32 to \$34, Pittsburg. Steel bars remain at 1.60c. and plates at 1.70c.

**Sheets**—Deliveries have improved but prices remain firm at 2.60c. for black and 3.75c. for galvanized sheets No. 28 gage.

**Ferro-Manganese**—The market is dull, prices for spot ranging from \$65 to \$66.

**Dusseldorf, Germany**

June 1—The German Iron and Steel Union reports the production of pig iron in April at 1,077,703 tons; which is 58,554 tons more than in April, 1906. It is 21,554 tons less than in March; but April had one day less, so that the daily average, which was 35,460 tons in March, was 35,923 tons in April—an increase of 463 tons. For the four months ended April 30 the total production was as follows, in metric tons:

	1906.		1907.	
	Tons.	Per Ct.	Tons.	Per Ct.
Foundry iron....	690,527	17.2	729,268	17.3
Forge iron.....	286,966	7.1	267,595	6.4
Steel pig.....	295,086	7.3	338,879	8.0
Bessemer pig....	165,019	3.9	161,415	3.8
Thomas pig.....	2,589,179	64.5	2,720,146	64.5
Total.....	4,016,777	100.0	4,217,303	100.0

Increases were, in foundry iron, 38,741 tons; in steel pig—which includes spiegel-eisen, ferromanganese, and all similar alloys—43,793; in bessemer pig, 6396; in Thomas, or basic pig, 130,967. There was a decrease of 19,371 tons in forge iron, leaving the total gain this year 200,526 tons, or 5 per cent.

**Metal Market**

NEW YORK, June 12.

**Gold and Silver Exports and Imports**

At all United States Ports in April and year

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

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

**Gold and Silver Movement, New York**

For week ending June 8 and years from Jan. 1.

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week.....	\$ 5,530,588	\$ 45,224	\$ 980,298	\$ 17,951
1907.....	10,227,122	5,615,351	17,128,436	760,249
1906.....	5,718,521	44,431,197	27,908,550	918,212
1905.....	33,118,146	5,268,759	14,308,575	1,719,789

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

The joint statement of all the banks in the New York Clearing House for the week ending June 8, shows loans £1,141,445,100, a decrease of \$1,514,300; deposits, £1,119,141,500, an increase of \$9,053,100, as compared with the previous week. Reserve accounts show:

	1906.	1907.
Specie.....	\$187,129,600	\$213,574,200
Legal tenders.....	81,816,300	72,191,700
Total cash.....	\$268,945,900	\$285,765,900
Surplus.....	\$ 7,162,050	\$ 5,980,425

The surplus over legal requirements shows a decrease of \$6,801,925, as compared with the previous week this year.

Specie holdings of the leading banks of the world, June 8, are reported as below, in dollars:

	Gold.	Silver.	Total.
Ass'd New York			\$213,574,200
England	\$173,876,835		173,876,835
France	537,586,025	\$198,166,485	735,752,510
Germany	128,715,000	59,870,000	188,285,000
Spain	77,545,000	128,270,000	205,815,000
Netherlands	26,653,000	28,104,500	54,757,500
Belgium	15,833,335	7,916,665	23,750,000
Italy	161,595,000	24,737,000	186,332,000
Russia	580,355,000	31,475,000	611,830,000
Aust.-Hungary	227,615,000	63,605,000	291,220,000
Sweden	20,720,000		20,720,000

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

Shipments of silver from London to the East are reported by Messrs. Pixley & Abell, as follows, for the year to May 30:

	1906.	1907.	Changes.
India	£ 7,613,213	£5,257,534	D. £ 2,355,679
China			
Straits	1,750	491,862	L. 490,112
Total	£ 7,614,963	£5,749,396	D. £ 1,865,567

Imports for the week were £2000 from China, £5000 from the West Indies, £5000 in Mexican dollars from Vera Cruz, £7000 in Mexican dollars and £127,000 in bars from New York; a total of £146,000. Exports were £15,000 coin to Australia, £65,800 coin to the straits, £85,000 in bars and £90,500 in Mexican dollars to India; £256,300 in all.

Indian exchange has been firmer, and the Council bills offered in London brought an average of 16.09d. per rupee. The demand for money in India is strong. Buying of silver for India was only moderate.

Other Metals

June.	Copper.			Tin.	Lead.	Spelter.	
	Lake, Cts. per lb.	Electrolytic, Cts. per lb.	London, £ per ton.			Cts. per lb.	Cts. per lb.
6	24 @25	23 @23 1/2	97 1/2	41 1/2	5.75	6.45	6.30
7	24 @25	23 @23 1/2	97 1/2	41	5.75	6.45	6.30
8	24 @25	22 3/4 @23	.....	41	5.75	6.45	6.30
10	24 @25	22 3/4 @23	97 1/2	40 1/2	5.75	6.45	6.30
11	24 @25	22 3/4 @23	97 1/2	41	5.75	6.45	6.30
12	24 @25	22 3/4 @23	96 1/2	40 1/2	5.75	6.45	6.30

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

Prices of Foreign Coins

	Bid.	Asked.
Mexican dollars	\$0.51 1/2	\$0.53 1/2
Peruvian soles and Chilean	0.47	0.50
Victoria sovereigns	4.85	4.87
Twenty francs	3.85	3.89
Spanish 25 pesetas	4.78 1/2	4.80

SILVER AND STERLING EXCHANGE.

June.	Sterling Exchange.	Silver.		June.	Sterling Exchange.	Silver.	
		New York, Cents.	London, Pence.			New York, Cents.	London, Pence.
6	4.8680	66 1/2	30 1/2	10	4.8700	66 1/2	30 1/2
7	4.8710	66 1/2	30 1/2	11	4.8700	66 1/2	30 1/2
8	4.8700	66 1/2	30 1/2	12	4.8700	66 1/2	30 1/2

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

**Copper**—The market this week is substantially a repetition of last week. Some sporadic sales of near-by electrolytic have been made for export at a slight concession in price, but there has been no business with domestic consumers, who are still conspicuous by their absence and are evidently determined to use up their present supplies before entering into further contracts. No business in Lake copper was reported during the week, and quotations for that grade are entirely nominal. As for a number of weeks previous, the total amount of business done last week was small in comparison with the transactions under ordinary conditions. The large selling interests, which have been holding out of the market, continue to maintain their position. Everything apparently depends upon how soon the large consumers will come into the market prepared to place orders. In the meanwhile some producers appear to be tired of waiting for the situation to clear up and are disposed to accept lower prices. The market closes at 24@25c. for Lake, 22 3/4@23c. for electrolytic, and 21 1/2@21 3/4c. for casting.

The market for g.m.b.'s in London has been steadily declining, and supporting orders have so far made no impression. The close is lower and easy at £96 5s. for spot, £93 5s. for three months. Refined and manufactured sorts we quote: English tough, £102; best selected, £106; strong sheets, £113.

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

**Copper Wire**—The base price of copper wire, No. 0000 to No. 8, is 27 1/4@27 1/2c. per pound.

Exports of copper from New York for the week were 2443 long tons. Our special correspondent reports exports for the week from Baltimore at 1525 long tons copper.

**Tin**—The decline in London has made further progress, and even at the lower prices reached, the market is but barely steady. The close is cabled at £185 10s. for spot, £180 10s. for three months.

The New York market is without special feature, excepting that there is again a scarcity of spot supplies, which has resulted in a premium for immediate shipment, in which business is being done at 40 3/4c.

**Lead**—The price for desilverized remains steady at 5.75c., New York. and 5.67 1/2c., St. Louis. Corroding brands are 0.1c. higher.

Owing to a decided falling off in shipments from Australia, the London market is very firm and heavy premiums are being paid for immediate shipment. Prices at the close are strong and advancing at £20 7s. 6d. for Spanish lead, and £20 10s. for English.

**St. Louis Lead Market**—The John Wahl Commission Company reports from St. Louis that lead is firm but quiet. There have been fairly liberal sales of Missouri brands at 5.67 1/2c., both for prompt and forward delivery.

**Spanish Lead Market**—Messrs. Barrington & Holt report from Cartagena, Spain, under date of May 18, that the price of pig lead has been 92 reales per quintal; silver, 13.25 reales. per ounce. Exchange 27.84 pesetas to £1. The price of lead, on current exchange, is equal to £18 10s. per long ton, f.o.b. Cartagena. Shipments have been 470 tons argentiferous and 100 tons desilverized to Marseilles; 471 tons argentiferous and 200 tons desilverized to Great Britain; 200 tons desilverized to Hamburg; a total of 1441 tons.

**Spelter**—The market is rather quieter and business has been of reduced volume. The close is unchanged at 6.45c. New York, 6 30c. St. Louis.

Advices from London indicate a singularly weak spelter market, due to production overlapping consumption. The close is cabled at £24 7s. 6d. for good ordinaries, £24 12s. 6d. for specials.

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

**Antimony**—The market is extremely weak and prices have suffered a heavy decline, which has been due to the pressure of holders who have been forcing sales. There appears to be a considerable stock of metal in some hands. Quotations at the close are 12@13c. for ordinary brands, while for Hallett's and Cookson's there is at present no sale. A range of 12 to 16c. probably represents the whole market.

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

**Platinum**—A slight further decline has taken place in the market, and there appears to be a disposition to await further developments rather than to take advantage of the present lower prices, which are quoted as follows: Ordinary metal, \$26 per oz.; hard metal, \$28.50. Scrap is worth \$20@21.

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

**Wisconsin Ore Market**

**Platteville, Wis., June 8**—While the price of 60 per cent. zinc ore remained the same as last week, lead was off considerably, selling at \$74@75 for the better grades. One of the most prominent ore buyers states that the smelters have a surplus, but his instructions to buy all ore in sight still hold good. This statement was substantiated by the action of all buyers. The buying movement was well defined all throughout the week for immediate loading, and the tonnage purchased totals up to a respectable size though all was not loaded. Toward the latter part of the week some interest was shown in purchasing for next week, but no sales for future delivery were reported. The large amount of ore in the bins at the smelter, and the active buying this week are significant that, at least for the present, there will be no material change in the price of zinc ore. Nearly all of the larger producers contemplate changes and improvements of some sort, that will tend to increase the output.

Shipments of the district, by camps for the week ending June 8 were as follows:

Camps.	Zinc ore, lb.	Lead ore, lb.	Sulphur ore, lb.
Platteville .....	279,400	.....	.....
Buncombe-Hazel Green..	752,900	.....	.....
Benton.....	479,340	.....	.....
Cuba City.....	210,290	.....	.....
Highland.....	198,000	.....	.....
Linden.....	182,310	.....	.....
Galena.....	79,700	.....	.....
Livingston.....	60,000	.....	.....
Mineral Point.....	44,000	.....	.....
Rewey.....	.....	44,290	.....
Total for week.....	2,285,940	44,290	.....
Year to June 8.....	41,667,200	1,826,440	189,160

The lead output for this camp should increase materially. The producers claim that they have sold all their ore produced, consequently the ore in the bins at the mines cannot be called a surplus. A slight improvement in the car supply is looked for in the near future.

**Missouri Ore Market**

**Joplin, Mo., June 8**—The highest price paid for zinc ore was \$51 per ton, on an assay base of \$46@48 per ton of 60 per cent. zinc, averaging \$45.42. The highest price paid for lead was \$75.50, medium grades commanding from \$72 to \$74.

averaging \$76.06. Although the high price of the week was \$75.50, numerous settlements were made on purchases of the previous week, accounting for the apparent incongruity of an average price higher than the high price.

Within three weeks there has been a total increase in the production of zinc concentrate of 610 to 760 tons per week, by the opening of new mines and starting of new mills. Deducting the loss by the inundation of the Badger mines the net increase is 350 to 400 tons per week. During these three weeks the demand has grown stronger each week, until considerable ore is being contracted ahead of its production.

Following are the shipments of zinc and lead from the various camps of the district for the week ending June 8:

	Zinc, lb.	Lead, lb.	Value.
Webb City-Carterville.	3,444,850	983,210	\$118,273
Joplin.....	2,150,790	309,310	63,373
Duezweg.....	893,280	195,240	28,411
Galena-Empire.....	839,190	190,610	26,544
Alba-Neck City.....	869,310	36,850	22,798
Prosperity.....	373,270	249,340	18,245
Aurora.....	890,940	15,790	17,396
Granby.....	660,000	50,000	12,100
Oronogo.....	460,870	.....	10,815
Spurgeon.....	318,260	42,650	7,645
Baxter Springs.....	150,360	58,970	5,829
Zincite.....	193,080	29,750	5,534
Sarcozie.....	85,070	.....	1,956
Carthage.....	60,660	.....	1,486
Sherwood.....	43,770	11,560	1,468
Badger.....	42,240	2,730	1,138
Reeds.....	41,180	.....	947
Totals.....	11,518,720	2,170,010	\$344,158

23 weeks.....277,947,660 44,239,880 \$8,332,441  
Zinc value, the week, \$261,613; 23 weeks, \$6,528,286  
Lead value, the week, 82,545; 23 weeks, 1,804,155

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

ZINC ORE AT JOPLIN			LEAD ORE AT JOPLIN.		
Month.	1906.	1907.	Month.	1906.	1907.
January...	47.38	45.84	January...	75.20	83.53
February...	47.37	47.11	February...	72.83	84.58
March.....	42.68	48.66	March.....	73.73	82.75
April.....	44.63	48.24	April.....	75.13	79.76
May.....	40.51	45.98	May.....	78.40	79.56
June.....	43.83	.....	June.....	80.96	.....
July.....	43.25	.....	July.....	74.31	.....
August.....	43.56	.....	August.....	75.36	.....
September.	42.58	.....	September.	79.64	.....
October.....	41.55	.....	October.....	79.84	.....
November..	44.13	.....	November..	81.98	.....
December..	43.68	.....	December..	81.89	.....
Year.....	43.24	.....	Year.....	77.40	.....

**Chemicals**

**New York, June 12**—The general chemical trade is without special incident. Business has been rather quiet, with no new developments.

**Copper Sulphate**—Demand continues steady, and there is no accumulation of stocks. Prices are unchanged and we quote \$7.50 per 100 lb. for large quantities, carload or over; \$7.75 per 100 lb. for smaller parcels.

**Nitrate of Soda**—The demand continues good. Spot nitrate is scarce and there is no business for early delivery. For 96 per cent., this year's delivery, 2.55c. is quoted, and 2.47c. for 95 per cent. For 1908 deliveries, prices for 96 per cent. is 2.55½c., and for 95 per cent. 2.50c. is named.

**Mining Stocks**

**New York, June 12**—The general stock market continues irregular and depressed, the occasional rallies being offset by reactions in a downward direction. The large exports of gold last week were a depressing feature, and others were not wanting.

Amalgamated Copper closed at \$86¼; American Smelting common at \$118¾. United States Steel brought \$98½ for the preferred and \$34¾ for the common stock.

A sale of Homestake, of South Dakota, was reported during the week at \$72.50 per share, a recovery from the recent low price of \$55.50 per share.

There were two or three spurts on the curb, but they did not amount to much, and the market was generally dull and rather depressed. British Columbia Copper, Nevada-Utah, Greene-Cananea and United Copper were among the more active stocks.

**Boston**

**June 11**—The market for mining shares continues without animation except occasionally where some special cause creates a temporary advance, only to be lost the following day or so. Buoyancy in the stock market is followed by depression and as a result little change is to be noted in market prices for the week ended today. Amalgamated is off slightly from a week ago, closing at \$83.75. According to reports filed in Butte, Mont., for taxation purposes, six of the Amalgamated subsidiary companies, together with North Butte, Butte Coalition and Alice companies, net earnings for the year ended June 1, 1907, were \$19,445,965, an increase of over \$6,300,000 over the preceding year.

The real feature of the week was the break today of \$5.75 over night in the price of Utah Consolidated to \$53. Unfavorable reports of underground workings, as published by a local news bureau, were responsible for this. Mohawk had a temporary rise of a few dollars on an increase in the dividend from \$4 semi-annually, to \$5; but the closing price is only \$2.50 above that of June 4. Greene Cananea has had a good rise of \$1.75 to \$16.25 on expectation that a dividend will soon be announced. Shannon is up \$1 to \$18.12½. The regular semiannual dividend of 50c. per share was declared last week.

Bingham is off \$1 for the week to \$15. Boston Consolidated \$1 to \$24 and Copper Range more than \$2.50 to \$76.50; Calumet & Arizona has shown buoyancy and is \$2 higher at \$156. North Butte is up fractionally to \$80.50, ex-dividend of \$2. Osceola is up \$5, to \$125 and Tamarack \$5 to \$105; Calumet & Hecla fell \$15 to \$783, and Quincy \$4 to \$109. The latter company is selling off a

few of the untaken shares offered shareholders last fall. Boston and Corbin has been the curb feature, advancing \$2.37 1/2 to \$11.37 1/2. There are but 80,000 shares of this stock.

Utah has acquired additional adjoining properties. The price on the curb is around \$5.

Colorado Springs

The trading during the past week was better than in the previous week. The prices in general are about the same, but the volume of business has been greater. Mary McKinney advanced from 55 to 60, and dropped back to 58c. Work showed greater activity than it has for some time, recording sales to the extent of 20,000 shares the past week.

STOCK QUOTATIONS

Table with columns for NEW YORK and BOSTON, listing stock names and prices for June 11 and June 11.

Table titled 'N. Y. INDUSTRIAL' listing various industrial stocks and their prices.

Table titled 'ST. LOUIS' listing stock names and prices for June 8.

Table with columns for S. FRANCISCO and NEVADA, listing stock names and prices for June 5 and June 12.

New Dividends

Table listing companies, their payable amounts, rates, and total amounts for new dividends.

Assessments

Table listing companies, their delinquent and sale amounts, and total amounts for assessments.

Monthly Average Prices of Metals

Table showing monthly average prices of silver for New York and London from 1906 to 1907.

AVERAGE PRICES OF COPPER

Table showing average prices of copper for New York and London from 1906 to 1907.

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

AVERAGE PRICE OF TIN AT NEW YORK

Table showing average prices of tin at New York from 1906 to 1907.

Prices are in cents per pound.

AVERAGE PRICE OF LEAD

Table showing average prices of lead for New York and London from 1906 to 1907.

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

AVERAGE PRICE OF SPELTER

Table showing average prices of spelter for New York, St. Louis, and London from 1906 to 1907.

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