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## Russellville Brown Iron Ore District

By A. H. SAWYER\*

**SYNOPSIS**—Brown ores occur in this Alabama district in deposits of two types. Prospecting by wells and drill holes. Mining with steam shovels. Ores are all washed. The product runs from 42 to 48% in iron.

The Russellville brown-ore district of Alabama is situated in Franklin County, 106 miles northwest of Birmingham. The district comprises about 25 square miles, the town of Russellville lying in the northern portion. The Northern Alabama Ry. serves the field. Most of the ore is smelted in the furnaces at Sheffield, but some is shipped to the Birmingham furnaces to be mixed with red ores. The country is rolling and drains into the Tennessee River.

### GEOLOGY

The deposits lie in the Lafayette, which was deposited on the Bangor limestone after the latter had been sub-

The second type, in the red loam, was probably derived from the first mechanically and redeposited where it is now found. It is really a placer deposit.

### PROSPECTING METHODS

The ground is prospected either by sinking wells or by churn drilling. Where the deposits are thin and the ground is dry, the sinking of wells is the common and probably the cheaper method. These wells are about 3 ft. in diameter and are sunk with a hand windlass. The work is usually done on contact at 25c. per ft. for the first 12 ft. and 35c. for the remainder. While some wells have been put down to a depth of 50 ft., they are usually from 20 to 30 ft. in depth. Where water is encountered, the churn drill is used and the cost varies according to conditions, but should not exceed that of digging wells. In the gravel it is best to sink wells and when this is passed through, to use drills for the rest of the hole.



OLD PLANT OF THE SLOSS-SHEFFIELD CO.



NEW SLOSS-SHEFFIELD PLANT

ject to erosion. The unconformity between the two is well shown by the cone-shaped masses of limestone frequently uncovered in mining the ore.

The ore deposits appear to be of two types: (1) More or less continuous masses or blankets of ore lying directly upon the Bangor limestone or separated from it by only a thin stratum of clay or gravel; and (2) small masses, boulders and irregular fragments mixed with the red loam of the Lafayette formation.

The first type, so far as known, extends over a more limited area than the second type, but is the thicker and richer of the two. It is usually covered by a capping of exceedingly hard conglomerate, composed of chert pebbles cemented with siliceous iron oxide. This is locally called "peanut capping."

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Most of the wells sunk in the past were put down where surface indications were favorable. While this practice is still in vogue, the method pursued by the more progressive operators is to lay the ground out in 200-ft. squares and test the deposit at each corner.

### MINING METHODS

The companies at present operating in the district are the Sloss-Sheffield Steel & Iron Co., the Sheffield Coal & Iron Co., and the Auxford Brown Ore Co.

Mining is carried on with steam shovels, having buckets of about  $1\frac{1}{4}$  cu.yd. capacity, working in opencuts. In the deposits of the first type, the stripping is first removed and then the ore is mined, a 10- to 15-ft. face being taken in one bench. It is the custom to have one shovel working on stripping and one on ore. The stripping shovel often encounters small pockets of ore, which are separated and sent to the washer. The ratio of cubic

yards of dirt mined to tons of washed ore varies between  $1\frac{1}{2}:1$  and  $3:1$  in deposits of the first type and between  $4:1$  and  $8:1$  in those of the second type.

The material dug by the steam shovels is loaded into 3-yd. side-dump cars and hauled to the washers by 12- to 15-ton dinky locomotives. From 3 to 5 cars make a train, depending on the grades and on the length of the dump at the washer.

#### WASHING PLANTS

The washeries are approached by trestles of varying length, depending on the topography of the country. The difference in elevation between the dumping and shipping tracks is about 50 feet.

The ore is dumped on grizzlies from 40 to 50 ft. long, parallel to the dumping track. The grizzlies are built of five 60- to 80-lb. rails, spaced 4 in. and set at an angle of  $11^\circ$ . Under the grizzly and parallel to it is a cast-iron trough, at the upper end of which a 4-in. pipe enters and furnishes water to wash the ore. The lower end of the grizzly, just above the chute to the trommel, is level, and here there is discarded the oversize, consisting of clay balls, large pebbles and other waste material. This is



WASHER OF THE AUXFORD BROWN ORE CO.

loaded into cars by hand as it accumulates and is trammed to the waste dump. Here also are broken up the "dornicks" or small masses of ore.

The cast-iron trough or launder discharges into a conical trommel 12 to 16 ft. long, the screens perforated with  $1\frac{1}{4}$ -in. holes. The oversize goes to a picking belt, where clay and other refuse are removed, and is then delivered to the loading bins or direct to railroad cars for shipment to the furnaces. The undersize goes to the log washers, situated directly under the trommel.

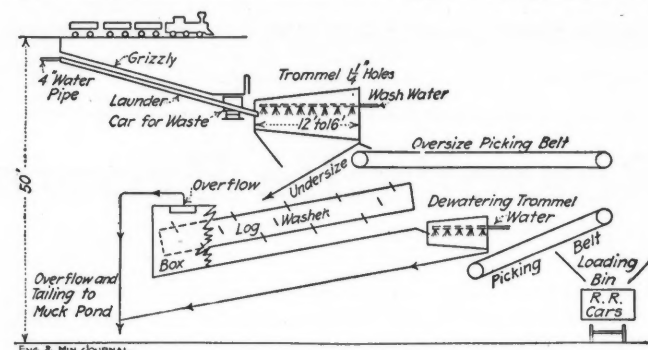
The log washers are arranged in pairs, either two or four being used. They consist of 18-in. octagonal timbers, about 30 ft. in length, to which chilled-iron blades are fastened in spiral fashion. The logs are set on 38-in. centers at an angle of  $7^\circ$  and are rotated by means of gears. They are inclosed in a water-tight box, which has an overflow to carry off the tailings to the muck pond. The washed ore is forced up grade against the water by the log blades and discharged into a dewatering trommel from which it is discharged through chutes to the loading bins or railroad cars. At some of the plants the ore is discharged upon a short inclined picking belt and many pebbles removed before shipping.

The water supply in the Russellville district is somewhat limited. It is necessary to build dams on the small streams for storing water and the muck ponds are usually

inclosed so that they are virtually immense settling ponds, the overflow of which is used again. The quantity of water required for washing is about 2000 gal. per ton of ore.

#### VALUE OF THE ORE

The washed ore runs from 42 to 48% iron, less than 1% manganese and contains from  $\frac{1}{2}$  to 1% phosphorus.



FLOW SHEET OF A RUSSELLVILLE WASHERY

The ore sells for about \$1.25 per ton, f.o.b. mines, for 45% iron and varies 5c. per unit up or down, 40% iron being the rejection point.

#### Talc and Soapstone in 1913

The talc and soapstone industries in the United States prospered in 1913, the total marketed production as reported by the U. S. Geological Survey being 175,833 short tons, valued at \$1,908,097, an increase of about 10.4% as compared with the production of 1912. As usual, New York State led in production with an output of 81,705 tons; Vermont was next, with 45,547 tons, and Virginia third, on account of its production of soapstone, with an output of 26,487 tons; New Jersey and Pennsylvania were credited with 11,308 tons; North Carolina with 4676, California with 952 tons, and other states, including Georgia, Maryland, Massachusetts and Rhode Island, 5158 tons. The figures for North Carolina include talc and pyrophyllite, both of these products being used for similar purposes. A new mill was started in Vermont, at Stockbridge, and will further increase the output of that state. In Virginia a new company began the production of gas tips and pencils at Verdier-ville.

Of the total production, 147,099 tons were marketed as ground talc, 20,465 tons as manufactured articles, and the remainder sold either as rough blocks or as sawed slabs of soapstone.

The average price in the rough for talc as mined in 1913 was \$3.77. Pyrophyllite ranged in price from \$2 in the rough to \$10 per ton when ground. The lower grades of ground talc sold for from \$5 to \$7 per ton. Manufactured articles in 1913 averaged \$28.99 per ton. About 13,774 tons were imported in the United States last year, the leading importing countries, in the order of their importance, being France, Italy and Canada. Canadian production showed a marked increase last year being estimated at 12,250 tons as compared with 8270 tons in 1912. The United States, however, is by far the largest producer and consumer of talc products; it is not only the largest producer but its output exceeds the combined production of all other countries.

# Mechanical Roasting of Leady Matte

By L. D. ANDERSON\*

*SYNOPSIS*—Matte roasting, as formerly performed in hand roasters, has been unsatisfactory. Experiments showed that two-stage roasting was an improvement, and excellent results were obtained by the use of a Wedge mechanical roasting furnace. By careful manipulation it was found possible to roast satisfactorily without the use of extraneous fuel.

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In the early days of lead smelting, the matte produced concurrently with the bullion was regarded as something of a nuisance, involving a rehandling which, in a certain sense, might be considered a reflection on the primary roasting work. Of later years, however, as metallurgists have come to recognize the value of a reasonable matte fall in cleansing the slag, efforts have been directed toward mitigating the expense involved in the roasting of this matte. In all lines of metallurgical work machinery has come to displace hand labor, and now its application in this direction is producing results of some importance. The narration of some experiences with a roaster of the McDougall type may point out some late tendencies.

## TWO-STAGE ROASTING AN IMPROVEMENT

One of the first necessities in the desulphurization of matte is crushing to suitably small size. A basic fact is that the elimination of the last few per cent. of sulphur is the most difficult part of the roasting operation, accomplished only by rather intense firing. The whole practice, as carried out in ordinary hand roasters, has been unsatisfactory and expensive, requiring constant firing, with the actual sulphur elimination an uncertainty dependent upon the personal equation, the quality of coal available and the composition of the matte. A result of finely crushing the matte is a greatly reduced blast-furnace speed, which even the practice of pounding the roasted material in pots into agglomerated cakes scarcely relieves. The above difficulties are largely overcome by the practice of the last few years wherein the roasting is divided into two operations, consisting of a pre-roast, in which the more easily driven off atoms of sulphur escape, and a blast or suction roast, wherein the last desirable units of sulphur are eliminated and the matte converted to a strong, porous sinter, which produces in the blast furnace increased speed and improved slags. For the pre-roasting operation many plants still use the old hand reverberatory, or "flat," roasters, but the tendency is now entirely toward mechanically rabbled furnaces, various types having been used with considerable success.

## INSTALLATION OF WEDGE FURNACES

In 1912, the U. S. Smelting Co. installed in its plant at Midvale, Utah, two furnaces, built after the patents of Utley Wedge, with the intention of trying them on lead-matte and abandoning the hand roasters, which had given so many years of service. Roughly speaking, these furnaces are of the McDougall type, insofar as they are provided with superposed hearths, on which the material is rabbled by plows on arms attached to a vertical revolv-

ing shaft, dropping from floor to floor until final discharge is effected. Several important features, however, distinguish these furnaces from the usual McDougall type, of which the most marked is the exceedingly rugged construction, well illustrated by the heavy central shaft built up of boiler plate to a diameter sufficient to admit the passage of a man through it, and standing on a large-diameter conical base-plate revolving on heavy conical rollers. The furnaces under discussion are 21 ft. 6 in. in diameter inside the boiler-plate shell and have each one feed floor on which the material is partially dried as it is rabbled toward the center, five roasting hearths and two skeleton hearths, open on the sides, for cooling. The multiple-outlet dampers, through which heat can be allowed to escape directly to the flue from any one or all of the four upper hearths, are a specially important feature. The arms are designed somewhat after the manner of cannon breech-blocks, to make possible quick replacement, in case of breakage, without shut down. The design is clever but has not as yet been appreciated for the reason that no arms have broken in the 16 months of service thus far given. The plows are of simple cast-iron design, quickly replaceable. Feed to the furnaces is by a belt feeder from a steel bin overhead, discharging on the outer circumference, whence the material is rabbled toward the center. The large drop hole and gas by-pass arrangement in the floors is very effective in keeping down the dusting effect.

When these furnaces were started up they were provided with large fireboxes for coal burning. A gentle fire for drying was succeeded by increasing temperatures until finally the intermediate floors were red hot, the high silica firebrick, in fact, partially glazing over. Pyrite running about 43% sulphur was then run for a few days in order to increase still further the temperature of the brick, if possible. With much curiosity matte roasting itself was then undertaken. It happened at that time that poor furnace work had produced a matte carrying 20 to 25% lead, and there was much apprehension lest this material frit or sinter together on the hearths. But these fears proved ungrounded, for no such trouble occurred. All this time a heavy coal fire was maintained in the fireboxes. New and inexperienced men took hold and ran the furnaces continuously from then on with little trouble.

## ROASTING WITHOUT EXTRANEOUS FUEL

In order that the previously roasted matte may be sintered, care must be exercised to avoid too great desulphurization. If the percentage of sulphur in the pre-roast is brought too low, it is difficult to ignite again. In the operation of these furnaces, this difficulty manifested itself at an early stage in the blast-roasting department where considerable unevenly roasted and friable product began to appear. In an effort to prevent too complete pre-roasting the speed of the rabbles was increased and a larger tonnage forced through. Finally the fires were gradually lessened, until at last they went out altogether. Yet the matte kept on burning and roasting. Herein was a noteworthy discovery—the possibility of roasting matte

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without the use of extraneous fuel. At first success was not attained every time the effort was made. Gradually, however, the ground principle became apparent. It was the conservation of the heat generated by running with a draft only just barely sufficient to carry away the gases generated. At first it was a common experience to get the matte roast nicely started, only to discover that the operation had ceased and the hearths "gone black," by reason of the admission of too much cold air. Under present conditions the draft in the main flue down-take is only about  $\frac{1}{16}$  in. of water. On the first and second roasting hearths it is about 0.035 in., on the third 0.040 in., while on the fourth and fifth it is scarcely measurable, being, in fact, at moments slightly plus or outpressing. At this point it should be explained that the tonnage of the furnaces proving to be in excess of matte-roasting requirements, spare time has been utilized for the roasting of lead-sulphide ores. In making a cutoff from one material to another, it is usual to put on a coal fire in the fireboxes to start ignition. Yet not infrequently it has been possible to start this ignition, when one material has followed the other with only two or three floors between, without using any coal whatever, the heat retained by the brickwork and carried in the gases from the roasting material just leaving the furnace being sufficient. To accomplish this, however, requires the exercise of some care and judgment.

The multiple-outlet damper mentioned has a really remarkable effect in raising or lowering the temperatures on any floors as desired. Both the temperature and, consequently, the percentage of sulphur in the calcines, can be regulated by this means.

#### FURNACES ECONOMICALLY OPERATED

The total power consumption for feeders, furnaces, etc., is less than 5 hp. per furnace. Each furnace uses about eight gallons of cooling water per minute, entering at a temperature of 40° F. and leaving at 75° F., the average of all the overflows. The gases escape in the downtake at a temperature of about 550° F., there being given off something like 12,000 cu.ft. of gas per minute from each furnace, rated at the boiling point of water and an altitude of 4500 ft. No accurate determinations of the dust losses have been possible as the gases from these furnaces are mingled with other gases and conducted to a bag house. Estimates based on weights of raw and roasted matte would indicate them to be under 8%. Each furnace handles in 24 hr. from 75 to 80 tons of lead-copper-iron matte, crushed to pass a 4-mesh screen. Naturally the cost is but a fraction of that involved in hand roasting.

It is interesting to note that the success attained in roasting matte without the use of extraneous fuel is based on a procedure quite opposite to that found of advantage in the roasting of ores carrying a larger percentage of sulphur than the 22% usually found in matte. The able paper given last year before the A. I. M. E., by Frank R. Corwin and Selden S. Rogers, on "Increasing the Efficiency of McDougall Roasters at the Great Falls Smelter of the Anaconda Copper Mining Co.," emphasized the beneficial effect on tonnage brought about by the increased draft made available by the famous new stack at that plant. The experiences outlined above would indicate that such a draft as prevails at Great Falls would require continuous coal or oil firing in order to maintain

a matte roast. One factor in promoting easy matte roasting is an accelerated weathering obtained by sprinkling with water both before and after crushing. Possibly this weathering causes matte of 22% sulphur content to roast more easily than would be possible with ordinary ores of a like sulphur tenor. Nevertheless the success attained in maintaining combustion in matte by carefully reducing the draft leads to some speculation as to whether the same procedure might not make possible the roasting without fuel of ores of lower sulphur content than are ordinarily considered amenable to such treatment.

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### Hydrated Lime for Cyaniding

BY RICHARD K. MEADE\*

Lime is extensively used in cyanide operations for the purpose of neutralizing the free acid developed in many ores during the process and for coagulating the slime and so assisting it to settle. As a general rule, the lime is purchased in the form of quicklime, stored in sheds and bins and drawn on as desired. When the time comes to use it, the lime is either mixed with the ore and ground with it, or else slaked with water to form a thin cream, which is then added to the ore pulp at some suitable point. The chief disadvantages of quicklime are its poor keeping qualities, as it rapidly absorbs carbon dioxide from the air and becomes worthless. There is always danger, too, in storing quicklime, as water from a leaky roof or other source will slake it, and the heat thus generated may set fire to any combustible matter in contact with the lime. The value of lime for cyaniding increases with its fineness, so that it is usually necessary to grind the lumps before slaking or mixing with the ore.

There has been introduced in the lime trade, within the past few years, dry, slaked lime under the trade name "hydrated lime." This is simply calcium hydrate,  $\text{Ca}(\text{OH})_2$ , or in the case of certain limes, a mixture of calcium hydrate and magnesium hydrate,  $\text{Ca}(\text{OH})_2 + \text{Mg}(\text{OH})_2$ . It is lime slaked with just enough water to convert it to hydrate without having an excess of moisture. When lime is slaked in the usual manner, water is added in considerable excess. This excess remains after the lime has slaked and forms it into a paste or putty. In the manufacture of hydrated lime, however, just sufficient water is added to slake the lime, and what small excess is employed is evaporated by the heat generated by the slaking process.

There are a number of points of superiority possessed by hydrated lime over quicklime which make it peculiarly adapted to the use of cyanide plants. It has splendid keeping qualities and may be kept for several months without appreciable loss of value. There is absolutely no danger of fire from it, and it may be stored in wooden bins or even paper or cloth bags without any risk. It is extremely fine; 90% of it will usually pass a 200-mesh screen. It is, of course, already slaked and in a finely divided condition, and hence needs no further treatment before use, and may be mixed directly with the ore in the bins or as fed to the grinding mills. Hydrated lime is usually purer than lump lime, because in the process of manufacture impurities are screened out.

On the other hand, of course, hydrated lime contains

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water, and hence a given amount of it will not contain as much calcium oxide as will the same amount of quicklime. At the same time, when hydrate can be obtained, it will probably prove the cheaper in the long run, owing to the convenience with which it can be stored and used.

As we have said, one of the great advantages of hydrated lime is its keeping qualities. This makes it especially desirable where only a small quantity of lime is used at a time, and over an extended period, allowing the user to purchase lime by the carload without loss from reversion to carbonate form.

Hydrated lime will absorb carbon dioxide if spread out in a thin layer. In a bin, however, the loss of hydrate from air slaking is slight. The outer layer of lime undoubtedly serves to protect the rest of the package. In some tests of hydrate kept all winter in a dry storehouse, the loss was found to average 3%; some of the outside bags showed as much as 5%, and some of the inside bags as little as 1½%. In the same length of time, a lot of lump lime would have been rendered practically worthless by becoming carbonated.

The fire risk from storing quicklime is well known to dealers in building materials. A ton of lime on slaking will give off as much heat as the burning of 75 lb. of good coal. If water has a chance to get at the lime and any combustible material, such as the barrels in which it is kept, is in contact with it, fire is apt to occur. With hydrated lime there is no fire risk.

Generally speaking, hydrated lime is much purer than lump lime. This is particularly true of hydrates made by the air-separator process. In hydrates made by this method, the impurities are separated from the hydrate. These impurities consist of ashes, siliceous cores, unburned limestone and a small amount of unhydrated lime, the latter usually occurring from the overburning and semifusing of the lime. When the lime is burned in "mixed-feed" kilns, in which the fuel comes in contact with the lime, the latter often contains coke or charcoal. This is a precipitating agent and both destroys cyanide and occasions loss of precious metal. The separators will discard this also, leaving the hydrate free from carbon.

As hydrate is not now manufactured to any extent in the territory where most of the cyanide plants are located, it is probable that the latter would even find it an advantage to build small hydrating plants and to prepare the lime as received, storing it in bins and drawing on this supply as needed. The equipment for this purpose need not be extensive, as the capacity of the hydrating plant would be small. Where power is available a small hydrating plant capable of manufacturing from 15 to 20 tons of hydrate per day could be equipped for between \$4500 and \$5000, including the installation of the machinery.

In the system designed by me especially for small capacities (15 to 20 tons of hydrate per day), the lime is first crushed to pea size by means of a small rotary crusher having an opening sufficiently large to take pieces of lime as big as a kiln will burn. The lime is weighed as it is put through the crusher, and then elevated into a small bin. When a charge, 400 to 600 lb., is obtained in the bin, a slide in the bottom of this latter is opened and the lime is dumped into the hydrator, which consists of a steel drum revolving on tires, and provided with a ventilating arrangement to carry off the steam produced. A measured quantity of water is added to the lime and the two are mixed by revolving the cylinder. At the end of

10 to 20 min., depending on the lime, the slaking is complete and the contents of the hydrator will consist of very fine light fluffy powder, the calcium hydrate, mixed with the impurities already mentioned. These latter are for the most part in the form of coarser particles varying from the size of a pea down to sand. The contents of the hydrator are then discharged into an air separator which discards these coarser particles. The fine powder so obtained is the finished hydrate.

The cost of hydrating lime by this process usually amounts to 30c. or 40c. per ton. This charge, however, would also include the cost of unloading a car of lime if placed alongside of the hydrating equipment, and also the cost of conveying the lime into the storage bin. The latter may be made of wood, but a large steel silo capable of holding, say 500 tons of hydrated lime, would be desirable in some instances.

For a cyanide works burning its own lime, the installation of a hydrating plant would allow the kilns to be run at certain seasons of the year and then shut down for the balance, the lime being hydrated as fast as made and stored in a wooden, steel or concrete silo. In certain localities where the operation of the lime plant is carried on at some seasons with difficulty, owing to the weather, etc., this would be of great advantage and would allow the lime kilns to be operated at their maximum capacity while they were burning stone, and consequently greatly cheapen the cost of production.

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## Drawback on Bonded Lead

WASHINGTON CORRESPONDENCE

William P. Malburn, assistant secretary of the Treasury in charge of customs, has sent to the Collector of Customs, at New York, a letter relating to the drawback on lead articles, in which he rules as follows:

In the matter of the liquidation of drawback entries covering articles manufactured with the use of lead produced in bonded-smelting warehouses from imported ore, the question at issue is whether in the liquidation of drawback entries covering articles manufactured in the United States from such lead allowance shall be made for waste in smelting and refining.

Under paragraph N of Sec. 4 of the tariff act of 1913, on the withdrawal for domestic consumption of lead produced in bonded-smelting warehouses from imported ores, duty is assessed on an equivalent amount of ore from which the lead would be producible in its condition as imported without any allowance for waste, which invariably occurs. Under Sec. 29 of the tariff act of 1897, on the withdrawal of such lead for domestic consumption, duty was assessed on the lead content of the ore from which it was produced.

While the two statutes cited differ in phraseology, their effect on such lead withdrawn from bonded-smelting warehouse for consumption in the United States is the same. The question of the legality and propriety of an allowance for waste in smelting and refining, where such metals are used in the manufacture of other articles in the United States under the act of 1897, was settled in favor of the proposition by T. D. 19,670 of July 19, 1898, T. D. 21,251 of June 12, 1899, T. D. 24,010 of Oct. 21, 1902, and T. D. 25,777 of Nov. 18, 1904, all of which decisions must be read in connection with one another.

Under the circumstances, in the liquidation of entries at your port covering articles manufactured from lead produced in bonded-smelting warehouse from imported ores, an allowance may be made for waste in smelting and refining equal to the difference in the quantity of lead actually withdrawn and the quantity of which duty was paid.

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**To Blast a Series of Holes in a Gneiss Quarry** spaced 12x16 ft. and 20x20 ft. and about 20 ft. deep, sticks of 60% Dupont dynamite, 1½ in. in diameter by about 8 in. in length, were used (A. I. M. E. Bull., Feb. 1914), and the charge was calculated to average about ½ lb. of dynamite per cubic yard of rock.

# Equipment of Mine Machine Shops

By F. A. STANLEY\*

*SYNOPSIS—Importance and scope of the mine machine shop noted. Descriptions of arrangement, construction and equipment of certain typical mining and smelting company shops.*

The mine machine shop, owing to its isolated location and the character of the operations, requires, as a rule, an equipment with greater range of capacity than that of the general repair plant situated in machine-shop districts. The mine shop is constantly called upon to make and repair parts, varying from small work up to heavy bed plates, big cylinders, pulleys and sheave wheels 12 to 15 ft. or more in diameter. Not infrequently the mine machine shop started primarily as a small department for the purpose of overhauling and repairing engines, pumps, rock drills, and the like, develops into an important establishment not only capable of attending to all the repairs of the mechanical equipment of the mine, but also adapted to building much of the new machinery required.

The mine shop in certain places also develops into a semi-commercial institution in that it is often called upon for all sorts of repairs required by other industries in the community.

Certain of the larger mining companies in this country maintain machine shops employing hundreds of mechanics and forming a part of extensive metal and wood-working plants, including iron and brass foundries, forge, machine and sheet-metal shops, pattern and carpenter shops, and so on.

## THE CALUMET & HECLA SHOPS

One of the largest and best equipped of these mine machine shops is that of the Calumet & Hecla Mining Co., at Calumet, Mich. This shop not only repairs all kinds of mining equipment, but also builds rock drills and other apparatus for the company's use.

The drill parts in particular are put through in large numbers and like various other parts are machined economically by the use of jigs and fixtures, so that in addition to a comprehensive equipment of standard machine tools, there are many special tools and appliances in the shop.

A good general idea of this shop and its tools may be gathered from Fig. 1. The building is of brick and frame construction, with the main bay served by a powerful traveling crane, the tools at either side of the bay being served by suitable jib cranes and hoists.

The heavy lathes, boring mills, planers, radial drills and other large tools are arranged as in Fig. 1, leaving the central portion of the floor clear for the free handling of material. The character of some of the work done in this department will be obvious from the illustration, which shows a few large castings, shafts and other machine members in the foreground.

Rock-drill and other work of lighter nature is attended to in other departments, one of which is illustrated by Fig. 2, which shows clearly some of the special apparatus developed for use in handling rock drills,

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either in connection with the making of new drill parts or in repairing old. The racks at the right form convenient storage space for drill cylinders and pistons ready for assembling, and the floor stands in front of the bench enable the drills to be fitted up and completed for operation without difficulty.

## ANACONDA SHOPS

Another machine repairing and building plant of large size, connected with the copper-mining industry, is the foundry department of the Anaconda Copper Mining Co., at Anaconda, Mont. This establishment comprises machine and pattern shops, foundry, sheet-metal and boiler shop, blacksmith shop, woodworking shop and other departments. It not only builds and repairs machinery for the various mines and reduction works of the Anaconda company, but also does considerable contract work for outside customers.

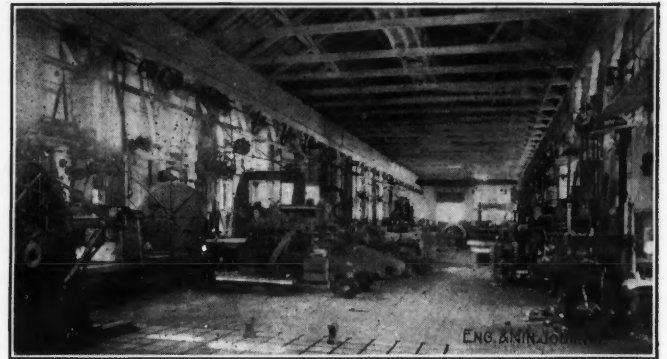


FIG. 1. CALUMET & HECLA MACHINE SHOP

A view of the machine shop is reproduced in Fig. 3, and a layout of the entire machine shop with location of all the tools and other equipment is given in Fig. 4. The building is of brick and frame. The main bays are served by hand cranes of 5-ton capacity each, the position of the runways being shown in Fig. 4. A complete list of

TABLE I. ANACONDA SHOP EQUIPMENT

No.	Machine	No.	Machine
1	4x12-ft. receiving tank	37	dynamo
2	3x7-ft. grease extractor	38	10-ft. boring mill
3	3x12-ft. feed-water heater	39	18-in. slotter
4	No. 0 pump feed	40	50-in. boring mill
5	5½x3½x5-in. duplex feed pump	41	10-in. slotter
6	50-kw. 500-volt dynamo	42	20x48-in. slab miller
7	18x36-in. engine	43	48x48-in. by 20-ft. open-side planer
8	5-ft. pulley boring mill	44	30-in. upright drilling machine
9	5-ft. pulley lathe	45	30-in. upright drilling machine
10	12x14-in. air compressor	46	28-in. upright drilling machine
11	40x96-in. air receiver	47	24-in. upright drilling machine
12	60-ton portable hydraulic press	48	30-in. upright drilling machine
13	magnetic separator	49	laying-out table
14	12-in. double-spindle drilling machine	50	18-in. double-spindle, car-wheel grinder
15	tool grinder	51	18-in. double-spindle emery grinder
16	10-in. drill grinder	52	pouring table
17	14-in. box column shaper	53	babbitt furnace
18	15x36-in. engine lathe	54	coal bin
19	15x54-in. engine lathe	55	30x30-in. by 8-ft. planer
20	20x36x2½-in. turret lathe	56	10-in. emery grinder
21	15-in. shaper	57	48 in. by 18-ft. forge lathe
22	20x20x72-in. planer	58	24 in. by 8-ft. engine lathe
23	No. 1 plain miller	59	24-in. by 10-ft. engine lathe
24	30x30-in. by 10-ft. planer	60	36 in. by 20-ft. engine lathe
25	24 in. by 8 ft. engine lathe	61	30 in. by 22-ft. engine lathe
26	20 in. by 9-ft. engine lathe	62	30-in. radial drilling machine
27	20 in. by 5-ft. engine lathe	63	60-in. plain radial drilling machine
28	24-in. by 7-ft. engine lathe	64	48-in. plain radial drilling machine
29	24 in. by 9-ft. engine lathe	65	hydraulic press for 12-in. wheels
30	24 in. by 9-ft. engine lathe	66	250-ton portable hydraulic press
31	24 in. by 9-ft. engine lathe	67	8-in. pipe threader
32	24 in. by 9-ft. engine lathe	68	12-in. pipe threader
33	24 in. by 9-ft. engine lathe	69	welding generator
34	10-in. emery grinder	70	2-in. pipe threader
35	18-in. emery grinder	71	10-hp. motor
36	50-kw., 500-volt dynamo		

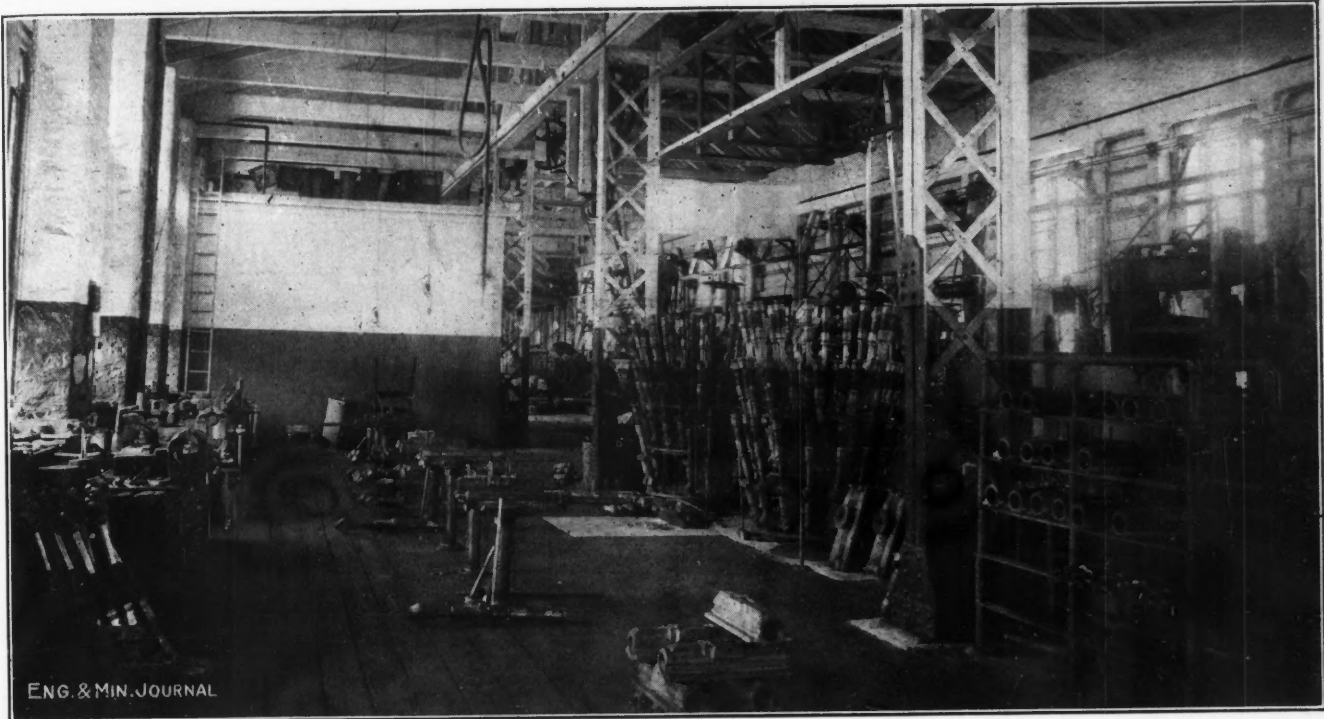


FIG. 2. ROCK-DRILL DEPARTMENT OF THE CALUMET & HECLA



FIG. 3. THE ANACONDA COMPANY'S MACHINE SHOP, ANACONDA, MONT.

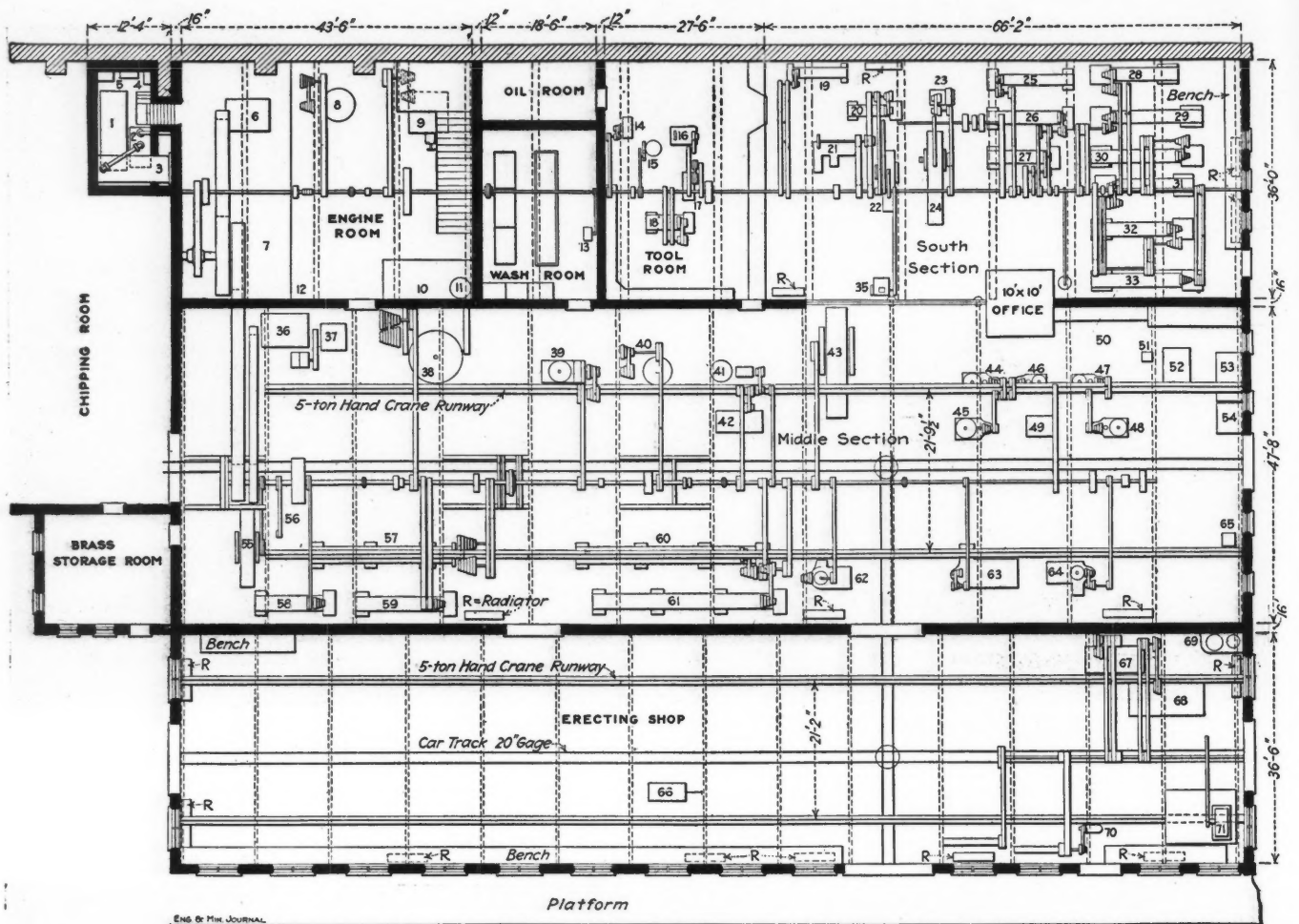


FIG. 4. LAYOUT OF THE FOUNDRY OF THE ANACONDA COMPANY AT ANACONDA

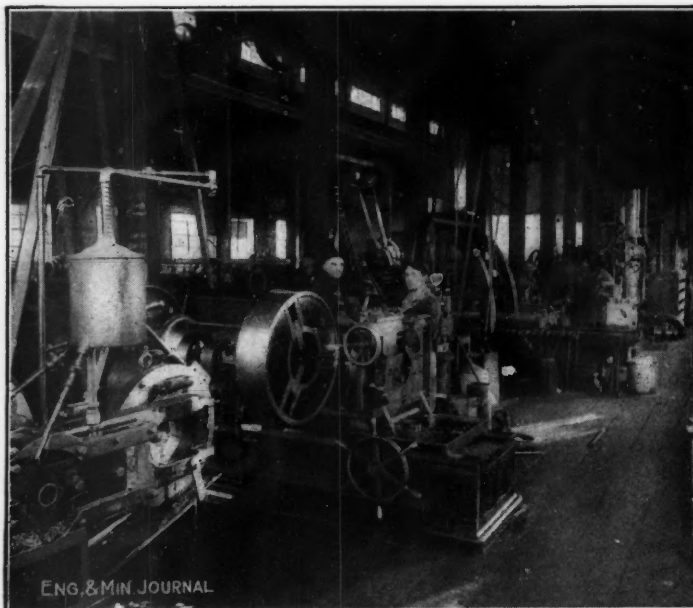


FIG. 5. THE MACHINE SHOP AT THE LEONARD MINE



FIG. 6. ANOTHER VIEW OF THE LEONARD SHOP



the mechanical equipment is given in Table I, the serial numbers corresponding to the numbers on the drawing, thus enabling the positions and dimensions of the various tools to be found at a glance.

The largest of the Anaconda Copper Mining Co.'s shops in Butte, Mont., is that at the Leonard mine, two views in which are shown in Figs. 5 and 6. This shop was erected only two or three years ago and is of concrete and steel. Its equipment throughout is of modern construction and a good idea of the size and character of the tools will be obtained from the illustrations, which show the machines located in the side bays.

OTHER SHOPS OF THE COPPER COMPANIES

The machine shop at the reduction works of the Copper Queen Consolidated Mining Co., Douglas, Ariz., is in a building 80x214 ft., with steel frame and brick walls. The equipment is given in Table II:

TABLE II. MACHINES OF COPPER QUEEN SHOP, DOUGLAS

1 20-hp. motor	1 1-in. head bolt cutter
1 32-hp. motor	1 3-in. head bolt cutter
1 10-ton traveling crane	1 18-in. by 3-ft. lathe
1 20-in. slotting machine	1 18-in. by 8 ft. 6-in. lathe
1 8-ft. boring mill	1 10-in. by 10-ft. lathe
1 3-ft. 6-in. by 13-ft. planer	1 18-in. by 12-ft. lathe
1 24-in. by 10-ft. planer	1 30-in. by 12-ft. lathe
1 hydraulic press	1 24-in. by 24-ft. lathe
1 18-in. shaper	1 7-in. by 8-ft. 4-in. wheel lathe
2 30-in. table drill presses	1 cutoff saw
1 5-ft. radial drill press	1 saw grinder
1 5½-in. pipe machine	1 screw press
1 12-in. pipe machine	3 emery wheels

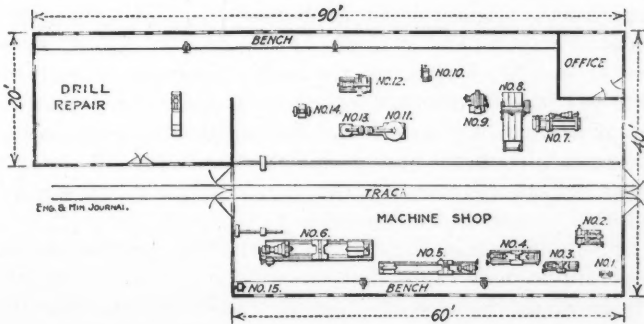


FIG. 7. BUNKER HILL & SULLIVAN SHOP AT KELLOGG

At the Mason Valley copper mines, Yerington, Nev., the machine shop, sheet-iron shop and blacksmith shop occupy one building 45x98 ft. The building is of heavy timber construction covered with corrugated iron. The equipment is given in Table III:

TABLE III. MASON VALLEY MACHINE-SHOP EQUIPMENT

1 28x57x19-in. gap lathe	1 16-in. back-gear shaper
1 36x30-in. by 10-ft. planer	1 pipe machine
1 16 in. by 8-ft. lathe	1 set 5-ft. bending rolls
1 20-in. upright drill	1 8x12-in. compressor
1 30-in. upright drill	1 30-hp. induction motor
1 cold saw	1 power punch
1 12-in. double emery stand	1 splitting shear
1 1½-in. single bolt cutter	

The Lake Copper Co.'s shop, at Lake Mine, Mich., is 24x40 ft. It is equipped with one 21-in. by 12-ft. lathe, one 24-in. by 24-in. by 6-ft. planer, one 16-in. shaper, one 20-in. upright drill press, one 14-in. saw table, one 1½-in. bolt cutter, one emery grinder and one grindstone.

TABLE IV. EQUIPMENT OF BUNKER HILL & SULLIVAN SHOP

No. 1 tool grinder	8 24x24x6-in. planer
No. 2 No. 2 milling machine	9 16-in. shapers
No. 3 15-in. lathe	10 hacksaw
No. 4 16-in. lathe	11 38-in. drill
No. 5 22-in. lathe	12 2-in. bolt cutter
No. 6 26-in. lathe	13 21-in. drill
No. 7 6-in. pipe machine	14 grinder
	15 10-hp. motor

SILVER-LEAD MINE SHOPS IN IDAHO

The plan of the Bunker Hill & Sullivan Mining & Concentrating Co.'s machine shop, at Kellogg, Idaho, is represented in Fig. 7. The dimensions of the building are given on the print and the positions of the different tools clearly indicated. The sizes of the machines will be found in Table IV, designated by the numbers of the drawing. Other repair departments at this mine, but not shown in connection with the machine shop, are the blacksmith shop, the car repair shop, equipped with metal shears, punches, etc., the tool-sharpening plant for keeping drills in order, and the carpenter shop.

The machine and blacksmith shops of the Federal Mining & Smelting Co., at Wallace, Idaho, are under one roof; the machine shop itself is 58 ft. long by 36 ft. wide. Its equipment is shown in Table V:

TABLE V. FEDERAL SHOP ITEMS

1 24-in. by 6-ft. planer	1 250-ton hydraulic press
1 28-in. drill press	1 150-ton hydraulic press
1 25-in. drill press	1 power hacksaw
1 car-wheel lathe, swing, 60 in. by 9 ft.	1 1½-in. rod-threading machine
1 14-in. by 3-ft. lathe	1 2½ to 6-in. pipe-threading machine
1 23-in. by 9-ft. lathe	

The blacksmith shop has two fires and is equipped with combined punch and shears, a steam hammer and a home-made drop hammer.

In addition to the above, there is an electrical shop equipped for repairs, such as armature winding; a saw

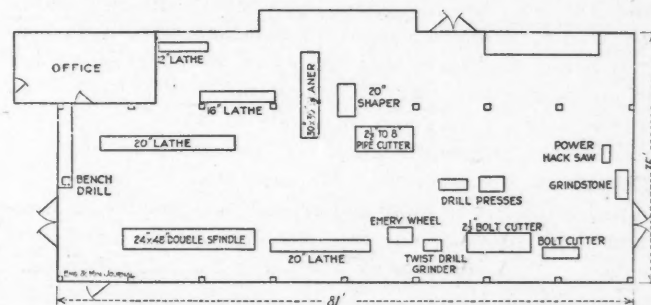


FIG. 8. SHOP OF THE PENN COMPANY AT VULCAN

mill for timber framing, wedge making and general light sawmill work; and mine carpenter shop and framing sheds.

MICHIGAN IRON-MINE SHOP

Fig. 8 represents the floor plan and shows the equipment of the machine shop of the Penn Iron Mining Co., at Vulcan, Mich. The dimensions of the shop and the capacity of the tools are plainly indicated on the drawing.

Flame Reactions

From a survey of the available data with regard to the luminosity of gases, it is concluded that an absolutely transparent gas will emit no light at any temperature unless a chemical reaction takes place (W. D. Bancroft and H. B. Weiser, *Journ. Phys. Chem.*, p. 281, 1914). A colored vapor may emit thermal luminescence, but it does not follow that all light from colored vapors is due to thermal causes, even when the radiation has a lower intensity than that of a black body at the same temperature. Since luminescence is often due to chemical action, the authors made a qualitative study of the flame reactions of tin and copper and their salts with a view to deciding what reactions cause the luminescence. Care was taken to distinguish between colors due to emission and to ab-

sorption, respectively. The reaction tin→stannous ion gave a carmine color, and tin→stannic ion a green color, the latter being more intense as a rule. The differences between the spectra of the halides of tin were due to differences in the absorption and emission of light by the halogens. In flames containing copper the reaction copper→cuprous ion gave a green color, Cu→cuprous salt a red and cuprous ion→cupric ion, or cupric salt, a blue color. The intensity of the green luminescence was so great that the unaided eye could not distinguish any blue in the ordinary copper flame even though the copper was burning chiefly to cupric salt. The violet red color of undissociated cupric chloride vapor (observed when chlorine acts upon very hot copper) must not be mistaken for luminescence.

### Holmes on the Need of Increased Bureau of Mines' Appropriation

WASHINGTON CORRESPONDENCE

Working for the increased appropriation for which the Bureau of Mines has made request, Director Holmes, of that Bureau, has just given elaborate testimony before the House Committee on Appropriations with a view to convincing that body that the extra \$100,000 suggested should be granted. Mr. Holmes stated that he particularly wants this money for the study of waste in smelting and for the ascertainment of the best use to be made of gases from the smelters. He said that the gases contained primarily sulphur and arsenic, one smelter in Montana thus throwing out into the atmosphere many tons a day. "The damage is extending for miles beyond," added Doctor Holmes. "In the case of another smelter in California, the damage can be traced 25 miles, where the drift of the wind is constant for a considerable period of time, and the area is extending. We have demonstrated how to take care of arsenic and the metalliferous materials given off in small quantities, such as lead fumes and that part of the sulphur given off in the form of sulphuric acid, the so called combination which goes into sulphuric acid, and which in that form is decidedly injurious."

We have found cases of damage from the arsenic, from the lead and from other metallic fumes. About the smelter itself, where the employees of the company operate, most of the damage done has been from the lead and arsenic gases. The policy we have followed is the proper policy to follow, that wherever it was feasible to do so investigations of this kind which were totally local in their character, should be paid for by the companies themselves rather than by the Government.

In connection with the smelter investigations there were certain problems which the smelting companies have practically declared to be unsolvable, and they did not think they ought to be called upon to spend money to solve problems which they did not think could be solved and which apply to other smelters as well as to themselves. Of the appropriation last year for this general work we have expended in all for smelter work \$15,000. Wherever the problem was at all a local one we have required the smelting company to do the investigation. We have selected the men and we have mapped out the line of examination which we thought should be followed, but every dollar of expenditure and the employment of the men and the handling of the moneys has been entirely within the hands of the smelters. What we do is entirely laboratory investigation on our part to determine, primarily with reference to sulphur gases, what can be done.

Doctor Holmes also made mention of the Cottrell process, invented by a government employee, which, by

virtue of the use of metal plates charged with electricity produces a deposit eliminating smoke.

"It is now being used in smelting operations in various ways," he said. "It is being used to take the arsenic out of the smelter gases as refined arsenic. It is being used in connection with petroleum in California, where the petroleum becomes so thoroughly mixed with water that it forms an emulsion so that the water will not separate from the oil by gravity.

"It has been tested by several smelting companies to such an extent that they are now actually installing large-scale plants for such purposes. Another interesting application was in southern California, where two large cement plants in the center of orange groves were destroying them. The process completely settles the dust.

"With the expenditure of \$15,000, we have this year conducted the more abstract of these investigations, which could not be considered local in their character. Three of the smelters, under our general advice, are conducting investigations, each one of which costs practically as much as the amount we are spending. It seems our duty to get other people to bear these burdens just as far as feasible."

Doctor Holmes was asked by members of the committee about the waste of sulphuric acid.

"The only possible use of this acid," he said, "will come when it can be collected, and its collection involves the storage of an enormous quantity. Unless there is a market for the sulphuric acid, there would be the question of storage, and it would be leaking into the streams, which would be just as vigorously opposed as turning the gas loose in the atmosphere. What we are trying to do is to find some means of collecting it as sulphur in the form of a solid, so that it can be compressed into cakes; then it can be stored without any difficulty or loss in storage.

"Sulphuric acid is used in a good many manufacturing operations in the East, but the supply comes in the main from Sicily, because the cost of transportation from the West makes its price greater. Nevertheless, we are trying to get some of the larger smelting companies to go into not only the manufacture of sulphuric acid, but also of the phosphates."

Doctor Holmes mentioned other lines of investigation—such as safety and waste investigations in certain metallurgical plants, like those for the extraction of silver and gold.

He asked for an additional appropriation of \$20,000 for the next year. It is especially desired to use this money, he explained, with reference to investigating the explosives used in metal mining and quarrying. In metal mining, he said, they want quicker action, because they want to shatter the ore or rock, but they do not care anything about low temperature. What they want is an explosive that will produce the minimum of poisonous gases, because, as he said, in metal mining there is no such extensive ventilation system as in coal mines.

### Employment of Boys in Alabama Mines

The Alabama law, which forbids the employment of boys under the age of 14 years in mining, was recently interpreted by the Supreme Court of that state as extending to ore, as well as coal mines. (Cole vs. Sloss-Sheffield Steel & Iron Co., 65 *Southern Reporter*, 177.)

# Analyzing Mining Prospectuses

BY R. W. HADDEN\*

*SYNOPSIS—Ignorance of proper procedure, inexperience, the innate nature of man to take a hazard are as responsible as fraud for the facility with which so many promoters of worthless mining schemes find investors. Business caution is often forgotten by those who are successful and careful in other commercial pursuits. The remedy—consult the mining engineer, who is the credit man of the mining business. Often the prospectus brands the enterprise as is shown in an example herein cited.*

It is unfortunately too often the case that men who have been successful in commerce or manufacturing when they undertake to conduct a mining enterprise prove themselves incompetent, and it is hard to understand why the hard-headed business man, who intrusts the management of his business interests to competent assistants and insures himself against losses through the guidance of a cold-blooded calculating credit man will jump into some wildeat mining venture with an investment of thousands of hard-won dollars, without first making a careful investigation. The credit man of the mining business is the competent engineer, but seldom is he consulted by the intending investor.

Take the average prospectus of a mining company. How often is it subjected to the careful analysis of an experienced engineer? And yet the investor, did he contemplate purchasing a business, would scrutinize every detail of the prospective purchase before parting with his money. Whenever a manufacturer or wholesaler contemplates selling to a new customer, the credit man first secures from the purchaser a statement of his resources, he secures reports on his business record and ability from Dun or Bradstreet, and inquiries as to his character, honesty and financial ability through local bankers. Should the resulting information prove satisfactory, the merchant may then decide to invest with that customer to an extent equal to the value of the goods for which he will grant say a 60-day credit.

## MINING TOO WIDELY THOUGHT OF AS A GAMBLE

In mining, however, all this prudence and investigation seems to be eliminated, and the shrewd man of business too often invests in a mining venture as he would play roulette or the races; he makes it a gamble. Is it then any wonder that so many lose their so called mining investments? The wonder is, rather, that so many win.

Let us assume a hypothetical case of a man contemplating an investment in a mining venture in course of promotion. He has either seen some advertisement, read some of the company's alluring literature or heard of the opportunity through some friend. Say he contemplates an investment of \$10,000. Now, following the ordinary rules of business, the first thing would be to investigate the promoters, then analyze their literature, which would show whether those who are to be responsible for the success of the venture are careful, competent men, possessed of ability in mining, men not given to exaggeration and foolish statements, nor looking for the accomplishment of impossibilities. That much being settled, the next move would be to secure the services of an

uninterested, competent and experienced mining engineer, not a mere student, to make a thorough examination of the company's properties, and secure an abstract of title. The engineer's report will show if the property can be worked profitably, it will check up the statements in the prospectus; his valuation of the property, and his opinion of its possibilities will show if the capitalization is overgreat, and if the price asked for the shares bears a proper relation to the value of the property. The engineer will also be able to advise whether the property can be successfully equipped, developed and operated with the amount which the company contemplates providing for that purpose. The abstract or title will show whether the company owns the property, an important point. If the mine be located in Mexico, the question of title should receive the most careful scrutiny by a lawyer experienced with Mexican titles.

## WHAT REPORTS AND OPINIONS COST

Such a report will cost anywhere from \$250 up and expenses, depending upon the time required and the reputation of the engineer employed. But is it not worth it? In the first place it may mean the saving of thousands of dollars, and in the second, should the investment be advised and made, the investor will be posted and in a position to criticize the reports which the company may issue from time to time.

I have been consulted in many such instances, and in the majority of cases it was not even necessary for me to leave my office in order to advise; the prospectus and literature containing all the necessary evidence to condemn the proposition as unworthy of consideration.

Frequently the investor feels warranted in making the investment because the proposition is recommended by financial advisers in the current magazines, forgetting altogether that such opinions are usually biased to secure much needed advertising for the columns of the magazine in which such advice appears, and forgetting also that the data upon which this advice is based is usually supplied from interested sources. The investor should be particularly on his guard against being influenced by that class of magazine controlled and published by certain brokerage houses to sell their own wares, also that class having all the appearance of an independent organ, whose sole source of revenue is derived from its advertising columns, and the goods of the advertisers are lauded to the skies. Nor should too much credence be placed upon the adverse criticism appearing in such columns, which, in many instances, are merely forms of blackmail practiced upon lawful enterprises which scorn to use such an advertising medium.

## AN EXAMPLE OF RESULTS OF ANALYZING A PROSPECTUS

In 1906, I was consulted in New York as to the prospectus of the Alpha<sup>1</sup> Consolidated Gold Mining Co., the bonds and stock of which were at that time being advertised generally in the Eastern dailies and weeklies. I made a careful analysis of the literature of that company, and advised against the investment. My

\*Mining engineer, 220 Higgins Bldg., Los Angeles, Calif.

<sup>1</sup>This, and the names and initials following are not the correct ones.

predictions have all been fully confirmed by subsequent events, and it may not be out of place to give my report made at that time as an example of how such a prospectus should be analyzed, it being a fair average sample of the ordinary mining prospectus one so often receives in his mail. The report follows, and it was made without having to leave my office, being based wholly upon the prospectus and other literature handed to me by my client:

The president of the company is an ex-United States senator from New York. Regarding the personnel of the directors I know little, but can only say that no conservative business man should allow his name to be attached to such extravagant statements as this prospectus contains. In fact so ridiculous are the statements and absurdly unreasonable the expectations held out to the public that it is right and proper strongly to advise the leaving of this alluring proposition severely alone, and this for the reason that the board of directors, showing such palpable ignorance of what is necessary in the way of development, what may be looked for in way of production, and what expected in the way of profits from mining, is certainly one not calculated to bring to a successful issue any mine, no matter how good or promising.

The property of the company is in the Lost Animals, Hill-top district of New Mexico, and the principal holdings are the Snake and Opportunity mines, the latter of which was full of water when Mr. B. K. T. made his examination in 1902, consequently its value is merely conjectural. As to the Snake if it contained such valuable orebodies, a pertinent question is, why did the former owners cease to operate the mine? Was it because the mine could no longer be worked at a profit? Mr. T.'s map shows plenty of explored ground blocked out, which had evidently not paid to work, inasmuch the former operators went beneath it to get pay ore. The report gives as an asset 99,615 tons of slope fillings of an average value of \$5 per ton. It is pertinent to ask how this value was arrived at, and also as to how these fillings could possibly be sampled in order to arrive at a valuation. Again, 17,336 tons of dump ore, averaging \$3.38 per ton, should scarcely be figured at this time as an asset, when, on p. 7 of its prospectus, the company estimates the cost of converting its ore into money at \$4 per ton.

This report of Mr. T. shows some 60,000 tons of ore in sight, having a gross value per ton of \$8. The five-year mortgage bonds of the company, amounting to \$1,000,000 mature Jan. 2, 1908, showing that the company has already been before the public for three years. The directors claim to have purchased \$200,000 worth of these bonds at par. The treasury consequently should have had ample funds with which to prosecute development. It is therefore pertinent to ask what has been done since January, 1903? Has the interest been met on the bonds already sold? If so, from what source? It is safe to say that the erection of the mill, building of pipe line for water, completion of working shaft, installation of machinery and pumps, and opening up of the mine for a large production of ore will occupy the remaining months of 1906. From what source will interest on bonds be paid Jan. 2, 1907?

A mine requires to be opened with many thousands of feet of drifts, upraises, etc., before it can maintain a daily production of 200 tons of ore; but we will give the company the benefit of all doubts, and granting that they may commence in January, 1907, with a daily production of 200 tons and keep it up for 340 working days of that year, what do we find? A production for the year of 68,000 tons of ore, which, at their own figures of \$4 per ton net, will yield \$272,000 with which, on Jan. 2, 1908, to meet the interest and pay off the bonded indebtedness.

This should be enough to show you what run you will get for your money, but just let us look a little further into this prospectus. Before doing so I want you to get an idea of what a 200-ton daily production means. It amounts to the hoisting every five minutes of the 24 hours of two mining cars of ore, in addition to the hoisting of waste, lowering of mining timbers, hoisting and lowering of men, tools and material. The gold mines maintaining a 200-ton daily production are the exception rather than the rule, consequently when this company talks of making a 2000-ton daily production, one has to laugh. Again the gold mines showing yearly net earnings of \$1,000,000 are indeed rare, and one is forced to ask how many pipes this board of directors had to smoke before they had such a glorious dream as that contained in the last paragraph of p. 7 "We believe therefore

we are conservative in anticipating that within five years the output of ore from these mines will be 2000 tons daily, with a daily net earning of \$18,000, and a yearly net earning of \$6,480,000." It is pertinent to state here that the total production, not merely profits, from placer and lode mining from the whole Hillsboro district from 1877 to 1904 does not exceed \$6,000,000, and yet here is a company asking the public to believe its so called conservative statement that its property alone will not only produce, but earn, greater profits than that amount in one year.

A mining investment should pay at least 10%. The capital of this company is \$3,000,000 on which 10% would be \$300,000. This sum earned annually in dividends might make the stock worth par, \$1. We have already shown that it might make a profit of \$272,000 in 1907, and yet in the face of all this we are told that the directors believe their stock will then sell at \$5 per share (p. 7 of prospectus).

Mr. T.'s estimated gross value of the ore in the Snake was evidently considered too small, so these careful, conservative directors took out 250 tons from the 420-ft. level, from which a "selected" shipment of "first class ore" was sent to El Paso smelting works. Size of shipment is not given, although it would appear to have been a ton. The return was \$93.18 per ton. Seeing that this small lot was selected from 250 tons what do the figures \$93.18 mean? Nothing. From the remaining 249 tons a carload was sent to Henry E. Wood at Denver for the purpose, it is said, of finding out the value of the "second class ore." Returns showed \$20.22. Was this carload also selected? Most likely, as a prospectus must show up well, and the best is never too good.

On p. 5 Mr. E. L. X. refers to his examination of the ore in the Opportunity mine. Mr. T. says in his report he could not examine that mine because it was full of water, and I cannot find any reference to its having been pumped dry subsequent to Mr. T.'s visit.

#### MONEY LOST IN SWINDLE NOT IN MINING

From the foregoing one can readily see how a little study and analysis of mining-company literature will enable an intending investor to satisfy himself as to the value of the investment. This is an example of where it is unnecessary to employ an engineer, the company itself supplying all the evidence necessary to condemn it. One too often hears the statement, "I have lost too much in mining." In 99 cases out of 100 that man never lost a dollar in a mine. He was caught in a swindle and mining was the bait. In all probability a scrutiny of the prospectus along the lines indicated above would have disclosed a similar warning to keep out.

#### PROMINENT MEN, AS OFFICERS, ARE SOMETIMES ONLY VICTIMS OF PROMOTERS

Needless to say, my client did not invest in Alpha Consolidated Gold Mining Co. Instead he published my report in a New York mining journal, and the whole fabric went to pieces. The unfortunate thing was that this exposure carried to his grave, the president, who was a most worthy man, and whose name had merely been secured by the promoters to give standing to the promotion, and secure the attention of the public. He never got over the scandal connected with the exposure, and died of a broken heart. This circumstance should be a warning to men of prominence against lending their names to promoters without first carefully investigating.

In the last few years investors in America have got drubbing after drubbing in the market for railways and industrials. Even the bond markets show a loss so serious as to be felt by the savings banks. Railways have been watered to such an extent that they cannot now find capital for needed equipment and improvement, and they are now being pestered by legislators engaged in making capital for popular clamor. During all of this, most of the first-class mining stocks maintain an even tenor, and

it is only among the copper issues that earning possibilities have been somewhat interfered with. Make the comparison as you will. Railways and industrials are the investment issues which must retire with second honors, while mining issues come to the front as bearers of first honors for investment preferment, and are becoming more and more popular among investors.

In these days when mining has been reduced to a manufacturing procedure, and a safe one at that when properly conducted, with, in the main, a commodity that does not fluctuate in market price as do other commodities, why should not legitimate mining be preferred as an investment? The profits are not the result of pauper labor, as miners at all times receive good wages, nor are the dividends the result of stock-market manipulation. The ore in sight in a mine is just as safe an asset as a stock of goods in a store; in fact it is safer, as it is not subject to loss through age or otherwise; it does not go out of style, and the product of a mine can most always find a profitable market.

It may be well to bear in mind that whereas agricultural products, such as grains, fruits, vegetables, etc., can be replaced from year to year, the ores extracted from a mine can never be replaced, and in making a mining investment, it is judicious to investigate as to the reserve, and compute whether or not the price of the shares bears a proper ratio to the physical condition of the property; especially is this so in the case of a property that has been producing for several years.

### The Watts Underground Transit

In the JOURNAL of April 18 was published a description of a mining transit brought out by E. R. Watts & Son, of London. In commenting on this instrument, we criticized certain points in its design. It appears that the manufacturers make another model for mining work which embodies many of the features which we noted as desirable in an underground transit and is more specifically adapted to such use. In this model, the vertical circle is protected in a dust- and water-proof case, an auxiliary telescope is provided for attachment at any one of four points and a long bubble is mounted directly on the telescope. This should prove a splendid underground instrument.

### Platinum in Westphalia

Doctor Fischer, director of the Royal Mining Academy, at Clausthal, Germany, writes a cautionary letter to the *Deutsche Bergwerkszeitung* in reference to an article published in that paper on the platinum occurrence in Germany, in which the Clausthal Mining Academy is given as authority for certain statements. In this letter he says: "It must be observed that the Mining Academy has absolutely nothing to do with this matter. Professional opinions given by Doctor Hommel have been delivered by him as a private person, and not in his capacity as teacher at the mining college. The Mining Academy regards this correction as specially important, because of late reports have repeatedly been published in the daily press, which even went so far as to speak of borings carried out by the Clausthal Academy, and also because the names of the Academy as well as of Doctor Hommel

have repeatedly been misused for publishing most monstrous misstatements and exaggerations." Statements concerning the Westphalian platinum operations appear in the JOURNAL of June 20, p. 1252, and July 4, p. 10.

### Types of Journal Bearings for Mill Use

BY HERBERT A. MEGRAW

At first glance, it might appear that mill operators generally were overlooking an important economic point through the exceedingly small amount of interest manifested in the line-shaft bearings of mills of all kinds. Such an opinion might easily be confirmed, even in large and important mills where every detail is supposed to receive discriminative study, but the source of the loss is not necessarily involved in the type of bearing used.

There are three distinct types of bearings in general use for industrial purposes, these being plain bearings lined with anti-friction metal, roller bearings, and ball bearings. The plain bearings are susceptible of refinements, such as ring-oiling devices and aligning adjustments. Roller and ball bearings exist in various degrees of perfection. The principal question, then, for the mill operator, is which of these types of bearings ought he to install in a mill, and approximately what will be the saving obtained by the most satisfactory type?

Before attacking the question of type, however, it might be profitable to say a few words about the practical application of the types already in use. Undoubtedly, plain anti-friction metal journals are principally installed, and just as undoubtedly, they receive too little attention, a condition which surely entails an insidious loss of money. Lack of care costs a good deal more than improper selection of the type of bearing, even if it can, in reality, be shown that any one type is better than all others for the purpose. The principal fault is improper alignment, a condition which involves a greater waste of power than any other. Even where alignment was good at the time of installation, it is not always so maintained. It cannot be expected that a delicate adjustment like shaft alignment will be maintained through the settling of mill foundations, drying of timbers, twisting of steel members, or any and all of the changes attendant upon the tuning up of a mill. Often long shaft installations are never realigned after installation, and the inevitable result is an inordinate amount of friction and consequent waste of power.

Lack of attention in keeping bearings clean and properly oiled is responsible for loss of efficiency. Proper oiling does not mean the wholesale application of lubricant, which simply runs in and out of a bearing. That is waste. Only the required amount of oil ought to be used, and bearings ought to be carefully cleaned out at frequent intervals, because the dust and dirt which accumulates in them in any kind of a mill, is sufficient in a very short time appreciably to increase the friction. By taking proper care of even the simplest form of bearing, great increases of economy can be secured, nor can the same care be safely omitted even when the most advanced types are employed.

The actual utility of the three types of bearings, ring-oiled babbitt bearings, roller bearings, and ball bearings,

can be appreciated by the conclusions reached in an article on the subject by C. C. Thomas, E. R. Maurer and L. E. A. Kelso, presented to the American Society of Mechanical Engineers. Twenty bearings of each type were used in the tests.

The apparatus consisted of 25 ft. 10 in. of line-shafting in five equal sections, mounted in hangers, which were inverted and used as floor stands. The hangers were bolted to two 8-in. I-beams, which were leveled upon the floor. The shafts were of cold-rolled steel,  $2\frac{7}{8}$  in. in diameter. Each section was 5 ft. 2 in. long; the adjacent sections were coupled together by means of a flexible leather disk or two straps connecting the two flange couplings. The flexible couplings prevented the transmitting of any part of the load applied on one shaft to either adjoining section, and also prevented binding between shafts and bearings due to possible lack of alignment.

A direct-current Fort Wayne motor was directly connected to one end of the shafting by means of a flexible coupling. Its rating was  $7\frac{1}{2}$  hp., 28 amp., 400/1600 r.p.m., four-pole, 230 volts.

The load was applied through levers upon hardened knife edges and pin points as fulcrums. Across the top of the 8-in. I-beams and at right angles to them were bolted short 6-in. I-beams to which, the fulcrums were attached. Standard 1000-lb. scales were set upon the 6-in. I-beams. A double system of leverage was used in

This was particularly troublesome at high loads and speeds.

The speeds used in the tests were between 150 and 450 r.p.m., corresponding, respectively, to about 100 and 300 ft. per minute peripheral speed. Most of the loads used were between 700 and 1800 lb. per bearing, corresponding respectively to about 30 and 80 lb. per sq.in. for the babbitt bearings. All statements of results, therefore, are subject to the above limitations as to speed and loads.

Two lubricants were used in all the tests: Atlantic Red Engine Oil in the babbitt and roller bearings, and No. 2 Keystone Grease in the ball bearings.

The data included in Table 1 regarding coefficients of friction for the three types of bearings at various loads and temperatures of bearing, and at a peripheral speed of the shaft of 150 ft. per min., corresponding to the average lineshaft speed of 235 r.p.m., are interesting:

TABLE 2. COMPARISON OF RELATIVE AMOUNTS OF POWER CONSUMED IN FRICTION

Bear-	Peripheral speed = 100 ft. per min. corresponding to 157 r.p.m.		Peripheral speed = 300 ft. per min. corresponding to 470 r.p.m.	
	Temperature of Bearing = 77°F.	Temperature of Bearing = 100°F.	Temperature of Bearing = 77°F.	Temperature of Bearing = 100°F.
Ball	1	1	1	1
Roller	2.2	2.5	2.7	3
Babbitt	3	3.6	4.5	4

Table 2 presenting the comparison in a different way is given. It gives the relative amounts of power consumed in friction by the three types of bearings, assuming the relative amount of power consumed in

TABLE 1. COMPARISON OF COEFFICIENTS OF FRICTION

Bearing	Peripheral speed of shaft = 150 ft. per min. corresponding to 235 r.p.m.					
	Average Load per Bearing = 727 Lb.		Average Load per Bearing = 1227 Lb.		Average Load per Bearing = 1727 Lb.	
	Temperature Bearing = 77° F. Coeff. Friction	Temperature Bearing = 100° F. Coeff. Friction	Temperature Bearing = 77° F. Coeff. Friction	Temperature Bearing = 100° F. Coeff. Friction	Temperature Bearing = 77° F. Coeff. Friction	Temperature Bearing = 100° F. Coeff. Friction
Ball	0.0025	0.0019	0.0022	0.0018	0.0020	0.0016
Roller	0.0069	0.0055	0.0055	0.0047	0.0049	0.0042
Babbitt	0.0112	0.0075	0.0082	0.0058	0.0070	0.0051

order to get sufficient load upon the bearings with as short a length of leverage as possible. A pressure ratio of 8.33 at each bearing to one at the scale was realized.

The loads were applied to the shaft by two bearings between each pair of hangers. These bearings were identical with those in the hangers. The bearings were prevented from turning by short levers fastened to the bearings and resting upon uprights from the floor. Only one type of bearing was tested at a time, so that no complications might arise in establishing the losses for the particular bearing under test. The reason for using 20 bearings was that the amount of power necessary for a single bearing was so small as to be difficult of measurement. Also any single bearing might not truly represent results from that type of bearing in general.

The three kinds of bearings tested were: The Hess-Bright ball bearing, manufactured by the Hess-Bright Manufacturing Co.; the ring-oiled bearing, manufactured by the Dodge Manufacturing Co., lined with babbitt metal made from their formula, and the Hyatt roller bearing, manufactured by the Hyatt Roller Bearing Co. All bearings were for the same size shaft and, in fact, the same pieces of shafting were used for all tests, except that two sections bent during the tests were replaced.

To avoid the endwise thrust of the shaft, when supported by the roller bearings, it was necessary to interpose two ball-thrust collars. Before this was done, excessive vibration of the motor and of the apparatus resulted from the tendency of the shaft to move endwise.

friction by the ball bearing as 1. The relative numbers given are based in each case on the average power for three loads: 710, 1210 and 1710 lb. for ball bearings; 740, 1240 and 1740 lb. for roller bearings; 730, 1230 and 1730 lb. for babbitt bearings.

The power for the babbitt bearing is higher than for the others except perhaps at low loads and speed, and the power for rollers is higher than for balls. The excess of power for babbitt over rollers and rollers over balls increases with increase of speed for all loads.

For babbitt and roller bearings there is a marked difference between the average coefficient of friction for the first hour and for the second hour. Thus in one of the runs, the average coefficient for the first hour was about 0.0058 and for the second hour about 0.0048. Hence the energy wasted in friction in the second hour was about 85% of that in the first hour. This effect is less marked with roller bearings.

The clear result of this test is to show that ball, roller and babbitt bearings are efficient in a general way in the order named. The difference in power consumed for the ball bearing and plain bearing is, at low speed, as 1 to 3, the roller bearing coming in between, while at higher speeds the difference may be as great as 1 to 4.5. It is to be understood, of course, that conditions in the tests are the best possible in every case, and that the difference is that due to type alone.

In an article dealing of the power consumed by bear-

ings in a former issue,<sup>1</sup> it was shown by a series of tests that the average reduction in power consumption by using roller bearings, over plain bearings, was 0.1 hp. On a 2-in. shaft, the plain bearing used 0.133 hp., while the roller bearing used only 0.026 hp., a reduction of about 80%. The information was obtained by testing a large number of bearings which were driven by electric motors. In this way, the power requirements of the motors with different loads was measured, and that required by the shafting alone arrived at by difference.

The difference between the amount of power required with the belts on and with the motor running free, represents the power absorbed in bearings, subject to a slight correction on account of the change of efficiency of the motors at different loads. The extra tension on one side of a belt, when operating a machine, and the consequent increased friction, is not measured. This amounts to about 20%, but as the increase is due to work done, and occurs only when the machine is operating, it was not considered in the calculations.

While the superiority of ball and roller bearings is evident in all comparisons, it is noteworthy that the actual power difference is not extreme and some careful study will have to be given to each instance in order to select the most satisfactory installation.

✽

### Mond Nickel Co.

The Mond Nickel Co., Ltd., after an existence of nearly 14 years, has just voted to reincorporate under the same name and increase its ordinary-share capital. It is not often that an extremely prosperous company goes into even formal liquidation, but in this instance it was considered advisable to recapitalize on a basis commensurate with the favorable developments at the company's copper-nickel mining properties in the Sudbury district in Ontario. This corporation has been reticent in the past about giving out information relative to its properties, but it is interesting to note that at the recent general meeting the chairman announced that at the present rate of production the ore reserve would last for "something like half a century," and that even at a greater rate of production, now contemplated, the known ore reserve would outlast the lives of most of the present stockholders. Within the last year the company has completed its new smelting plant in Canada and has acquired additional mining properties, the most important of which was the Leveck No. 1. The company has also acquired a valuable water power on the Spanish River, which is now being developed and will insure cheap electric power when an increase is required. With its new and up-to-date metallurgical plant, the treatment costs will be reduced, and improvements in the mining equipment will also lower underground cost, so that the company now finds itself in a most satisfactory condition. The new Mond Nickel Co., Ltd., will reissue the 5% debenture stock, amounting to £375,000, and £500,000 of preference-share capital will also be reissued, but preference shareholders will receive five new £1 shares in place of the old £5 shares, the change being made so as to provide a more marketable security. Deferred shares, accepted by Dr. Ludwig Mond in lieu of any cash profit for transferring the assets which he had acquired before the formation of the company, have

<sup>1</sup>Eng. and Min. Journal, Aug. 30, 1913.

now been eliminated by increasing the ordinary-share capital of the new company to £900,000, which will be divided equally between former ordinary shareholders and the deferred shareholders. The reincorporation will thus have a tendency to simplify and unify the interests of the various bodies of shareholders, and we trust that the company will long enjoy the period of prosperity which is now in prospect.

✽

### Dr. Kolbeck, of Freiberg

The old Freibergers in America were greatly pleased by the visit of Dr. Kolbeck, rector of the Bergakademie, who came to New York to attend the 50th anniversary of the School of Mines at Columbia University. Dr. Kolbeck brought with him the official chain of the rector of the Bergakademie, which was conferred by the Government in 1906, the official inscription being the following:



RECTOR'S CHAIN, FRIEBERG, BERGAKADAMIE

*Amts-kette für den Rektor der Kgl. Sachs. Bergakademie zu Freiberg auf Grund Allerhöchster Verleihung überreicht am 27. Oktober, 1906. von Seiner Excellenz Herrn Staats- u. Finanzminister Dr. Rüger.*

There was an interesting incident about this chain soon after Dr. Kolbeck's arrival in New York. He attended a meeting of the New York section of the American Institute of Mining Engineers. In talking with some friends he mentioned that he had his insignia with him. "Where is it?" he was asked. "Oh, in my trunk at the hotel," he replied. His friends were distressed that so valuable a thing should be unguarded in a bedroom of a New York hotel. This was at the hour of midnight, but Dr. Kunz

was with the party; so they went to the hotel, obtained the Freiberg insignia, and took it to the vault of Tiffany & Co., to which, of course, Dr. Kunz had the entry.

## Radium and Mining Commission Legislation

WASHINGTON CORRESPONDENCE

Considerable interest has been expressed in the situation and prospects of the various bills relating to the mining of radium and to the establishment of a mining-law commission, whose duty it shall be to revise the existing legislation of the United States relating to mines and mining. The present prospect is that the Smoot bill for a mining-law commission, which passed the Senate some time ago, will be adopted by the House before long. It is now on the speaker's table and may be called up at any time. This bill was abstracted in the JOURNAL of May 16, 1914, p. 1016.

Present prospects do not favor the adoption of either of the radium bills now pending. One of these was introduced by Mr. Foster, on Jan. 31 (H. R., 12,741) and was ultimately committed to the committee of the whole house on Feb. 3, where it still remains. The other was presented by Senator Walsh of the Senate Committee on Mines and Mining and is substantially identical with the Foster bill. Neither bill is receiving much attention now and both have been sharply opposed by the anti-conservation element in Congress. Harm has been done to their prospect by the discouraging statement with reference to the utility of radium in the cure of cancer. In reporting the bill in the Senate, Senator Walsh said in part:

"The bill as reported gives the Government the prior right to purchase radium-bearing ores mined from the public lands located after the passage of this act at such prices, to be fixed by the Secretary of the Interior and published in advance, as will encourage the prospecting for and mining of such ores by private parties. It also authorizes the Secretary of the Interior to provide the necessary building and equipment with which to extract the radium from these ores; to sell the byproducts obtained in connection with such operations. The prospector and miner is thus given the assurance of a steady market and prompt payment at reasonable prices for the ores which he mines; and, if at any time the Government is not prepared to purchase such ores, he is authorized to sell them in the open market."

The report of the House Committee on Mines and Mining (H. R., 214) sets forth so clearly the radium situation and the need for such legislation that it calls for but brief further treatment.

In the first place, the call for this legislation has a humanitarian basis because of its relations to public health, and the arguments which might be raised against the Government's entering into mining or metallurgical operations in relation to other mineral substances, which might have a purely commercial basis, might not apply in this instance.

The experiences of the few surgeons in this and other countries who have been able to secure a sufficient quantity of radium for use in the treatment of disease, have demonstrated beyond reasonable doubt the importance of radium as a cure for certain superficial types of cancer, and give promise of its value in supplementing surgical operations in the treatment of other forms of cancer

if this treatment can be begun in the early stages of the disease and as surgeons secure radium enough to become more experienced in its application.

Best statistics available show that there are in the United States at the present time no less than 200,000 persons suffering from cancer, and that the death list in the United States from this dread disease is not less than 75,000 persons each year.

At the present time there are not more than 40 grams of radium in all countries available for the use of medical science, and of this quantity not more than 2 grams are available for use in the United States.

## Buffalo Mines

The Buffalo Mines, Cobalt, Ont., for year ended Apr. 30, 1914, shows that while dividends amounting to \$660,000 were paid it was necessary for the company to draw on its quick assets to the amount of \$271,813 to meet this payment. This indicates that the actual net gain from operations was \$388,187. The report shows the net income after adjustment to have been \$389,782, the difference is in a slight gain in the capital accounts.

The company produced and sold 1,637,809 oz. of silver valued at \$974,082 or about 59.5c. per oz. Freight and treatment charges were \$123,216 or about 7.5c. per oz. Other income, \$7958, made total income, after deducting freight and treatment, \$858,824. According to the statements the net income from producing this silver was about 23.8c. per oz. indicating a total cost of approximately 35.7c. per oz. including freight and selling charges. The mines produced 77,616 tons of ore as follows; 824 tons from raising, 11,564 tons from drifting, 42,615 tons from stoping, and 22,691 tons from reserves in stopes and on surface. All this ore was treated in the mill and based on this tonnage the costs were as follows; per ton milled:

Mining (\$2.80 per ton broken) .....	\$1.99	Cobalt office .....	\$0.33
Milling .....	1.41	New York offices .....	0.16
Cyaniding (\$4.03 per ton cyanided) .....	0.71	Insurance, taxes .....	0.38
Repairs and renewals ..	0.18	Royalties .....	0.04
Depreciation .....	0.45	Adjustments .....	0.03
Ray Lease, operating ..	0.09	Freight and treatment ..	1.59
Boarding house .....	0.14	Total .....	\$7.70
Shops .....	0.06	Less credits .....	0.10
Stable .....	0.04	Net cost per ton .....	\$7.60
Assaying, surveying, drafting .....	0.10		

The mill treated 77,616 tons of ore averaging 25.31 oz. of silver per ton and recovered 76.14% by concentration. The cyanide plant treated 13,388 tons of slime concentrates from the mill averaging 10.13 oz. of silver per ton of which 77.8% was recovered. The total mill recovery was 81.5%. The amalgamation plant and refinery treated 20 tons of high-grade ore direct from the mine, 301 tons of jig concentrates, 923 tons of table concentrates, and 6157 lb. of metallics from the low-grade mill, and 17,347 lb. of precipitates from the cyanide plant. The total production of refined bullion from this plant was 1,682,759 fine ounces or 18,707 oz. more than silver contained in the ores treated during the period, the difference being process silver from ores previously treated.

The reserves from development during the year are approximately 54,116 tons, averaging about 25 oz. silver per ton or a total of 1,352,900 oz. There are approximately 28,039 tons of ore broken in the stopes, containing 707,725 oz. In addition to this ore, there are stored over 200,000 tons of sand tailings containing over a million ounces of silver which will possibly be treated.

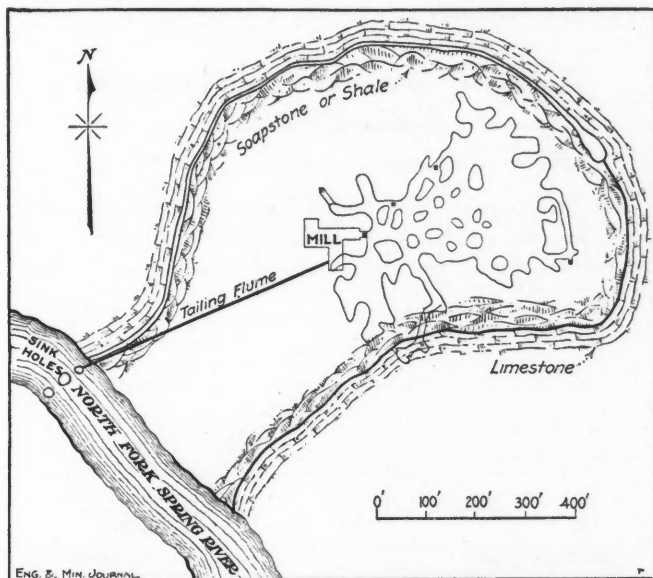


# Details of Practical Mining

## Plugging Water Channels into a Mine

BY J. E. RENO\*

The Little May mine is situated on a flood plain of the North Fork of Spring River, three miles northwest of Neck City, Jasper County, Mo. The mill was erected and started to operate in the summer of 1910 and mining was carried on successfully until some time in March, 1911, when the river, through sink holes in its bottom and a solution channel following the contact of the shale and limestone as indicated on the map, broke into the mine workings. The water came into the workings from all sides and its volume was so great that the mine was flooded and work had to be abandoned until the high water in the river subsided, when various schemes for stopping up the sink holes were tried.



MAP SHOWING RELATION BETWEEN RIVER AND MINE

A drought of about four months' duration followed the wet period and while the river was extremely low, coffer-dams of burlap sacks filled with soil from the river bank, were built around the sink holes. The holes were then filled with hay and dirt and covered with boulders. During this time, June 1 to 17, the mine was dewatered. The channel had still not been closed, since muddy water came into the mine, and it was evident that dirt was not the material with which to choke off the water.

It was next attempted to seal the sink holes with rock and concrete, but in August when another flood came, new sink holes developed and the water flow into the mine for about two months was as heavy as ever. In the meantime more pumps were installed, capable of handling the water, which had increased from 700 to about 3000 gal. per min. For two weeks more the former methods were

\*Superintendent, Little Mary Mine, Webb City, Mo.

tried, at a further cost of \$1000, but without success.

I then devised the plan of running a tailing flume from the mill to the river, a distance of 600 ft. and extending it to the various sink holes. This cost \$600, but did away with carting the tailings.

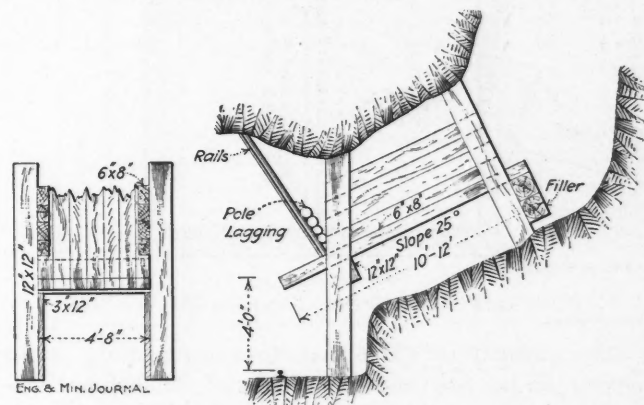
The tailings contained a good deal of cementing material and were found to be a cheap and efficient material both for the coffer-dams and for filling the sink holes. In two hours after the tailings had been turned into the holes, the water had been cut down to the normal flow of 700 gal. per min. When nearly filled, boulders were piled on the tailings up to the level of the bottom of the river to serve as ballast and kept the river from washing out the tailings.

Three other breaks in the river, at different periods, were stopped in the same manner, and the river permanently choked off.

## Chute for Handling Boulders

BY HENRY J. VOLKER\*

The accompanying drawing represents a chute designed to handle large boulders from a shrinkage stope. Its chief feature is its door, which is simply pole lagging in



WIDE CHUTE WITH GATE OF LAGGING

lengths of about 6 ft., extending clear across the front of the chute and resting against two inclined rails set in hitches in the back of the drift and notches in the chute bottom just opposite the sides of the chute. The inclination of the rails, which is greater than 90° to the chute floor, makes the effort of raising the poles with a bar less than if the rails were vertical. Vertical rails were tried, using 3-in. planks instead of poles, but great difficulty in raising the planks was encountered.

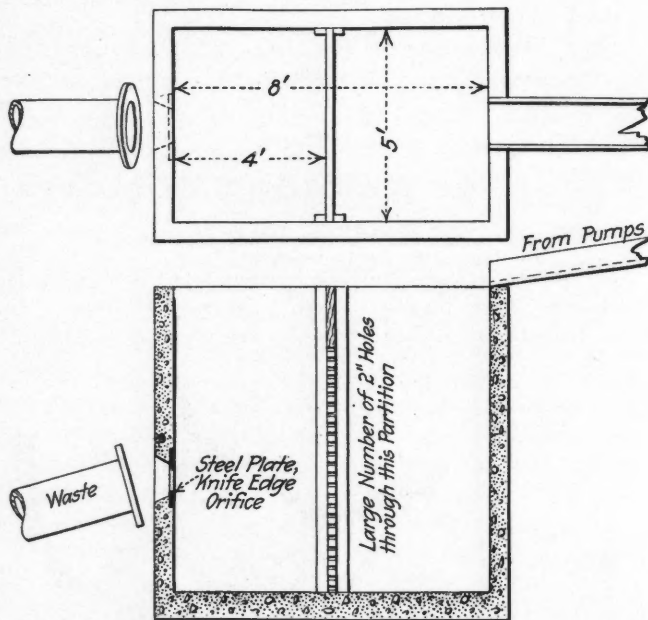
Between the back posts of the chute and the ground, filler pieces are usually required, and also at least one under the back cross-piece, depending on how the ground breaks. An iron plate is placed on the floor of the chute to resist wear and permit the material to flow

\*No. 3 Mine, Canadian Copper Co., Sudbury, Ont.

more easily. The plate is not shown in the drawing. Spikes, about 10 in. long, made by the mine blacksmith, are used in putting the chute together.

### Permanent Measurement Tanks for Mine Pumps

Permanent concrete tanks have been installed at both the East Vulcan and West Vulcan shafts of the Penn Iron Mining Co., so as to obtain a continuous record of the amount of water pumped. (*Bull. A. I. M. E.*, February, 1914.) One of these tanks is shown in the accompanying illustration. There is a division wall in it pierced with a great many 2-in. holes. The water from the mine flows into the back part of the tank and through the holes in the division wall into the front part. This breaks up the flow and eliminates the "velocity of approach" to the orifice. In the front wall of the tank there is a plate of steel with a circular knife-edge opening of exact size.



ENG. & MIN. JOURNAL

CONCRETE MEASURING TANK WITH ORIFICE

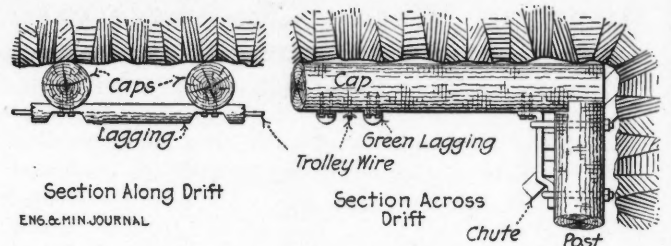
The quantity of water that flows through the orifice depends on the head above the center of the orifice. This head is continuously recorded on a water-level gage and tables for each orifice show the gallons per minute corresponding to each tenth of a foot of head. The recording chart is circular and when the pumping is regular, the recorded line approximates a circle. When the pumping is irregular the average is ascertained by the use of a planimeter. Orifices of different sizes are used when the quantity of water changes, so as to keep the water at somewhere between 2 and 4 ft. above the center. With these permanent measuring tanks and suitable electrical instruments a test of pumping efficiency becomes a simple matter.

**In Making a Primer It Is Essential**, according to the "du Pont Magazine," that the detonator be so placed as not to become jammed in the hole, or be struck by the tamping stick or be pulled out; it must be entirely embedded in the dynamite and should have its closed end point toward the bulk of the charge. The fuse should come in contact with the dynamite only for about 1/2 in. near the detonator; hence lacing is not permissible. Metal should not be used to secure the detonator to the stick of dynamite.

### Trolley-Wire Protection of Round Lagging

BY W. H. JOBE\*

The accompanying illustration from my annual report for 1912-13, represents a method of protecting underground trolley wires, devised by Capt. E. Carlson, of the



Section Along Drift  
ENG. & MIN. JOURNAL

Section Across Drift  
Chute Post

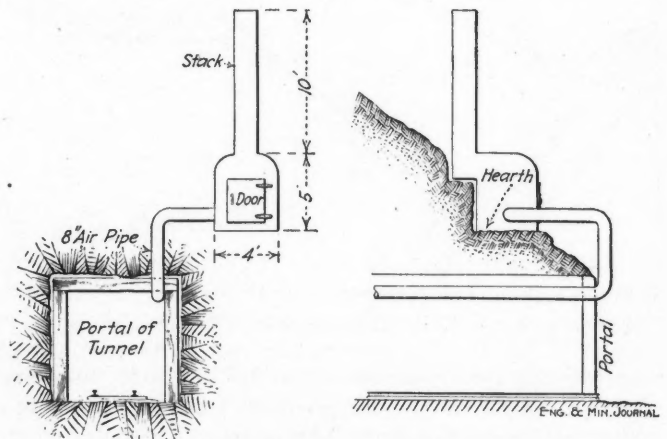
#### POLE GUARDS TO PREVENT CONTACT WITH TROLLEY WIRE

Bristol mine, near Crystal Falls. Lengths of round green tamarack lagging are notched and spiked to the drift caps on both sides of the trolley wire. This material is readily had and is cheap. It is more easily placed than the ordinary inverted trough and is much stronger and capable of resisting the shock of blasting in the chutes, which is frequently necessary.

### Adobe Stove for Tunnel Ventilation

BY T. SWIFT†

The illustration shows a modification of the stove ventilator, as used in Mexico. This stove was built of adobe bricks and was rather large, 4x4 ft. square, 5 ft. high,



STOVE FOR SUCKING GASES FROM TUNNEL

with a stack 10 ft. high. It was built outside of the tunnel and above the portal. The air pipe was run from the last set of timber near the face of the tunnel and entered the stove at the top of the hearth. A roaring wood fire would suck the powder smoke from the 400-ft. tunnel after shooting, in 10 or 15 min... The arrangement seems to require only that the top of the hearth, where the pipe enters, be above the elevation of the pipe at the face. In cases when the draft does not start readily and "la estufa no quiere" a damper in the pipe at the stove will over-

\*Inspector of Mines for Iron County, Crystal Falls, Mich.  
†Mining engineer, Mineville, N. Y.

come the difficulty, if kept closed until the fire is going briskly and then opened. This arrangement was not scientifically built or investigated, but it worked well and is handy where natural ventilation or compressed air are lacking.

### Loose-Leaf Time-Keeping Forms

By R. R. HEAP\*

It is customary in the Joplin district to pay off each week on Saturday, holding back from the wage only one day, Saturday of the day shift and Friday night of the

more, he has to fill in the occupation of each man in an extremely limited space. Since this entire arrangement is awkward, I attempted to get a book printed to begin the week with Friday, but was told by the manufacturers that to warrant the change they would require a larger order than I could place and I therefore devised a loose-leaf system. While no one else in the district is using this system, it has proved thoroughly satisfactory and with us no return to the old method would be considered. We use 10 forms in all, of which six are illustrated here, the other four differing in only a few details.

Four forms were used for the mill, those for the day shift being shown here, Figs. 1 and 2; those for the night

1 Mill Time		Day Shift for Week Ending										1913	
OCCUPATION	NAME	SAT	SUN	MON	TUE	WED	THU	FRI	TOTAL	RATE	AMOUNT		
		PER DAY	PER DAY	PER DAY	PER DAY	PER DAY	PER DAY	PER DAY	PER DAY	PER DAY	PER DAY		
Jigman													
Helper													
"													
"													
Feeder													
"													
Sludgeman													
"													
Engineer													
"													
Total													

FIG 1

2 Day Mill Report for Week Ending		1913									
No.	Ibs.	SAT	SUN	MON	TUE	WED	THU	FRI	TOTAL	WEIGHT	TOTAL
		PER CAR	PER CAR	PER CAR	PER CAR	PER CAR	PER CAR	PER CAR	PER CAR	PER CAR	PER CAR
No.	Ibs.	Cars Mill Lead									
No.	Ibs.	Cars Mill Lead									
No.	Ibs.	Cars Sludge Jack									
No.	Ibs.	Cars Sludge Lead									
Total Zinc Concentrates											
Total Lead Concentrates											
Total Concentrates											
Hours at Milling											
Hours at Repairing											
Total Mill Time											

FIG 2

No. 1 Mine		Night-Day Shift, Week Ending										1914.	
OCCUPATION	NAME	FRI	SAT	SUN	MON	TUE	WED	THU	TOTAL	RATE	AMOUNT		
		PER DAY	PER DAY	PER DAY	PER DAY	PER DAY	PER DAY	PER DAY	PER DAY	PER DAY	PER DAY		
Foreman													
Holsterman													
"													
"													
Broomman													
"													
"													
Blacksmith													
Bika Helper													
"													

FIG 3

No. 3 Mine		Night-Day Shift, Week Ending										1914.	
OCCUPATION	NAME	FRI	SAT	SUN	MON	TUE	WED	THU	TOTAL	RATE	AMOUNT		
		PER DAY	PER DAY	PER DAY	PER DAY	PER DAY	PER DAY	PER DAY	PER DAY	PER DAY	PER DAY		
Shoveler													
"													
"													
"													
"													
"													
"													
"													
"													
"													
Total Cans													

FIG 4

No. 1 Shaft		Night-Day Shift, Week Ending										1914.	
LOCATION	NAME	FRI	SAT	SUN	MON	TUE	WED	THU	TOTAL	RATE	AMOUNT		
		NO. FEET	NO. FEET	NO. FEET	NO. FEET	NO. FEET	NO. FEET	NO. FEET	NO. FEET	PER DAY	PER DAY		
Headline Hoies													
"													
"													
"													
"													
"													
Stops Hoies													
"													
"													
"													

FIG 5

No. 2 Shaft		Night-Day Shift, Week Ending										1914.	
OCCUPATION	NAME	FRI	SAT	SUN	MON	TUE	WED	THU	TOTAL	RATE	AMOUNT		
		PER DAY	PER DAY	PER DAY	PER DAY	PER DAY	PER DAY	PER DAY	PER DAY	PER DAY	PER DAY		
Powderman													
"													
"													
"													
Boxes Powder Used													
No. Shots Made Up													
No. Hoies Squibbed													
No. Head Hoies Shot													
No. Stops Hoies Shot													
Total Hoies Shot													
No. of Shots Fired													

FIG 6

ENG. & MIN. JOURNAL

### SOME OF THE FORMS USED IN THE LOOSE-LEAF TIME-KEEPING SYSTEM

right shift. When the ordinary commercial type of time book is used, beginning the week on Sunday, the foreman has to begin his week in the last column, or two columns, and then jump to the first column. Further-

shift are identical except that the week begins with Friday. The second mill sheet provides for tallying production.

The six sheets for the mine are interchangeable for night or day shifts. Thus, Fig. 3 shows the sheet pre-

\*Superintendent, Lennan Zinc & Lead Co., Miami, Okla.

pared for the night shift by crossing off the word "Day" and the lower row of daily headings. There are always at least two spaces given to each occupation so that in case a man is discharged during the week, there will be a blank line in which the name of his successor can be written. Fig. 4 shows the sheet for the shovelers, and differs in being arranged to show the total number of cans instead of the total number of days worked, inasmuch as the shovelers are paid by the can. The total for each shift gives at a glance the production of the shaft for that shift. Another form, similar to that of Fig. 3, contains six lines for machinemen and six lines for machine helpers, while a fourth sheet is also similar, but devotes two lines to "hookers," four to trammers, two to trackmen and two to "brunomen," while two are blank.

The drilling and blasting are taken care of by the two forms shown in Figs. 5 and 6. A bonus system of drilling is used, based on the footage made for the week, and for the powdermen, a bonus system based on the saving of powder per ton.

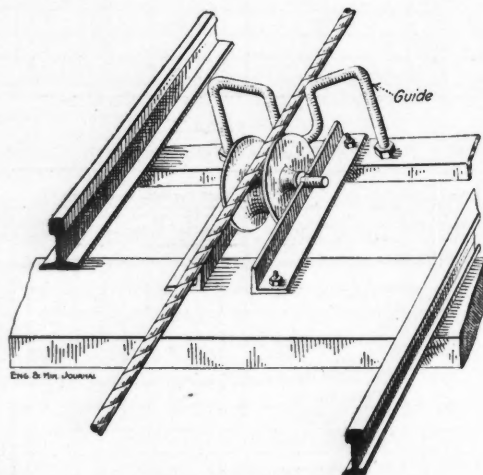
The sheets measure  $3\frac{3}{4} \times 6\frac{3}{4}$  in. and are printed on one side only. The timekeeper prepares them for each mine shaft and shift, puts them in a  $\frac{1}{2}$ -in. ring binder and gives them to the foreman. At the end of the week they are returned and filed. The result has been that little trouble is experienced with the payroll, the labor employed on any shift can be seen at a glance and the foremen are highly pleased with the arrangement.



## Rope Guide to Footwall Sheaves

BY CLARENCE M. HAIGHT\*

A simple but effective method of guiding a hoisting rope to its sheaves on the foot wall of an inclined shaft is shown by the accompanying drawing, which explains itself.



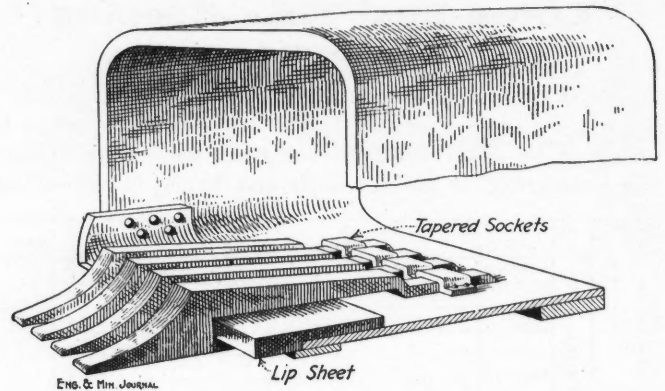
BRACKET FOR GUIDING HOISTING ROPE TO SHEAVE

The brackets are used by the New Jersey Zinc Co. on its main shaft at Franklin Furnace, N. J. This shaft dips about  $50^\circ$ ; the tracks are  $6\frac{1}{2}$  in. deep, and are supported on concrete piers. The guides are made of  $\frac{7}{8}$ -in. round iron, supported by angles, as shown. The sheaves are of iron with a wearing surface of hard rubber.

\*Mining engineer, Franklin Furnace, N. J.

## New Tooth for Steam-Shovel Dipper

A new dipper tooth has been invented by Edward Webb and Vernon Keech, of Virginia, Minn. (U. S. Pat. 1,087,621). It is arranged for holding to the bucket by



METHOD OF INSERTING TEETH

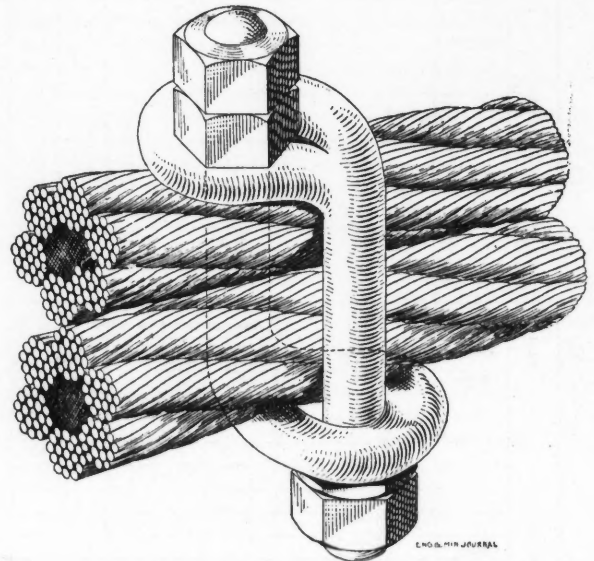
friction. The shank end is slipped into a tapered socket as shown, and the digging end is carried by a lip-sheet, the front edge of which is notched to admit the teeth.



## Home-Made Cable Clamp

BY WALTER R. HODGE\*

The chief virtues of the clamp illustrated here are simplicity of operation, ease of fabrication and tenacity of grip. An ordinary blacksmith can turn out a dozen an hour without straining himself. For  $\frac{3}{4}$ -in. cable the



APPLICATION OF LIGHT CABLE CLAMP

clamp is made of  $\frac{3}{8}$ -in. iron bent into a  $1\frac{1}{4}$ -in. eye and welded. A shank 3 in. long is threaded half its length and turned at an angle of  $90^\circ$  to the plane of the eye and two nuts provided for each shank. The clamps are used in pairs, the shank of one being shoved through the eye of the other with the two thicknesses of cable between and the nuts placed and tightened and locked with the extra nut.

\*Mining engineer, Ducktown, Tenn.

## Details of Milling and Smelting

### Steel Double Truck Car

BY R. B. WALLACE\*

The double-truck surface car used at the Republic mine on the Marquette range, Michigan, is shown in the accompanying illustration. The capacity of the car is 60 cu.ft., or  $3\frac{1}{2}$  tons of ore. At two of the shafts the car is run to the stockpile and pocket by gravity, and at the third by endless-rope motor haulage. The car dumps automatically, and the dump is adjustable. The box is 7 ft. long, 4 ft. wide and 4 ft. 4 in. high. The bottom, door and end plates are  $\frac{1}{2}$  in. thick and the bottom and door are lined with  $\frac{1}{2}$ -in. wearing plates. The under-frame consists of three 5-in.,  $14\frac{3}{4}$ -lb. per ft. I-beams reinforced with  $2\frac{1}{8}$ -in. truss rods. The door is reinforced with one rod. The axles are  $2\frac{1}{2}$  in. diameter, and the



STEEL CAR USED AT THE REPUBLIC MINE, MARQUETTE RANGE, MICHIGAN

bearings are outside the wheels. Hyatt roller bearings and manganese-steel wheels are used. The track gage is 3 ft. All the angles used in bracing are  $3 \times 3 \times \frac{1}{2}$  in. The bottom of the box lies at an angle of  $47^\circ$  which allows the ore to run out freely. The car is  $14\frac{1}{2}$  ft. long and 5 ft. 10 in. high overall. Due to the heavy pounding of the hard ore, all parts are made extra strong and a considerable amount of steel is used in the car.

### Salt for Clinker

Clinker adhering to the sides of the furnace walls of a boiler and tending to bridge over the grate may be knocked off with a firing tool, but in this way damage is done to the brickwork, says *Power*.

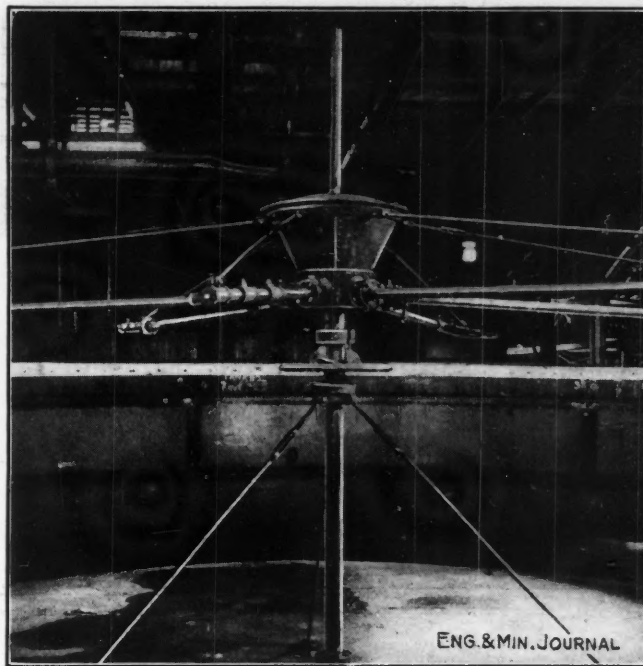
In a Canadian plant serving a salt works, chain-grate stokers are used and trouble was caused by clinker adhering to the side walls and extending out over the grate. Much of the low-grade salt is thrown away at these works. One day last winter the laborers conceived the idea of dumping some of the waste salt into the

\*Republic, Mich.

coal pile in front of the boilers instead of wheeling it a long distance in the cold. Soon after using this "salted coal" it was noticed that the clinker on the side walls had vanished; investigation and experiment showed that the salt was responsible for its disappearance. Now, when it is desired to remove clinker on the side walls a few shovels of salt are thrown into the coal hopper feeding the stoker and a little is also thrown on the clinker.

### Sand Tanks at the Dome Mill

With the new system of ore treatment at the Dome mill, South Porcupine, Ontario, it is designed to treat half the product as sand and half as slime. The leaching installation for sands consists of six  $40 \times 8.5$ -ft. steel tanks. They contain the usual bottom grating, and a filter bed of



TYPES OF BUTTERS DISTRIBUTOR IN SAND TANK AT THE DOME MILL

coco matting and canvas. The filter bed is caulked around the tank, between the grating and tank sides, with rope.

In order to assist in sluicing out the tanks, the filter beds are inclined from diametrically opposite sides, forming a V-shaped depression along the opposite diameter. In the tank side, flush with the filter mat, at the ends of this depression, are two side-discharge doors. In the center of the tank there is a round door fitted with a plug controlled by a wheel at the surface of the tank.

A wooden strip is fixed to the steel-tank side at the top, so that it may be accurately leveled, permitting an even overflow at all points. An annular canal around the outside of the tank side collects the overflow and conducts

it, to exit points, whence it returns to the battery-water tank for re-use. The leaching time for sands in the tank is calculated to be about five days. Incoming pulp is delivered to the tanks through a Butters distributor. There are two of these, each serving three tanks. They operate on a truck overhead, traveling on girders.

### Cost of a Reverberatory Bottom

BY PERCY E. BARBOUR\*

The No. 6 Garfield reverberatory furnace, 19x112 ft., was built on a slag foundation and then 20 in. to 24 in. of silica sand was tamped in to form the hearth bottom. The silica used was from the quarry at Draper, Utah, and was crushed to sand and delivered in gondola cars above

Fig. 1 shows the gang at work tamping, and Fig. 2 shows the furnace bottom complete, ready for heat and charge. Fig. 3 shows a cross-section of the furnace from the working drawing.

### Dust Trap for Handling Fine Ore

In the handling of finely crushed ores at the plant of the Deloro Mining & Reduction Co., Deloro, Ont., dust is a factor which must be controlled, both because of its injurious effect upon the operators, and because of its high value, rich ores only being handled. With these facts in mind, a dust trap has been devised and is in use in several places about the works.

When cars of fine ore are to be dumped into a bin, the



FIG. 1. TAMPING THE FURNACE BOTTOM



FIG. 2. THE FURNACE BOTTOM COMPLETE

the charge hoppers of the furnace, was dumped and shoveled into the hoppers and thence into the furnace by laborers. The sand was then distributed by wheelbarrows and tamped by Greek laborers using 8x8-in. blocks with plug handles. Tamping began at the verb end and the

bin is covered with a shallow hopper, terminating in a short pipe of size appropriate to the material to be passed. Over the end of the pipe is a cover so balanced that the stream of material passing will open it, allowing the ore to pass freely, while with the cessation of the stream the

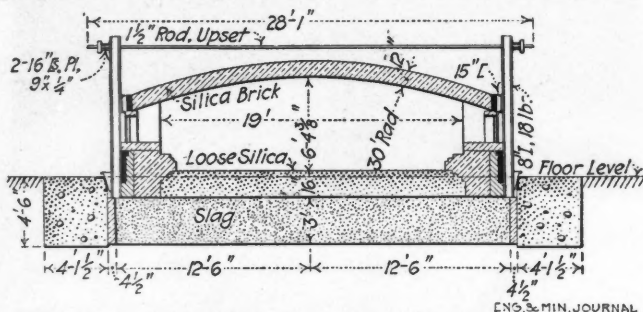
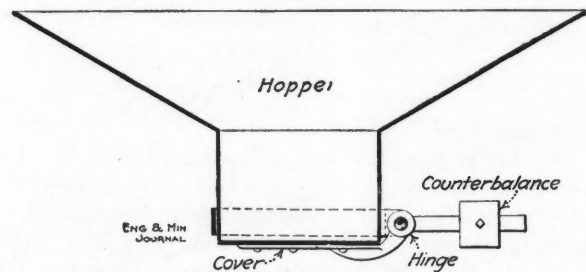


FIG. 3. SECTION OF REVERBERATORY FURNACE



DUST TRAP FOR FINE ORE

bottom, which resulted 200 tons of silica sand, was put in in 6½ working shifts.

The total cost was as follows:

COST OF FURNACE BOTTOM	
200 tons of silica sand delivered at furnace.....	\$31.26
Unloading sand .....	18.18
Making tamping blocks .....	8.25
Labor tamping in bottom:	
Straw boss, 3½ shifts.....	\$10.50
Greek laborers, 42½ shifts.....	74.37
Furnacemen, 6 shifts.....	21.00
Furnace helpers, 18 shifts.....	36.00
Sundries .....	141.87
	3.15
<b>Total cost.....</b>	<b>\$502.71</b>

\*Mining Engineer, 887 Middle St., Bath, Maine.

cover closes automatically, prohibiting the escape of dust. This contrivance has worked so well that a number of them are being used in the plant; wherever, in fact, fine, dry material has to be transferred. It prevents the waste occasioned by loss of rich dust, and also enables the operators to work in comfort and safety. The accompanying sketch illustrates the idea.

Some Experiments in the Direct Smelting of the Copper-Nickel Sulphide Ores of Sudbury are about to be undertaken in Ontario. The Mond Nickel Co., at Coniston will use the Fink furnace in its experiments, while the Canadian Copper Co., at Coppercliff, will try the Knudson furnace. The plan, at least in one of these works will be to blow up to about 40 per cent. matte, which will then be treated in the Peirce-Smith converters, making the usual 80% copper-nickel product.

# The Cost of Doing Things

## Mining Costs at Goldfield

The following figures were taken from the 1913 report of the Goldfield Consolidated Mines Co., Goldfield, Nev. The mines produced 349,465 tons of ore from the following sources; stopes, 310,927 tons; development, 25,782 tons; and dumps, 12,756 tons. The average grade of this ore was \$15.56 per ton and total operating costs including milling, etc., \$6.32 per ton. Stopping constituted 38.64% of the total expense; development, 14.73% and indirect mining and milling costs, 16.07%. The following, which includes a proper proportion of indirect costs, gives details of mining costs:

DETAILS OF MINING COSTS								
Goldfield Consolidated.								
Year Ended Dec. 31, 1913								
	Stopes per Ton (a)	Drifts and Crosscuts per Ft. (b)	Raises per Ft. (c)	Winzes per Ft. (d)	Diamond Drilling per Ft. (e)	Total Development per Ft.	Total Cost per Ton Ore Mined	
<b>Supplies:</b>								
Mine timbers.....	\$0.432	\$0.954	\$0.679	\$1.888		\$0.861	\$0.497	
Powder.....	0.137	0.335	0.229	0.834		0.300	0.161	
Caps.....	0.005	0.013	0.009	0.025		0.011	0.006	
Fuse.....	0.016	0.039	0.027	0.095		0.035	0.019	
Candles.....	0.018	0.064	0.030	0.054		0.051	0.023	
Drills and fittings.....	0.025	0.060	0.041	0.082		0.053	0.029	
Pipe and fittings.....	0.010	0.036	0.024	0.033		0.031	0.013	
Track and fittings.....		0.047				0.029	0.003	
Pump repairs*.....	0.034	0.082	0.056			0.072	0.039	
Cars and repairs.....	0.003	0.008	0.005			0.007	0.004	
Iron and steel.....	0.005	0.012	0.008	0.025		0.011	0.006	
Blacksmith shop.....	0.002	0.004	0.003			0.003	0.002	
Change room and office.....	0.006	0.014	0.010	0.067		0.013	0.007	
Lubricants.....	0.007	0.016	0.011	0.011		0.015	0.008	
Electrical supplies.....	0.010	0.024	0.016			0.021	0.012	
Miscellaneous hoisting.....	0.012	0.028	0.019			0.025	0.014	
Tools.....	0.007	0.018	0.012	0.070		0.017	0.008	
Miscellaneous.....	0.028	0.022	0.011	0.133	0.536	0.061	0.033	
<b>Total supplies.....</b>	<b>\$0.757</b>	<b>\$1.776</b>	<b>\$1.190</b>	<b>\$3.317</b>	<b>\$0.536</b>	<b>\$1.616</b>	<b>\$0.884</b>	
<b>Labor:</b>								
Superintendence.....	\$0.029	\$0.090	\$0.060	\$0.167		\$0.080	\$0.036	
Shift bosses.....	0.049	0.152	0.101	0.267		0.134	0.061	
Engineers.....	0.050	0.219	0.136	5.308		0.228	0.073	
Miners.....	0.399	1.913	1.047	3.960		1.611	0.553	
Muckers.....	0.449	2.192	1.180	3.702		1.833	0.625	
Timbermen.....	0.124	0.548	0.318	0.167		0.461	0.168	
Blacksmiths and helpers.....	0.021	0.086	0.053	0.067		0.074	0.028	
Pipe and trackmen.....	0.027	0.110	0.068	0.033		0.094	0.036	
Cagers.....	0.035	0.142	0.088	0.033		0.122	0.047	
Pumpmen.....	0.012	0.038				0.024	0.014	
Filling.....	0.158						0.146	
Top carmen.....	0.081	0.122	0.101	0.017		0.114	0.088	
Nippers.....	0.035	0.143	0.089	0.017		0.122	0.047	
Mine and shaft repairs.....	0.048	0.196	0.121			0.167	0.064	
Machine drill repairs.....	0.009	0.036	0.022	0.034		0.031	0.012	
Timekeepers.....	0.008	0.034	0.021	0.033		0.029	0.011	
Assay department.....	0.086	0.346	0.214	0.083		0.286	0.113	
Mechanical department.....	0.049	0.199	0.123	0.067		0.170	0.065	
Electrical department.....	0.034	0.139	0.086	0.067		0.119	0.045	
Engineering department.....	0.024	0.097	0.060	0.067		0.083	0.032	
Sampling department.....	0.006	0.024	0.015			0.020	0.008	
Watchmen.....	0.022	0.089	0.055			0.076	0.029	
Surface department.....	0.188	0.477	0.296			0.407	0.156	
Diamond drill.....					2.165	0.167	0.019	
<b>Total labor.....</b>	<b>1.873</b>	<b>7.392</b>	<b>4.254</b>	<b>14.089</b>	<b>2.165</b>	<b>6.462</b>	<b>2.476</b>	
Power, electricity and air.....	0.115	0.302	0.262	2.0.5	0.505	0.341	0.145	
<b>Total mining.....</b>	<b>2.745</b>	<b>9.470</b>	<b>5.706</b>	<b>19.471</b>	<b>3.206</b>	<b>8.419</b>	<b>3.505</b>	
Dump moving including purchase of equipment, 12,756 tons.....							0.841	
Notes—*Includes new equipment. (a) 310,927 tons of ore from stopes. (b) 24,203 ft. of drifts and crosscuts. (c) 14,193 ft. of raises. (d) 300 ft of winzes. (e) 3029 ft. of diamond drilling. Diamond drill costs include everything except carbons, 71c. per ft. drilled.								
Stopping costs per ton of ore stopped, \$2.54								
Cost of development per ton of ore mined, \$0.97								

## Mill Heating in Canada

Heating of the milling plants in the cold sections of America, the North and West, adds an appreciable item to operating costs. At the mill of the Nipissing Mining Co., Cobalt, Ontario, mill heating for the cold months costs 11<sup>3</sup>/<sub>10</sub>c. per ton on the yearly tonnage. Approx-

mately, the same figure applies to all the cyanide plants of the Cobalt and Porcupine camps, and perhaps to other eastern Canadian districts.

## Tonopah Belmont Mine and Mill Profits

The report of the Tonopah Belmont Development Co. for the year ended Feb. 28, 1914, shows a total profit, from operations at Tonopah, of \$2,014,316. The accompanying table shows the operations in detail.

TOTAL OPERATING COST MINE AND TONOPAH MILL FOR YEAR ENDED FEB. 28, 1914  
TABLE I

	Dry Tons	Value	1913 Average Per Ton
<b>Mine:</b>			
Gross value ore milled..	172,398	\$3,636,861	\$21.096
Net value ore stock on hand added to ore stock .....	248	2,038	8.217
<b>Total mine production .....</b>	<b>172,646</b>	<b>\$3,638,899</b>	<b>21.078</b>
Metal losses in mill tailings .....	172,398	\$203,266	1.179
Smelting losses in concentrates .....	172,398	18,657	0.108
<b>Total losses in treatment .....</b>	<b>172,398</b>	<b>\$221,923</b>	<b>1.287</b>
<b>Values realized ....</b>	<b>172,646</b>	<b>\$3,416,976</b>	<b>19.791</b>
<b>Mining:</b>			
Stopping .....	150,161	\$452,664	3.014
Development .....	22,485	257,709	11.461
<b>Transportation</b>	<b>172,646</b>	<b>\$710,373</b>	<b>4.114</b>
<b>Milling:</b>			
Milling .....	172,398	\$441,354	2.557
Marketing bullion .....	172,398	55,555	0.322
Marketing concentrates and slag .....	172,398	18,353	0.106
<b>General Expense:</b>			
Administration, taxes, office expense, depreciation .....	172,646	185,250	1.073
<b>Total operating ...</b>	<b>172,646</b>	<b>\$1,410,885</b>	<b>8.172</b>
Realization from operation .....	172,646	\$2,006,091	11.619
Miscellaneous profit .....		3,225	
<b>Total profit .....</b>		<b>\$2,014,316</b>	

## Milling Costs, Virginia City, Nev.

The following costs were taken from the annual report of the Mexican Gold & Silver Mining Co., Virginia City, Nev., for year ended Oct. 31, 1913. The mill treated 29,365 tons of ore consisting of 15,973 tons of Mexican mine ore and 13,392 tons of Monte Cristo ore. Of the total tonnage treated, 118 tons were concentrates cyanided for the Monte Cristo. The cost of mill operation, not including construction, etc., was as follows: Crushing and conveying, 7.4c. per ton; power, 47.9c.; labor, 59.3c.; repairs and renewals, 33.8c.; chemicals, 66.6c.; water, 17.7c.; lubricants, 1.5c.; heating, 16.6c.; general mill expense, 23.9c.; melting, 7.5c.; marketing bullion, 20.7c.; assaying, 6.2c.; taxes and insurance, 10.9c.; total, \$3.20 per ton treated. The extraction on the Mexican mine ores was 93.44% and on Monte Cristo ores 89.2%.

The highest cost for milling for one month was \$4.28 per ton and the lowest cost \$2.56 per ton. Details of supply consumption follow:

Average value of Mexican ore, \$30.98 per ton.  
Average value of Monte Cristo ore, \$9.21 per ton.

	\$ Per Ton	Lb. per Ton
<b>Cyanide:</b>		
Mexican ore .....	0.495	2.00
Monte Cristo Ore.....	0.237	1.17
<b>Lime:</b>		
Mexican ore .....	0.034	4.02
Monte Cristo ore.....	0.039	5.26
<b>Lead salts:</b>		
Mexican ore .....	0.044	0.41
Monte Cristo ore.....	0.119	1.06
<b>Zinc dust:</b>		
Mexican ore .....	0.172	1.62
Monte Cristo ore.....	0.105	0.98
Shoes and dies.....	0.017	0.33
Chilean rings and dies.....	0.022	0.67
Chilean screens .....	0.011	0.11
Tube-mill liners .....	0.038	0.89
Pebbles .....	0.095	7.33
Fuel oil for heating, 16.3c. per ton ore, or 3.69 gal per ton ore.		

### Drilling Costs in Nova Scotia

In the JOURNAL of May 9, a table of costs was omitted from an article on the cost of core drilling with govern-

COSTS OF DRILLING IN NOVA SCOTIA WITH GOVERNMENT MACHINES

Hole No.	Class of Drill	Core	Material	Dip	Depth	Fast-est Rate per Hr	Labor	Man-agement	Light, Oil, Waste	Car-bon, Wear	Cas-ing	Re-pairs and Spare Parts	Fuel	Lum-ber	Freight and Truck-ing	Shot	Grav-el	Man and Horse	Water	Total	Per Ft.
1	Diamond, steam.....	2-in.	Coal	24°	287	12.75	\$31.20	\$30.80	\$0.30	\$1.17	\$2.40	\$5.00								\$70.87	\$0.25
2	Diamond, steam.....	2-in.	Soft sedimentaries		415		194.38	652.60	2.50	64.45	11.31		\$41.28	\$5.68	\$111.45					1083.65	2.61
3	Diamond, steam.....	2-in.	Metamorphosed limestone		245		75.25	168.70	1.20	236.70		16.00	30.00	3.75	85.60					617.20	2.51
4	Diamond, steam.....	2-in.	Granite and limestone	45°	468	5	130.25	254.25	2.00	320.00		30.40	93.50	5.25	14.35					850.00	1.81
5	Diamond, steam.....	2-in.	Quartz and limestone	90°	216	4.25	72.25	105.40	1.60	62.10		13.85	26.00	1.50	13.00					295.70	1.37
6	Calyx, steam.....	6-in.	Shale and sand stone		218	4	209.25	113.00	5.00		40.00		25.00	23.00	86.00	\$11.25				507.50	2.47
7	Calyx, steam.....	6-in.	Soft sedimentaries		339	5	332.40	313.03	4.22		248.36		64.50	3.25	111.77	18.00				1095.53	3.22
8	Calyx, steam.....	6-in.	Shale and coal		206		a232.73					14.00				9.00	\$0.75			256.48	1.24
9	Calyx, steam.....	6-in.	Shale and coal		168		205.45	327.37				90.00				7.20	0.75			630.77	3.22
10	Calyx, hand or horse.....	1½-in.	Sedi-mentaries		118	3	32.00	77.60				8.70		5.00	11.25	6.00		6.40	30.00	176.95	1.50
11	Calyx, hand or horse.....	1½-in.	Sedi-mentaries		95	3	26.00	46.56							6.00	3.00		13.19	24.00	118.75	1.25

a Includes management

ment machines in Nova Scotia. The table is published herewith.

### Costs of Air Compressors

BY PERCY BARBOUR\*

A recent tender for bids for air compressors for a mining plant resulted in the following range of figures, which reduced to averages, give some good figures for estimating. There were twelve bids. One is thrown out of consideration on account of insufficiency of data and one is discarded on account of obvious error in weight. The 10 bids are on compressors with two-stage compression with either single steam cylinders in tandem with the air cylinders or duplex steam cylinders, with one exception, which had cross-compound steam end. The steam pressure was 100- to 125-lb. gage and the air pressure 100-lb. gage.

Piston displacement of these various machines ranged from 706 to 1380 cu.ft. per min. Total weights ranged

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from 16,800 to 35,000 lb.; total costs, f.o.b. factory, without air receivers, from \$1960 to \$3960. The cost of the compressors per cu.ft. of piston displacement ranged from \$2.58 to \$3.75, and averaged \$2.95. The cost per pound of total weight ranged from 9.8 to 11.7c., and averaged 10.9c. The weight per cu.ft. of piston displacement ranged from 24.1 to 35.3 lb. and averaged 27 pounds.

### Cost of Gasoline Haulage in Wisconsin

The Cleveland Mining Co., at Hazel Green, in the Wisconsin zinc and lead fields, is using mechanical haulage underground in the Cleveland mine. The unit in service is a 4-ton Whitcomb gasoline locomotive standard in all respects except gage. The specifications called upon the manufacturer to alter his design to an unfavorable degree by the requirement of 18-in. gage. The haulage in this district is over a short radius, so that data based on the

ton-mile service is misleading, compared with other fields where mechanical haulage has usually become necessary on account of distance. Results in 1913, as given by the Cleveland Mining Co., are as given in the accompanying table. The performance of the locomotive has been satisfactory in every way.

Total tonnage hauled.....	123,150
Total miles traveled by locomotive (approximately half of this total is loaded and half empty).....	6970
Operating labor, per ton.....	\$0.015
Maintenance and supplies, per ton (this includes gasoline, oil, etc., for operation, supplies, labor and material for maintenance).....	0.005
Total operating cost per ton.....	0.020

### Cost of Drill Repairs

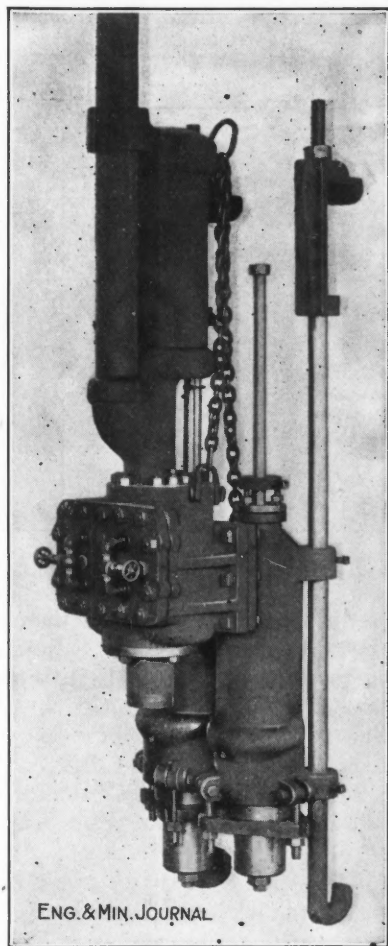
The cost of repairs on piston and hammer drills used for tunneling are about equal today, according to U. S. Bureau of Mines' Bull. 57. In 1905-06 on the Gunnison tunnel, they were 3c. and 13c., respectively, per foot of hole drilled. The hammer-drill cost was much less on later undertakings; being on the Yak tunnel, 1¾c.; Marshall-Russell, 1½c.; Carter, 2c.; Lucania, ½c.; Rawley, 1 cent.



# Mining & Metallurgical Machinery

## Luitwieler Sinking Pump

The accompanying illustration, exhibits a sinking pump made by the Luitwieler Pumping Engine Co., Rochester, N. Y., and intended for use with the pumping engine made by this company. The pump itself does not differ materially from the water end of most reciprocating sinking pumps, except that the plunger rods, it will be noted, are not connected to anything. They are intended for attachment to other rods or direct to the pumping engine, and it is this part of the machine that is of the most interest. By using no cranks, the faults traceable to them are eliminated. Instead of cranks, a system of cams is used, the cams receiving their power from any source, such as electric, gasoline, steam or belt drive. Each cam transmits its motion to a sliding yoke through the medium of rollers, thus minimizing friction. In a duplex pump, the long axes of the cams are placed 180 deg. apart, and in a triplex, 120 deg. apart, to make the application of force uniform.



WATER END OF SINKER

In this way the pump is made nonpulsating, and by being nonpulsating, a continuous flow of water is maintained, the entire load does not have to be started from rest at each stroke, less power is required, and dead centers never occur. The manufacturers also claim that the construction of the pumps is such that they are perfectly balanced; all moving parts are in equilibrium; minimum power is required for the service performed; load is nonfluctuating; causes of shock and break are eliminated; surplus of power to overcome inherent mechanical deficiencies are unnecessary, and that repairs are rarely required. The pumping engines are guaranteed to show an efficiency of 80 per cent. The users of Luitwieler pumps include the Moctezuma Copper Co., Nacozari,

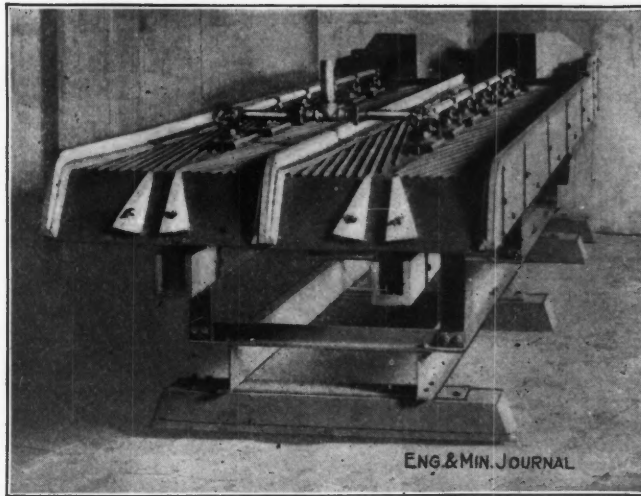
Mexico; Arizona Southwestern Copper Co., Kingman, Ariz., Rosiclare Lead & Fluorspar Mines, Rosiclare, Ill., and the Harvard Gold Mining Co., Jamestown, Calif.

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## The Isbell Concentrator

The Denver Engineering Works has acquired all the rights to this concentrator and will hereafter be its sole manufacturer. This machine is on exhibition in the laboratory at the factory and the demonstrations have created much speculation as to its ultimate capacity and efficiency when put into commercial service. It is claimed that, in one large mill, a single Isbell concentrator has taken the feed formerly going to six tables of well known make and has made just as good recovery.

Some of the features of this machine that are noted by an impartial observer are: Its seemingly large capacity, the flow of ore and water longitudinally of the deck, the deep bed of pulp on the table, the relatively small amount of water required, the feeding of unclassified or unsized ore, the apparent uniform efficiency under fluctuations in the feed, and the numerous points of discharge of the concentrate.



THE ISBELL CONCENTRATING TABLE

As shown in the figure herewith, the table is duplex in construction. Each deck has two planes that form a slight gable along the center line. Ruffles are so attached to the surfaces of the deck that the concentrate must actually travel slightly "up hill," notwithstanding the fact that the deck slopes toward the discharge end.

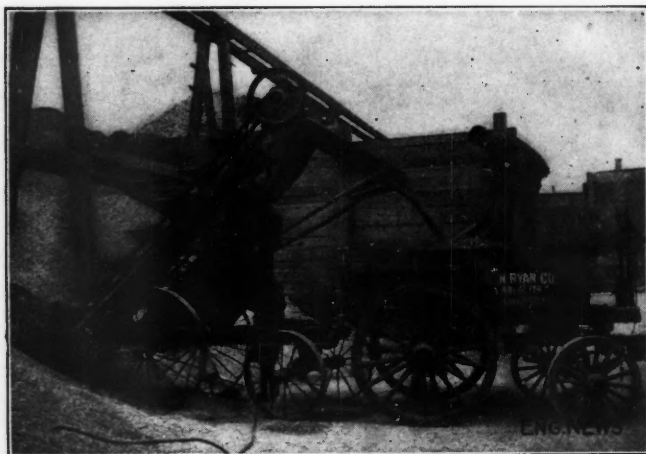
Pulp is fed with just sufficient water to render it quite fluid in consistency. The oscillations of the table are lengthwise. They cause the materials to stratify quickly according to specific gravities, irrespective of sizes of particles. In other words, the action is that of jigging and not hindered settling. A bed  $\frac{3}{4}$  in. or more deep may be maintained. Since the progress of the ore down the table is comparatively rapid, a heavy feed is permissible.

The concentrate lodges behind the riffles and is jolted along until it enters the so called cutouts—the discharges—in each of which it is met by a counterflow of wash water that acts as a classifying element and by proper adjustment permits only the heaviest material to pass down into the small pipe that constitutes the outlet. Should any concentrate be washed back onto the table, it will repeat its jiggling or stratifying process and will approach one of the succeeding cutouts where it again encounters a flow of water.

Ordinarily, by proper regulation of the inflow of wash water, different minerals will be withdrawn from the six cutouts. If galena be present in the feed, it should be saved at the first spigot, while successive products will be of decreasing specific gravities. Inspection of the several products thus saved shows each to be composed of particles of many sizes, but of practically one mineral. Thus, slimes will be found collected with coarse grains. The feed may be interrupted or its quantity may be considerably varied without apparently changing the characteristics of the products. The amount of water required will vary with the tonnage handled and with the minerals to be recovered; an average is perhaps 10 gal. per min., and this quantity is fed almost entirely through the six cutouts.

### Portable Motor-Driven, Bucket Elevator Loader

An electrically operated portable wagon-loader of the bucket-conveyor type is illustrated herewith. No small



MACHINE LOADING CRUSHED STONE

gasoline engine has yet been found dependable enough to give constant service with the kind of labor ordinarily available for operating the loader, so the use of the machine is confined to situations where electric current is to be had. The motor is of  $7\frac{1}{2}$  hp., inclosed in a dust-proof casing (*Eng. News*, May 28, 1914).

When not in use, or when it is to be moved the loader is tipped down so as to rest on the bottom of the trapezoidal frame containing the motor. When tipped up as shown, the conveyor buckets are moved into the pile of material by sliding on the channel frame of the carriage; this is effected by a hand lever working a pawl and ratchet. There is 3 ft. of this movement.

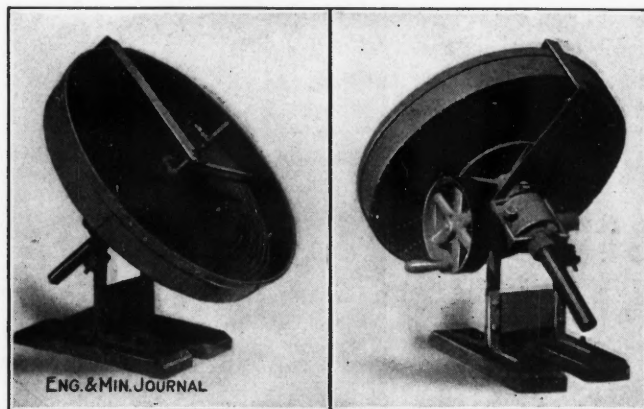
The overall height of the loader in collapsed position is 7 ft. 6 in.; when operating, it is 13 ft. The width is 5 ft. 11 in., and the length 12 ft. The two rear wheels

are 60 in. in diameter and the front wheels are 42 in. The machine illustrated is loading crushed stone from a storage-yard pile. It can also be used to advantage in sand and gravel pits and for coal handling. It is manufactured by the George Haiss Manufacturing Co., Inc., 142d St. and Rider Ave., New York City.

### The Arnold Concentrator

The Arnold concentrating machine works by gravitation and rotation, producing separation upon inclined graduated involute riffles. It consists of an adjustably inclined steel pan fitted with involute steel riffles secured to the inner surface of the pan. The pan is rotated slowly either by hand or belt power.

The crushed material is fed into the pan at the lower left-hand part by any hopper. This material is carried to the right of the pan where it rolls over and over, producing segregation and settling of the heavier parts



ARNOLD CONCENTRATOR

of the mineral. The riffles then take up this precipitate and carry it to the central hollow shaft, and while sliding on the tapered riffle, it is further freed from gangue, so that it is discharged into the tube completely cleaned. The tailings discharge over the rim. This machine has been tried on over 200 different kinds of mineral and is said to give good results in all cases. It is claimed to be the lightest machine made, using steel only and weighing 100 lb. in the 18-in. size and in the 36-in., about 150 lb., with capacity greater than any table. It requires  $\frac{1}{8}$  hp. for driving full load. For dry placering it is the only machine that can be carried into any of the dry deserts of Utah, Nevada, New Mexico and California, and take the gold out without the use of mercury, compressed air, etc. In addition the riffles are completely self-cleaning, and do not clog, as does a sluice box.

A demonstration plant is being installed at the Comodore tunnel, Lawson, Clear Creek County, Colo., of 50 tons capacity, to operate on low-grade lead-silver ores. When this plant is installed, it will be the only 50-ton mill in a building 12 ft. wide by 54 ft. long.

The Traylor Engineering & Manufacturing Co. announces that it has completed arrangements with Charles Jacobson, for the manufacture and sale of the well known Jacobson gas engines. The Jacobson gas engine is of the scavenging type, and can be used on natural, producer and illuminating gases of all kinds and characters. The engines are built in all sizes with single and multiple cylinders and particularly adapted for direct connecting to alternators running in parallel.

# Photographs from Butte



WILLIAM ("MUCKIE") McDONALD AND CHARLES H. MOYER, LEADERS OF THE UNION FACTIONS AT BUTTE. McDonald, who is opposed to the I. W. W., has been elected president of the new union. The photograph of Moyer was taken when he precipitately left Hancock, Mich., last December.



MINERS' UNION HALL, BUTTE, MONT., DYNAMITED JUNE 23

## NEW PATENTS

United States patent specifications may be obtained from "The Engineering and Mining Journal" at 25c. each. British patents are supplied at 40c. each.

**ALLOY**—Metallic Alloy and Process of Manufacture Thereof. Harry Ormiston Ormiston, Rockdale, near Sydney, N.S.W. (U. S. No. 1,101,089; June 23, 1914.)

**ALUMINUM ALLOY**. Charles P. Van Gundy, Catonsville, Md. (U. S. No. 1,098,137; May 26, 1914.)

**ALUMINUM ALLOY**. William A. McAdams, Bay Shore, N. Y. (U. S. No. 1,099,561; June 9, 1914.)

**AMALGAMATOR**. Joseph W. McCalliard, Los Angeles, Calif., assignor of one-half to Nicholas A. D'Arcy, Los Angeles, Calif. (U. S. No. 1,100,386; June 16, 1914.)

**AMALGAMATOR**—Combined Amalgamator and Concentrator. Paul Kuehn, Detroit, Mich. (U. S. No. 1,100,020; June 16, 1914.)

**ANTIMONY AND ARSENIC ORES**, Method of Treating. Alexander Trifonoff and Daniel Gardner, St. Petersburg, Russia. (U. S. No. 1,097,897; May 26, 1914.)

**ARSENATE OF LEAD**, Process of Making. Herbert H. Dow and Edwin O. Barstow, Midland, Mich., assignors to Dow Chemical Co., Midland, Mich. (U. S. No. 1,100,673; June 16, 1914.)

**BARYTES**—Method of Separating Barytes from Ores. Charles Jason Greenstreet, Webster Groves, Mo. (U. S. No. 1,3735; May 26, 1914.)

**BLAST FURNACES**—Bosh Plate for Blast Furnaces and the Like. Luther L. Knox, Niles, Ohio, assignor to Keystone Bronze Co., Pittsburgh, Penn. (U. S. No. 1,101,700; June 30, 1914.)

**CARNOTITE**—Process for Treating So-Called Carnotite and Associated and Similar Vanadium and Uranium Minerals. Herbert N. McCoy, Chicago, Ill. (U. S. No. 1,098,282; May 26, 1914.)

**CASTING**—Process of Casting from Volatilizable Metals or Alloys. William D. Hall, Oak Park, Ill. (U. S. No. 1,100,132; June 16, 1914.)

**CONCENTRATING APPARATUS**. Perle T. Hambric, Drytown, Calif., assignor of one-half to Wilton E. Darrow, Sutter Creek, Calif. (U. S. No. 1,100,971; June 23, 1914.)

**CONCENTRATION OF ORES**. Henry Howard Greenway, Melbourne, Victoria, Australia, assignor to Minerals Separation, Ltd., London, Eng. (U. S. No. 1,099,699; June 9, 1914.)

**CONCENTRATOR**—Ore Concentrator. John L. Signorette, Los Angeles, Calif. (U. S. No. 1,098,183; May 26, 1914.)

**CONCENTRATORS**—Driving Mechanism for Ore Concentrators. Emil Deister, Fort Wayne, Ind., assignor to The Deister Concentrator Co., Fort Wayne, Ind. (U. S. No. 1,101,486; June 23, 1914.)

**COPPER AND NICKEL**—Extraction of Copper and Nickel, Particularly from Low-Grade Ores and Products. Wilhelm Borchers, Aachen, Germany, and Harald Pedersen, Trondhjem, Norway. (U. S. No. 1,101,115; June 23, 1914.)

**COPPER REFINING**—Improved Process for Refining Copper and Other Metals. W. S. Rockey and H. Eldridge, Stapleton, N. Y. (Brit. No. 7409 of 1913.)

**CRUSHER**. Edouard Friedrich, Leipzig-Plagwitz, Germany. (U. S. No. 1,098,105; May 26, 1914.)

**CRUSHING MACHINE**. Orton G. Dale, Plainfield, N. J., assignor to Mead-Morrison Manufacturing Co., Cambridge, Mass. (U. S. No. 1,100,174; June 16, 1914.)

**CYANIDING**—Apparatus for Clarifying Liquids and Thickening Pulps. Hugh B. Lowden, Denver, Colo., assignor to Colorado Iron Works Co., Denver, Colo. (U. S. No. 1,098,842; June 2, 1914.)

**CYANIDING**—Apparatus for Filtering Slimes. Charles Butters, Oakland, Calif. (U. S. Nos. 1,100,217; 1,100,218; 1,100,219; 1,100,220; 1,100,222; June 16, 1914.)

**CYANIDING**—Process for Treating Cyanide Ores Containing Deleterious Slimes. Wilton E. Darrow, Sutter Creek, Calif. (U. S. No. 1,098,020; May 26, 1914.)

**CYANIDING**—Process of Filtering Slimes. Charles Butters, Oakland, Calif. (U. S. Nos. 1,100,221 and 1,100,223; June 16, 1914.)

**CYANIDING**—Separating Apparatus. Walter E. Trent, Reno, Nev., assignor of one-third to H. C. Cutler, Reno, Nev. (U. S. No. 1,097,896; May 26, 1914.)

**DRILL**—Rock Drill. Louis W. Greve, Cleveland, Ohio, assignor, by mesne assignments, to the Cleveland Rock Drill Co., Cleveland, Ohio. (U. S. No. 1,100,071; June 16, 1914.)

**DRILLS**—Improvements in and Relating to Percussive Rock Drills, Bits and Like Appliances. W. H. Wakfer, South Norwood, Surrey, Eng., and S. Peck Wallington, Surrey, Eng. (Brit. No. 10,566 of 1913.)

**DRILLS**—Improvements in Valve Apparatus for Percussive Rock Drills and the Like. G. Rayner, Abbeydale, Sheffield, Eng. (Brit. No. 617 of 1914.)

**ELECTRIC FURNACE**. Florentine J. Machalske, Plattsburg, N. Y., assignor, by mesne assignments, to American Ferroelectride Corporation, Plattsburg, N. Y. (U. S. No. 1,099,559; June 9, 1914.)

**ELECTRIC FURNACE**. William F. McNabb, Pittsburgh, Penn. (U. S. No. 1,100,191; June 16, 1914.)

**ELECTRIC FURNACES**, Contact for. Frederick T. Snyder, Oak Park, Ill. (U. S. No. 1,100,993; June 23, 1914.)

**ELECTRIC SMELTING**—Method of Smelting Iron Ores. Florentine J. Machalske, Plattsburg, N. Y., assignor, by mesne assignments, to American Ferroelectride Corporation, Plattsburg, N. Y. (U. S. No. 1,099,709; June 9, 1914.)

**ELECTRIC FURNACE** for the Reduction of Copper and Other Ores. William H. Hampton, New York, N. Y., assignor to the Conley Electric Furnace Co., Inc., Wilmington, Del. (U. S. No. 1,100,972; June 23, 1914.)

**ELECTRICAL INDUCTION FURNACE**. Karl Albert Fredrik Hiorth, Christiania, Norway. (U. S. No. 1,099,440; June 9, 1914.)

**ELECTRODE**. Florentine J. Machalske, Plattsburg, N. Y., assignor, by mesne assignments, to American Ferroelectride Corporation, Plattsburg, N. Y. (U. S. No. 1,099,558; June 9, 1914.)

**ELECTRO-METALLURGICAL PRODUCTS**; Process for Treating to Remove Impurities. Frank J. Tone, Niagara Falls, N. Y., assignor to the Carborundum Co., Niagara Falls, N. Y. (U. S. No. 1,099,674; June 9, 1914.)

**ELEVATOR-BUCKET CHAIN**. Oliver B. Finn, Colorado Springs, Colo. (U. S. No. 1,098,564; June 2, 1914.)

**EXCAVATING**—Shield for Excavating Tunnels and Shafts. Willie M. McDowell, Tacoma, Wash. (U. S. No. 1,100,142; June 16, 1914.)

**EXCAVATING**—Steering Mechanism for Excavating Machines. Charles B. King, Clarence B. Weston and Louis R. Russell, Marion, Ohio, assignors to the Marion Steam Shovel Co., Marion, Ohio. (U. S. No. 1,100,080; June 16, 1914.)

**EXCAVATING MACHINERY**. George Henry Dunlop Auburn, Victoria, Australia. (U. S. No. 1,098,146; May 26, 1914.)

**FLOTATION PROCESS**—Process for the Separation of Metallic Sulphides from Gangue and Apparatus Therefor. Leslie Bradford, Broken Hill, N.S.W., assignor, by mesne assignments, to Minerals Separation, Ltd., London, Eng. (U. S. No. 1,101,506; June 23, 1914.)

**FURNACE**—Improved Liquid-Fuel Heated Tipping Furnace for Melting, Smelting and Other Like Purposes. S. W. Price, London, Eng. (Brit. No. 5436 of 1913.)

**FURNACE LININGS**—Refractory Lining for Furnaces. Ottokar Serpek, Paris, France, assignor to Société Generale des Nitrures, Paris, France. (U. S. No. 1,099,131; June 2, 1914.)

**FURNACE** for Roasting, Smelting or Otherwise Treating Ores. Ernest Buchholtz, Harrow, Eng., assignor to the Oil Flame Furnace Co., Ltd., High Holborn, Eng. (U. S. No. 1,100,711; June 23, 1914.)

**FURNACE PREHEATER** and Shield. Walter S. Rockwell, New York, N. Y. (U. S. No. 1,101,961; June 30, 1914.)

**GOLD SAVING APPARATUS**. James W. Neill, Pasadena, Calif. (U. S. No. 1,100,904; June 23, 1914.)

**HAULAGE CLIP** for Endless Ropes. William Galloway, Cardiff, Wales. (U. S. No. 1,100,552; June 16, 1914.)

**HOISTS**—Safety Appliance for Mine Hoists. Walter E. Housman, Scottsdale, Penn. (U. S. No. 1,100,304; June 16, 1914.)

**INGOTS**—Method of Treating Ingots. Hiram W. Hixon, Aire Libre, Mexico. (U. S. No. 1,101,546; June 30, 1914.)

**LAMP**—Miner's and Like Electric Safety Lamp. Paul Wolf, Zwickau, Germany. (U. S. No. 1,100,336; June 16, 1914.)

**LAMP**—Miner's Carbide Lamp. Frank Guy, Springfield, Ill. (U. S. No. 1,097,716; May 26, 1914.)

**LAMP**—Miner's Lamp. William H. Logan, Carnegie, Penn. (U. S. No. 1,099,753; June 9, 1914.)

**MAGNETIC SEPARATION**—Improvements in and Relating to Magnetic Separating Machines. H. H. Thompson, Meadowside, Aldridge, and A. E. Davies, Abbey Farm, Hockley Heath, Eng. (Brit. No. 9725 of 1913.)

**METALLIFEROUS MATERIALS**, Art of Treating. Henry B. Hovland, Duluth, and George B. Frankforter, Minneapolis, Minn. (U. S. No. 1,098,668; June 2, 1914.)

**MINING COLUMNS**—Improvements in Mining Columns. F. Simon and J. W. Scott, Minnaar, Transvaal. (Brit. No. 16,145 of 1913.)

**NICKEL AND COBALT**—Process for Separating Copper from Nickel and Cobalt. Victor Hybinette, Fredericktown, Mo. (U. S. No. 1,098,443; June 2, 1914.)

**ORE REDUCTION**—Improvements in or Relating to Ore Reducing Machines. Copper Process Co., Chicago, Ill. (Brit. No. 19,301 of 1913.)

**RABBLES** and Rabble-Arm for Metallurgical Furnaces. Utey Wedge, Ardmore, Penn. (U. S. No. 1,100,461; June 16, 1914.)

**ROASTING**—Improvements in Roasting Furnaces for Ores and the Like. C. Gabrielli, Paris, France. (Brit. No. 8635 of 1913.)

**SAFETY**—Device for Protecting the Legs and Feet of Workmen from Injury by Molten Metal, Etc. Alexander E. Outerbridge, Jr., Philadelphia, Penn. (U. S. No. 1,097,354; May 19, 1914.)

**SINTERING**—Grates for Sintering Pans. John E. Greenawalt, Denver, Colo. (U. S. No. 1,098,035; May 26, 1914.)

**SMELTING AND BRIQUETTING** Process. Bernard T. Colley, Rancagua, Chile. (U. S. No. 1,098,883; June 2, 1914.)

**STEEL**—High Speed Tool Steel. Reinhold Becker, Crefeld, Germany. (U. S. Nos. 1,099,531 and 1,099,532; June 9, 1914.)

**THORIUM**—Process of Obtaining Salts of Mesothorium and of Radium from Thorium-Bearing Minerals. Bruno Keetman, Treppow, near Berlin, and Fritz Jost, Oranienburg, near Berlin, Germany, assignors to Deutsche Gasgluhlicht Aktiengesellschaft (Auergesellschaft), Berlin, Germany. (U. S. No. 1,100,743; June 23, 1914.)

**TIN**—Improvements in or Relating to the Dressing of Tin Ores. W. M. Martin, Redruth, Cornwall, Eng. (Brit. No. 19,514 of 1913.)

**TUNNELING CARRIAGE**. Russell S. Carter, Hewlett, N. Y., assignor to Ingersoll-Rand Co., New York, N. Y. (U. S. No. 1,098,014; May 26, 1914.)

**TUYERE**. Richard Bernhard, Cudahy, Wis., assignor to Power & Mining Machinery Co. (U. S. No. 1,097,907; May 26, 1914.)

## Gas-Producer Operation\*

Important requirements of a producer gas for power purposes are that soot and tarry matter be removed and that the temperature be lowered before the gas is delivered to the engine. The advantage of lowering the temperature is that the density of the gas is increased so that a given volume can develop more power because it contains more heat units.

### INSTALLATION

In setting up the producer, care should be taken to facilitate proper handling by raising it to such a level as will aid in cleaning and removing ashes and clinkers. If it should be placed too close to side walls, the operator will be hampered. It must be in proper alignment and placed so as to avoid the use of unnecessary piping and fitting. Provision must be made for proper drainage from the scrubber, as the cleaning water is likely to gather sulphur and tarry matter, which sometimes gives trouble in clogging and causes deterioration of the piping.

After setting up the producer and aligning it, the grates are put in position and the shell lined with firebrick. The latter are usually of special shape and should be carefully selected, using only sound ones. Before placing the lining in the shell a template should be made and laid out on the floor. In making this template, allowance is made for an annular opening of at least one inch between the outside of the lining and the inside of the shell, this space being used for insulation purposes.

After the brick has been fitted to conform with the template, the laying of the lining is proceeded with. The mortar is made of fireclay and water, mixed to the consistency of cement mortar. All joints must be smooth, as any irregularity causes clinkers to adhere. The operator uses the brick wall as a guide for the poking bar, and if projections exist, the lining is likely to be damaged. After five or six courses of brick, the space between the lining and the shell is filled in with a cement of asbestos and fireclay. This serves as a bottom for insulation material, which usually consists of ordinary sand, although in some cases asbestos is used. The cement should be thoroughly tamped to a depth of 12 or 14 in., thus preventing the sand from running out. Further courses of firebrick are then laid and more sand poured in and lightly tamped until within 3 or 4 in. of the top of the lining, the remaining space being filled with asbestos and fireclay mortar. If the producer is equipped with sight holes, corresponding openings in the brickwork must be provided, these openings being filled with iron pipe. This completed lining should be examined for cracks, any of which ought to be well filled with cement.

The producer should be cleaned out, when it is ready for the cover to be bolted or riveted on. The charging hopper and poke-hole cover are connected. Some producers have water jackets or vaporizers to supply the incoming air with vapor on its way to the fuel bed. Others use a small boiler between the producer and the scrubber; where boilers are already installed, steam may be supplied from them.

There are many kinds of scrubbers for cleaning and cooling the gas before it is delivered to the engine. Some

consist of cast-iron shells sealed at the bottom and filled with wooden slats, broken brick, charcoal, coke, or with special cast-iron baffles. At the top of the scrubber is a connection for cold water which flows down a spray through the shell and comes in contact with the outgoing gases, thereby cleaning and cooling them. The water passes down to the water seal, then to the sewer or other outlet. The amount of water is controlled to allow the gas to be cooled to nearly the surrounding temperature. There are also mechanically operated scrubbers, which impart centrifugal motion to the gases and at the same time inject cold water.

Some producers have both a wet and dry scrubber, the latter for removing any tarry matter or dust, which the wet scrubber does not remove, but the principal reason for the dry scrubber is to separate any undue moisture that may be in the gas after leaving the wet scrubber. The many designs of dry scrubbers consist essentially of a cylindrical shell filled with wood slats of excelsior and set in a water seal. Instead of a dry scrubber, some installations employ a cylinder attached to the gas line between the wet scrubber and the engine; this is called a separator. The outlet from the gas line has a running nipple about one-third the length of the separator connected at the top and the gas outlet is also so connected. If the gases contain any moisture, it will settle at the bottom of the separator and then pass out through a water seal.

Producers generally have a third pipe leading to the atmosphere, which is to be opened when the apparatus is shut down and closed when it is running. Some installations have fan blowers for draft when starting the producers; others employ a natural draft through the purge pipe, while others use a steam blower for the purpose. The latter method is possible where boilers are at hand.

In connecting up the piping, fittings and the various auxiliaries, care is to be taken to see that they are thoroughly clean and free from scale on the inside. When connecting scrubbers to producer, a heat-resisting packing is to be used. All bolts, nuts and screwed-pipe fittings should be coated with graphite and a good grade of oil, to facilitate screwing them together or apart when necessary.

### OPERATION

The producer and its auxiliaries having been installed and connected, the machine is ready for service. All water seals are to be properly filled with water, the gas valve leading to the engine should be closed, and the valve on the purge pipe opened. The cleaning and ashpit doors should be opened, and in some types the air inlet to the producer closed and a blower attached. Before building the fire, scatter enough loose ashes over the grate and producer bottom to cover all metal work, then the fire can be started with wood or soft coal, which will produce smoke. By this means, it is easy to see whether all joints are tight. The producer should then be charged with a small fire of coal, which is kept up for several days to thoroughly dry out the lining.

It is important that the fire burn evenly before filling the producer, and at all times dead spots should be avoided, as they form air holes and permit air to pass through the fuel uncombined, and thus dilute the gas. A pilot light is usually connected to the outlet of the

\*Abstract of an article by E. G. Moon, published in "Power," Mar. 3, 1914.

producer for ascertaining the quality of the gas. If a trycock is used, it should be covered with a piece of wire gauze to prevent the flame from flashing back. A second gas pipe is connected with the gas line near the engine for freeing the line of air, as all air should be expelled from the system before any flame comes near the outlet, otherwise an explosion may result. When gas burns freely at the pilot, the producer is ready for service.

The vent pipe at the engine should be closed, the air inlet at the bottom of the vaporizer opened, as well as back of the producer, and the purge pipe of the producer closed. Water is then turned into the scrubber and vaporizer and as soon as the engine is started, the ashpit and cleaning doors are closed.

Poking the fire at certain intervals is often recommended, and while it may be necessary to do this according to specified instructions, it may be better to do it more often. If this is true, it indicates that the producer is too small to carry the load. Some instructions are to clean the grate every 24 hr. and the ashpit once every other day, yet there are cases where the grate must be cleaned two or three times, and the ashpit once or twice during the 24-hr. period.

It is essential to poke down the fine ash which accumulates on the walls, as it is likely to fuse and form clinkers, which impair the efficiency of the producer. Before poking down, the operator should remove the ashes from the edge of the grate, so as to make room for those that are to be poked down from the walls of the lining. In cleaning the ashpit, the door should not be left open too long as it may allow too much air to be drawn into the fuel bed. Some producers are equipped with shaking grates.

In poking, a straight bar is used. The operator opens one poke hole at a time and bars down close to the wall of the producer in a scraping fashion, to remove all fine ash from the lining, keeping the poking bar as close to the lining as possible, so as to scrape it clean. Poking must be done quickly in some producers, as air is apt to be drawn in and weaken the gas. In cleaning the grate, it is necessary not to work the fire down too low, as burning and warping of the grate and metal work around it may result.

The eye should never be placed too near a sight hole, as a flash of flame may cause a severe burn. In shutting down the plant, assuming that the engine is already shut down, open an ashpit door slightly, shut off air inlets to the producer, the main valve on the gas line to the scrubber, and the water-supply to the scrubber; then open the purge valve just enough to maintain a proper draft while the producer is shut down.

After the producer has been in operation some months trouble may be had in getting a good gas. In such a case see if the water is of the proper height in all the water seals; look for clinkers, and if any are found, regulate the vaporizer. If the producer is equipped with a thermostat this may be found corroded or perhaps the baffles or filling of the scrubber may need cleaning or renewing. Leaks may form between the scrubber and the producer, or leaks in the gas line itself, or possibly air holes in the fuel bed. If the producer is equipped with a tubular boiler and the temperature of the water cannot be raised, the tubes may be covered with scale. If gas is not being delivered cold, the spray pipes in the scrubber may be corroded, or broken, or split, thus causing the

water to flow down the side of the shell, or the tubing may need cleaning or renewing. If a centrifugal scrubber is employed the vanes should be examined for deposits of tarry matter.

If the producer has been heavily taxed, the brick lining may become burned. All burned brick should be thrown away. Those not entirely burned out may be used for upper courses and new brick supplied for the lower ones, but it is cheaper eventually to put in an entirely new lining.

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## Oysters vs. Smelters

NORFOLK CORRESPONDENCE

An interesting case was fought out in the United States District Court at Norfolk, Va., and a decision given by the jury on Saturday, June 27, 1914. Mr. Hemingway, a wealthy oyster packer who is retiring from the oyster business, brought suit for \$15,000 damage to his oyster beds by the Virginia Smelting Co.

Plaintiff produced receipts from the state inspector of grounds leasing him oyster ground near the smelting plant and showed that the Smelting Co. poured slag on some of his beds. The grounds for the suit were based on damage to oysters by the action of "copper and other deleterious substances" on the oysters.

Plaintiff produced an abundance of evidence from oystermen and others who swore that the smeltery had ruined the oysters for distances as much as 50 miles in all directions. A pamphlet from the state bureau of chemistry was put in evidence in support of the view that the smeltery did the damage. A chemist employed in government service was placed upon the stand and testified to the finding of certain percentages of copper in oysters from near the works and gave his explanation of how the copper came to them from the plant although he only found "traces" of copper in the slag.

The defense proved that copper in slag was not soluble; that its business is to recover copper and not to scatter it over the country; that enormous amounts of Paris green were spread on the lands in the surrounding districts yearly for a long time. That there were many other sources of copper and finally that copper is as necessary to the life of the oyster as iron is necessary as a carrier of oxygen in mammals.

It proved that oysters in Spain, Holland, England, New York, New Jersey and many other places had copper in quantities greater than was claimed by plaintiff in the oysters near the smeltery. The defense showed that oysters all over the district as much as 50 miles away and up the river had more copper than near the smelting plant. The prosecuting attorney claimed that the defendant was proving that the plant was taking the copper out of the oysters as they got nearer the works. The defendant solemnly repudiated any such claim, but proved that all the damage was due to sewage and showed by uncontrovertible evidence the oysters from these beds were not allowed to be sold for food and that copper had nothing to do with it, but that it was purely a question of sewage contamination.

During the proceedings both sides got busy opening oysters to prove their respective contentions. The results were often very amusing. The jury awarded the plaintiff \$250 which was, of course, a practical victory for the smelting company.

## Correspondence and Discussion

### Disseminated Lead District of Southeast Missouri

I note, with some pleasure, the communication of Frank L. Nason in the *JOURNAL* of June 6, in which, he verifies the statement that the overlying Potosi limestone and Davis shale bear no relation to the existence or non-existence of the disseminated lead deposits in the Bonne Terre limestone. Mr. Nason cites his own experience in drilling through this Potosi limestone and Davis shale and finding the disseminated lead near the base of the Bonne Terre limestone beneath. His experience was antedated some months by the sinking of a hole, with the Davis Calyx drill, under my direction, through 100 feet of Potosi limestone, and the Davis shale, on property then owned by the St. Louis Prospecting Co. and now owned by the Federal Lead Co.; but Mr. Nason is entitled to all of the honors of a first discoverer, for he had no knowledge of this prior drilling. He is entitled to greater honor, for it requires more courage for the professional geologist to reject accepted theories, as he did, than for a layman to go ahead, as I did, because then ignorant of the existence of such a theory.

Confessedly a layman, geologically, and neither a professional ore finder, nor a professional fault finder, I yet am constrained to find fault with Mr. Nason's communication in several particulars. The extension of the field of occurrence of these great unique lead deposits which have already produced \$200,000,000, and may produce a billion dollars more, is of great importance. This extension should not be defeated by the propagation of half-baked theories or imaginary difficulties. I had no intention of proposing puzzles in my first communication. I did hope to provoke a discussion by the scientists by which certain palpably erroneous ideas, which impede progress, might be eliminated.

What concerns all, and the scientist more than any, is the ascertainment of the truth; and the first step to that end is the rejection of the palpably false, whether it be alleged as a fact, or is an erroneous conclusion from facts. Nason eliminates the Davis-Shale theory, but he raises other difficulties equally as imaginary. He lays this specter of the Davis shale, which has deterred timid capital from exploring Washington County, in a decent grave; but he conjures to the eyes of capital other goblins equally as terrifying, but which must become equally as evanescent upon examination. He emphasizes that the important matter for consideration is the locality (*loci*) and not the origin of orebodies. Of course! It is only upon the hope that a discussion of the origin of orebodies might result in a more economical method of discovering the locality of orebodies that any publication of the theories of ore deposition, in either governmental publications or in the commercial-scientific press, is excusable; but it is the *locality* of the orebodies we are after. That "is the subject of the story!" It was the

Davis-shale theory which excluded the possibility of the locality of orebodies in Washington County being determined. Nason says it is the "geo-structure" that is to be considered. It was in the hope of bringing out from men like Mr. Nason, who are equipped both by education and experience to furnish it, some information, that I suggested that the early prospectors sought the areas traversed by fissure zones as the likely places for ore deposition and that their only guides to these areas were the lines of "sink holes" and the old surface workings. Nason unqualifiedly states that the structure of the rock in Washington County is right for ore deposition. He quotes, approvingly, someone who has said that the cost of drilling in St. Francois County has totaled, to date, \$15,000,000! These are wild and whirling words. There were never more than 120 diamond drills operating in the district, and these for only two seasons. For other seasons of the past 20 years, 40 drills is a big average. As the average cost of drilling is about 60c. per foot, it is certain that \$6,000,000 would cover the full expenditure for diamond drilling from surface and underground, of which the greater part is properly chargeable to mine development, or mining.

It must be remembered that all development work in St. Francois County is carried on by diamond drilling. In other districts, shafts, tunnels, drifts, upraises, and crosseuts are run for purposes of development. Here, the diamond drilling dispenses with all other methods of development, and is used even for the purpose of determining the most economical attack for ore extraction from known orebodies. The statement of this exaggerated sum is out of place in the discussion of the advisability of prospecting the Washington County area. Its insertion in the communication is unfortunate, for those who are not familiar with the conditions may, improperly, conclude that such an enormous sum was necessary for prospecting for the location of orebodies. As a matter of fact, each of the orebodies now being worked in the Flat River district of St. Francois County was discovered by the first, second, or third drill hole sunk on the respective 40-acre tract where the orebody is situated. The total expenditure for preliminary location, and for the determination that a workable deposit existed, for all of the orebodies in the Flat River District, did not exceed \$300,000, and I believe that the expenditure of that sum in careful prospecting in Washington County would expose an equal number of workable ore deposits. Nason states that the depth of the lead deposits in Washington County may be from 1500 to 2500 ft. from the surface. This statement, if not challenged at once, might do more harm than the Davis-shale theory did. My article published in the *JOURNAL* of Jan. 31, 1914, was in the office of the editor on Dec. 8, 1913. On Dec. 23, 1913, 15 days later, a drill hole was completed by "tenderfeet" on the New Diggings property south of Potosi, near the center of Washington County. The drill, after encountering a workable deposit of dissemi-

nated ore in the Bonne Terre limestone, reached the La Motte sandstone at a depth of 920 ft. from the surface. The drill passed through 450 ft. of Potosi limestone and Davis shale which is the usual thickness in Washington County. Five drill holes were sunk, seven years ago, in the extreme Southwestern part of Washington County and encountered the La Motte sandstone at about 900 ft. from the surface. A record of one hole, sunk in that region, appears at p. 57, Vol. 9, Part 1, "Mo. Bureau of Geology and Mines," which Mr. Nason should know, that shows 900 ft. to be the depth there.

A drill hole was sunk near Richwoods, in the Northern part of Washington County, during the past year, which proved the thickness of the Potosi limestone there to be less than 500 ft. This hole, I am reliably informed, proved some lead in the Bonne Terre limestone. Four holes drilled near Caledonia, about seven years ago, encountered the La Motte sandstone at a depth less than 600 ft. from the surface. At least two of these holes encountered workable disseminated lead. Considerable drilling was done near Irondale, in the southeastern part of Washington County, more than ten years ago, pay ore was struck in several holes, and the La Motte sandstone was reached at a depth of less than 380 ft. from the surface. Here then is an area of at least 200 sq.mi. described within a triangle, the base of which extends from Irondale to the west line of Washington County, 20 miles, with the apex of the triangle at Richwoods, where the thickness of the lime formations is proven in five widely separated localities, in each of which the existence of the disseminated lead is conclusively proven. It is important to note that in the St. Francois County field the existence of the occurrence of this disseminated lead is found only when it exists in large bodies. The conditions under which occurred the metasomatic replacement of the dolomite by the lead sulphide appear to have been operative over a large area, when operative at all. This fact has not been commented upon by the geologists, but if it be true of the area in Washington County, as it appears to be true of the area in St. Francois Co., that the occurrence of disseminated lead is either not found at all, or else is found extending over a wide area, the importance of the discovery of the mere occurrence of this form of deposit at a given point cannot be underestimated. I don't propose to be drawn into a discussion of the causes of this, for I am not equipped for such a discussion. I only suggest this as worthy of investigation, and, if found true, of profound thought by the students of ore deposition.

The records of drilling already done, as mentioned above, show that Mr. Nason's difficulties of drilling in Washington County are, mostly, imaginary. The ridge pole which he erects between the two counties, upon the Washington County side of which he hangs a red flag, is not there! There is no difference between the counties, geologically. The line separating these political divisions was fixed by the General Assembly of Missouri without reference to geology, and without creating geological differences. There are areas in the southern part of the Flat River lead district in St. Francois County exactly the same as the areas of greatest difficulty in Washington County. The study of the "rock preparation" for preliminary prospecting in Washington County need not be extensive. Pick out a line of sink holes in Washington County, or an extended chan-

nel, along the course of which surface ore has been taken, or an area where there is a network of pipe veins that have produced ore, and bore to the La Motte sandstone with a driller who is drilling for ore, and not merely to make a foot record, and, I believe the results of the "tenderfoot" drilling at New Diggings, last December, will be repeated so often, that Flat River will dwindle in importance by comparison with the treasures that will be disclosed in Washington County. If the area marked "Washington County" on the map were marked "St Francois County," 50 drills would be operating there today, for there is no reason why they are not there, except that some of the doctors of geology have created a psychological condition which prevents capital from spending the comparatively small sum necessary for the development of this extension of the St. Francois County field. I want to correct Mr. Nason on one other statement. I have wasted no energy in "seeking possible leaks by means of suppositious fractures." I merely stated that the early prospectors took the surface indications of broken ground as indicating areas traversed by fissure zones, and as likely areas for lower ore deposition. Mr. Nason himself puts the factor of "lines of folding and zones of crushing" as paramount. It is the "lines of folding and the zones of crushing" for which the prospectors have been groping, and which many of the technical men have been disregarding. If Mr. Nason has any method for the determination of "lines of folding and zones of crushing" better than observing the strike of sink holes and the earlier surface diggings, he should not longer delay its publication, for everybody is awaiting that kind of useful information. Meanwhile I hope this discussion will go on but it should go on between the geologists. Leaving a layman in this kind of a fight alone is like putting a cave man with a club to charge a gatling gun. Mr. Nason has helped eliminate the Davis-shale bugaboo, and the drill records themselves have already corrected Mr. Nason's errors about the difficulties of drilling in Washington County and the depth at which deposits may be found.

Let us hope that the difficulties of the development of this promising field will hereafter be confined to those which the Creator put there.

St. Louis, Mo., June 20, 1914. H. J. CANTWELL.

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### Sulphur Bugs

The reference in the JOURNAL of March 28, to Mr. Goodale's mention of the sulphur bug, reminds me of an experience we had one hot summer when working Huntington-Heberlein pots. We were annoyed by swarms of a sort of large fly, which settled on the ropes and handrails and flew about in the strongest sulphur fumes. They swarmed on the side where sulphurous fumes were too strong for a man to stand, and on the hottest side. They were a metallic green color on the bodies, and larger than the house-fly, but smaller than a bee. They were found only near the H.-H. pots, in the fumes, and remained so long as the pots were worked. I never saw them elsewhere, and they were new to the workmen, most of whom were bushmen well acquainted with the insect life of Queensland. Perhaps they were the same "sulphur bug," but where did they come from in our case?

Silverspur, Queensland, May 19, '14. EDGAR HALL.



## Editorials

### The Crime of Great Success

Thomas D. Jones, president of the Mineral Point Zinc Co. (a subsidiary of the New Jersey), and a director in the International Harvester Co., whom the President appointed to the Federal Reserve Board and whose nomination has been held up in the Senate Committee on Banking and Currency, appeared before that committee on July 6, to answer its questions and explain that he is not a malefactor, nor of the class whose name is anathema. Instead of trying to excuse himself and trim his sails according to the popular wind, Mr. Jones said flatly that he approved of all the acts and practices of the International Harvester Co. since 1909; that he believed those acts were proper and legal and that the company had not offended against the anti-trust laws. He said, moreover, that he was fully in accord with the policy of the company at the present time. Mr. Jones also told the committee of his closer affiliations and more important financial interests in the New Jersey Zinc Co., the so called zinc trust. Mr. Jones said that the New Jersey Zinc Co. produced about 20% of the spelter, 85% of the zinc oxide, and 3% of the sulphuric acid that is made in the United States. Quoting from the *New York Sun*:

"Mr. Jones almost startled the Democratic members when he said that the New Jersey Zinc Co., of which he is a director, returned dividends last year of 50% on its \$10,000,000 capitalization, and that it paid 40% the year before. . . . Members of the committee said afterward that the Chicago man had made a favorable impression because of his courage and independence, but they were fearful that the Senate would not be able to approve as a member of the Federal Reserve Board a man who defended the International Harvester Co., and admitted his identity with a great industrial corporation that is returning 50% in dividends on its consolidated properties."

Here we have an exhibition of the modern tenet that no man, or no corporation may longer participate in the government of this land, and perhaps may not even enjoy the protection of its laws, if he be in receipt of a very large income, no matter if that income be earned in an absolutely honest way. Last year it was the Agassiz and Shaws and the Calumet & Hecla Mining Co. who were the targets of abuse. Now it is Thomas D. Jones and the New Jersey Zinc Co. If the discoverers of the Great Bonanza of the Comstock were alive today, it might next be they.

The New Jersey Zinc Co. came into being about 15 years ago as the owner of a marvelous deposit of zinc and manganese ore in northern New Jersey. No other deposit of the same kind of ore has been known anywhere else in the world. The New Jersey Zinc Co. did not acquire its title by the location of Government land. The State of New Jersey was one of the original 13 colonies and its surface had been divided according to the British and Colonial law. The owner of the surface owned what

mineral he might discover within his boundaries. The celebrated occurrence of zinc ore at Franklin Furnace was noticed and prospected as early as 1640. The first mining was done in 1774. It was many years, however, before any serious mining could be done, for the reason that the way to smelt zinc ore was unknown and after it became known this unique kind of ore was found to be very difficult to smelt. But in 1851, Samuel Wetherill invented a way of making zinc oxide directly from the ore, and this was the beginning of the utilization of the ore, though for nearly 50 years that utilization was carried on in a relatively small way. The surface of the mine was divided among several interests, there was confusion of titles resulting from ambiguities of early deeds, and the most protracted mining litigation in the history of the United States had been running half a century. There had been many failures of operating companies. The three that were in existence in the '90s were only moderately successful. The orebody, as a whole, was not then commercially workable; certain parts of it only could be skimmed and used.

About this time, John Price Wetherill invented a means for separating the run-of-mine ore into its constituents, which individually could be treated at great profit for the production of spelter, zinc oxide and spiegeleisen. August Heckscher quickly perceived the importance of the new invention and, recognizing the wastefulness of the apparently interminable litigation among the companies owning the great deposit of ore, and indeed the impossibility of extracting the orebody in an economical way unless it were extracted as a whole, conceived the idea of consolidating the three little companies. The New Jersey Zinc Co. was the child of his imagination. An industry which had previously been conducted at small profit, soon began to yield very large profits, nor was this by virtue of any exactions from the public. It was especially by virtue of the invention of John Price Wetherill. Previous to the date of that invention, the Franklin mine, great and unique as it was, had but relatively little value, other than potentially. The great dividends that the company subsequently earned were due to the Wetherill invention applied to the mine. Subtract that invention and it would scarcely be known how to treat the ore of the mine, certainly not at the great profit that has been realized from the invention. Then came Mr. Catlin, who revised the methods of mining and effected enormous economies in the extraction of the ore, which would not have been possible unless the orebody could be worked as a whole. With the abolition of the costly litigation, and with the exercise of good management in other respects, the New Jersey Zinc Co. became the earner of the very large dividends which have startled the senators. These dividends were not sucked out of the public. In subsequent years the company invested in zinc mines and smelteries in the West, naturally extending its interests along the lines

that it knew by experience, but with all of its acquisitions the New Jersey Zinc Co. in the production of spelter is only one among nine or ten important interests. There is no branch of the metal business which has been less "consolidated" than the spelter business. In the production of zinc oxide, the New Jersey Zinc Co. occupies a more influential position, but the Wetherill patents for the manufacture of zinc oxide expired nearly half a century ago, and anybody may engage in that business who sees fit, nor does the consumer have to grovel at the feet of the New Jersey Zinc Co., since, if he finds the price of zinc white to be too high, he may use white lead or barytes, or some other substitute. In fact, the New Jersey Zinc Co. conducted an extensive propaganda to increase the consumption of zinc white at the expense of the consumption of white lead.

The men, who, like John Price Wetherill, August Heckscher, S. S. Palmer and Thomas D. Jones, create value by effecting economies, are the real conservationists. Why should they not reap the big dividends that their brains have earned, not by exacting toll from the public, but by saving what mediocre intellects have been wasting? Would the country be any better off today if the Franklin mine were operated as in the early '90s? But to return to our theme, it is absurd and reckless to refuse a man like Mr. Jones a participation in the affairs of our Government, in a capacity for which he is eminently suited, just because he has been prominently and constructively engaged in a great industry.

We have not written this about the New Jersey Zinc Co. because we hold any brief for that company. We do not hold a brief for any individual interest, but we do hold a brief for the mining industry, and we see jeopardy for that industry if the idea becomes prevalent that the winning of enormous profits be a crime against society. The possibility of being an Aladdin is the great inspiration of mining and the courting of risks wherein thousands are cheerfully lost in the hope that the lucky number may turn up. The optimism of Colonel Sellers, "there's millions in it," is the mainspring in the development of "prospects," out of which sometimes come mines; and it is the tradition of Mackay, Fair, Haggin, Hearst, Daly, Stratton and the other mining millionaires of the past that inspired those who have become the mining magnates of today. There are men who are drawing 50% dividends, and more, upon their investments in the porphyry copper mines, but 10 years ago those mines laid neglected. Who will begrudge the Guggenheims and Mr. Burrage whatever fortune they may cull from abandoned Chuquicamata? These opportunities laid long before a world which did not know enough to recognize them. Are the men who perceived them and seized them and became very rich to be disqualified as citizens and from serving their country?

### **Fiction and Fancy in Technical Literature**

The 10-cent magazines are commonly regarded as the natural repository of fiction, not the engineering and scientific papers. However, the latter contain more romances than is commonly supposed. The explanation of this paradox is that readers generally are unable to recognize the fiction and fancy that is served them in the guise of technical contributions. We have long had it in

mind to write something on this subject, when along comes George E. Collins, who, in his address retiring from the presidency of the Colorado Scientific Society recently, said about what we should have liked to say, but perhaps should not have dipped our pen in quite so tart an ink. Listen, then, to Mr. Collins:

Whatever convenience of arrangement, whatever apparent completeness of flow-sheet a dressing-plant may possess, if at the end the waste products are not led to a single channel where an automatic sample can be taken, we are justified in regarding it with suspicion, and in declining to receive with confidence any claims advanced as to the extraction made. There may be commercial reasons why the losses from a milling plant should not be published. I have even known cases where there were valid reasons why such determinations should not be systematically made. It should, however, be considered the unpardonable sin to pretend that they exist when they do not; and to publish to the world as technical data of scientific value what are merely efforts to advertise men or plants, on the strength of partial misrepresentative figures. Nearly one-half of published accounts of mining costs and of metallurgical savings are unreliable; and are in fact advertising matter, not reports. The very first time that the margin of error happens to operate both ways, so as to enable him to figure out a high saving, our budding metallurgist breaks out into print, or hands his "data" to somebody else who does the same service for him. Directly a new plant attains its full tonnage, and before the inevitable budget for repairs, supplemental construction and depreciation begins to be felt, similar data of "costs," equally misleading, are published. Thus the columns of our technical journals are filled; and the great ocean of human misinformation expands. Other writers quote in good faith from such articles, so that in the end we all become loaded up with a great deal of knowledge of things that are not so. What we need is a board of censors, an "International Brotherhood of Knockers," who will devote themselves to the task of puncturing balloons and disentangling knots. The members of this noble band should pledge themselves to contradict misstatements whenever found, to expose absurd pretensions, to point out fallacies. The residuum of real information would occupy one-tenth of the present bulk; and there might be some prospect of the ordinary person keeping up with the march of achievement.

We are sure that Mr. Collins did not mean to refer to the engineering periodicals alone. On the contrary the transactions of our engineering societies, those ponderous tomes which soon become musty on our library shelves, contain a more or less regular proportion of reports and statements that "aint so." On the whole, we are disposed to think that errors run a severer gauntlet of exposure in the engineering periodical than they do in the engineering society. Who is there that has not been to a meeting where some speaker has expounded misconceptions and inaccuracies about a subject, while experts have smiled cynically but have refused to participate in any discussion? "What's the use?" they may say. "Personal experience is the only thing that teaches most people. If we reply to this man we may become involved in a disagreeable controversy. Persons who really want to know about this subject will inquire of us privately. The public relishes misinformation—the engineering public no less than the everyday public—so let them have it." All wrong, of course, but nevertheless quite human. The same conditions do not obtain in the engineering paper. If an editor wants to know if some special department of his paper is being read, the infallible test is to make intentionally some mistake in it. The corrections that come pouring in are the answer to his question.

But, of course, neither the editor of the engineering periodical nor the editor of the engineering society's transactions, nor the readers of the publisher of scientific books is omniscient, and being fallible and human, they pass things contributed by authors of fair repute that look

all right, look to be merely the simple statement of fact, yet are not so if the truth were known, just as Mr. Collins avers so caustically. Perhaps the author has fooled himself—we recollect one who used to report 99% extraction from his concentrating mill, although tributers were making a good living out of his tailings—perhaps he is so overwhelmed by his optimism as to construe success out of what is really failure. However it be, it is undeniably the fact that many things are published as being so, which are not, and errors thus originating become eventually embodied in the books of the professors.

### BY THE WAY

As indicative of the size of the Calumet & Hecla organization, testimony by the manager, James MacNaughton, before the Congressional Investigating Committee at the time of the late strike, is of interest. Mr. MacNaughton gave it as his opinion that the Calumet & Hecla Mining Co. had \$21,000,000 to \$22,000,000 invested in plant. The deepest workings of the Calumet & Hecla proper are 5000 ft. vertically, or 8100 ft. on the dip of the formation. The several companies which Mr. MacNaughton manages had a total of 8506 men employed on July 22, 1913. Compare this with 6000 men employed in mining in the State of Idaho and 5000 in the State of Nevada. Even in all of Montana the number of employees is less than twice as great, about 15,500. The complement of bosses for the Calumet & Hecla and its subsidiaries was between 750 and 800; this would be a large labor force for an ordinary mine.

The careless handling of dynamite by those most familiar with its destructive effects is admitted by engineers and contractors engaged in blasting. A remarkable incident illustrating this type of foolhardiness was described in the "Travelers Standard" for May. A certain contractor had given what he considered adequate instructions to one of his men with regard to the handling of dynamite. The work was carried on in cold weather, and the dynamite required thawing before use. The contractor had provided a suitable thawing kettle by which the thawing could be done in a safe and proper manner. A fire was built on the ground to warm the water for the kettle, and the helper was then left to attend to the purely mechanical part of the process. The contractor returned sooner than expected, and discovered that his man had stood the dynamite sticks on end in a circle around the fire to thaw, and that several of them had caught fire and were burning. He called to his helper and told him to run for his life, but the man misunderstood, and seeing that he was detected in his disregard of the instructions he had received, he immediately snatched up the dynamite that was not burning and threw it away from the fire. He then stamped upon the burning sticks, to extinguish them, and subsequently rubbed the ends of them on the hard ground, to make sure that no sparks remained. The repeated cries of warning of the contractor was interpreted by the assistant to mean simply that he should work faster. By some remarkable chance, there were no serious consequences.

Walter George Newman told a really touching tale to the Senate Investigating Committee, which is inquiring about the use of official letter paper of the Census and Rules Committees for circulation of a letter praising the Gold Hill mine. Newman testified that he asked Senator Overman's stenographer to make copies of the letter and that a clerk in the Census Committee made others. Senators Overman and Chilton, chairmen of those committees, knew nothing of it, he said. Washington press dispatches relate that while Newman was telling the story of his struggles to promote the property, he wept, and once his sobs stopped him. Newman said that about 35 or 40 copies of the letter on Senate paper were sent to his personal friends among the Gold Hill stockholders. None was used to "boost" the stock, he protested. In a choking voice, continue the press dispatches, Newman told the committee of the early struggles of himself and his brother, J. J. Newman, to develop the mine. "My brother saw things going to pieces," he said, "and he took five sticks of dynamite and blew himself into ten thousand pieces. He left a letter saying his life's work was gone. He said North Carolina was the richest state in the Union. When I heard that, I took oath I'd never let go that property till I proved his statement, or went the way he went." This is almost as pathetic as the deaths of Little Nell and Uncle Tom. If Mr. Newman has got to prove by the Gold Hill mine that North Carolina is the richest state of the Union or else blow himself into ten thousand pieces, the outlook for Mr. Newman is not encouraging. However, his proposition may merely be equivalent to the hackneyed "I'll eat my hat if," etc.

The *Rocky Mountain News* (Denver) prints the following correspondence relative to a recent more or less mythical happening in the radium field:

Your correspondent located in Grand Junction is evidently in error in the write-up headed "Alleged Radium Thief Captured," in the "News" of June 25. The facts, which I have ascertained after considerable difficulty, are as follows: The said J. E. Stone, who was captured on the Utah desert with 30 sacks of radium ore, did not have it packed on horses as stated, for the weight was too much (3000 lb.), so Stone rented two elephants from a traveling circus near Cisco, Utah. After loading the valuable ore on them, he started toward Green River, Utah, where he expected to cache the ore until he could ship the same to a firm in Germany.

The theft was soon discovered. Deputy Sheriff Risley, fully armed, in a high-powered automobile and a bodyguard of cowboys recruited from a nearby ranch, was soon on the trail of Stone, who was sighted with a pair of powerful field glasses. He was overtaken after a chase of 50 miles. He refused to dismount. A cowpuncher threw a lariat 75 ft. and lassoed him. Stone then surrendered and was taken to the county seat to stand trial. The ore was the most valuable mined in this country. It was worth \$60,000, and, had Stone made his getaway, he would have been independent for life.

He now says if he had had camels instead of elephants he thinks he could have gotten away with the ore. The elephants, he declares, were too easy to follow after the scent was taken up. It was impossible for him to get away as planned, for the elephants suffered so much for the want of water that they were uncontrollable. There have been several write-ups on this matter. We are only writing this to give you the straight of it, as there is nothing like printing the facts. As your correspondent located at Grand Junction was so far from the scene, his errors are excusable.

ALLEN DELCONAS.

Thompsons, Utah, June 28, 1914.

P. S.—We would like to act as your regular correspondent for this territory, as there are lots of exciting things happen around here that the public never gets the straight of.

We believe that last, Al.

## Searles Lake Potash

BY LEWIS H. EDDY\*

The potash deposits at Searles Lake, San Bernardino County, Calif., are about to be utilized by the American Trona Corporation. The corporation was formed some time ago and supplied with sufficient capital, to develop the property on a large scale. To carry out the contemplated plans, required the building of about 32 miles of railroad from Searles station, on the Owens River branch of the Southern Pacific R.R., to the site of the works, situated northwest of the crystal body or lake, as it is commonly called. Construction was begun in September, 1913, and in May, 1914, the railroad was ready for handling of traffic.

It was impossible for the company to complete the construction of a 3000-ton plant, without adequate transportation facilities. So advantage was taken of the time required to complete the railroad, and an initial unit or pilot plant was built and is ready for operation. This plant is not fundamentally experimental, as the various products were separated on a commercial, or at least tonnage basis, in 1912. This initial unit enables the corporation to test out various types of auxiliary apparatus, such as heaters, coolers, filters, condensers, etc. The plant is equipped with several different types of each machine, and after operating for a reasonable length of time, it will be known definitely which particular type of each machine is best adapted for the other units. The present plant has cost about \$150,000, but the corporation hopes to save as much as this amount in the construction of the final works by reason of the knowledge gained during the operation of this large-scale testing plant.

The deposit<sup>1</sup> consists of a body of crystals, covering approximately 20 square miles, and averaging 70 ft. in thickness. These crystals are permeated by saturated brine, the average level of which is 1 in. below the surface of the crystals. The brine is substantially uniform in composition throughout, while the crystals vary considerably in different portions of the deposit and at different depths of the same well. More than 200 wells have been drilled and the deposit has been thoroughly explored. The raw material which will be used is the brine. The mining costs represent the cost of pumping the brine. This cost is ridiculously low, as the elevation of the works above the surface of the crystal body is only about 75 ft.; and to turn out the capacity contemplated in the large-scale works, it will be necessary to pump only 2,000,000 gal. per day.

The principal salts in the brine are sodium carbonate, potassium chloride, sodium borate, sodium chloride and sodium sulphate. The salts of value are potash, borax and soda ash, the potash being by far the most valuable. At present no value is attached to the salt or sulphate, but it is hoped some day to find a market for them, or to convert them into other and more valuable products.

As an interesting side-light on the situation, it may be said that the borax and soda ash must be removed in order to produce marketable potash, for the alkalinity of these products would destroy the value of the potash as a fertilizer. It will, therefore, be seen that the borax, as well as the soda ash, is obtained as a byproduct in the

\*Associate editor, "Engineering and Mining Journal," San Francisco, Calif.

<sup>1</sup>"Eng. and Min. Journ.," Feb. 1, 1913, and Feb. 28, 1914.

manufacture of potash; and its cost is obviously considerably less than where it constitutes the chief article of manufacture.

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## Silica Output in 1913

The production of silica, excluding gem material and sand, in the United States for 1913 is reported by the U. S. Geological Survey as 232,192 short tons, valued at \$953,832. This output is classified into the different varieties of silica as follows: Quartz, 97,902 tons; sand (finely ground material), 106,857; tripoli (commercial), 20,831; diatomaceous earth, 6602. The quartz production was less than in 1912, and the average value of the crude quartz was 73c. per ton, and for ground quartz \$6.23. Most of the crude quartz is produced by North Carolina, Pennsylvania and Tennessee. The output was largely used for packing acid towers and for flux in copper smelting, the Tennessee Copper Co. being a large user. Ground quartz was produced principally in Maryland, Connecticut, Michigan and Wisconsin. Finely ground sand and sandstone, used for similar purposes to the finely ground massive, crystalline quartz, was produced in Illinois, Ohio, Pennsylvania and West Virginia, prices ranging from \$3.25 to \$5.25 per ton. Commercial tripoli, produced from silicified limestone (not true tripoli), is used as a light abrasive and was produced principally in Illinois and to a lesser extent in Missouri, Pennsylvania and Tennessee; the average price was \$10.32 per ton. Diatomaceous earth, also known commercially as infusorial earth, kieselguhr and, properly, tripoli, was mainly produced in California, Nevada and Washington and in a minor way in the Atlantic Coast states. The average price was \$10.50 per ton. There was no domestic production of flint, but the imports of flint pebbles were valued at \$319,509, the principal exporting countries being Denmark, France, Belgium and Newfoundland.

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## Clay Deposits in Indian Reservations Open to Exploration

WASHINGTON CORRESPONDENCE

On June 30, the Senate passed the following act: That all lands containing minerals: Kaolin, kaolinite, fuller's earth, china clay and ball clay, within such parts of Indian reservations as have heretofore been opened to settlement and entry under Acts of Congress which did not authorize the disposal of such mineral lands shall be open to exploration and purchase and be disposed of under the general provisions of the mining laws of the United States.

Provided, that the same person, association, or corporation shall not locate or enter more than one claim, not exceeding 160 acres in area, and that none of the land or mineral deposits, the disposal of which is herein provided for, shall be disposed of at less price than that fixed by the applicable mining or coal-land laws, and in no instance at less than their appraised value for agricultural purposes.

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The Dexter White Caps Mining Co., Tonopah, Nev., for 1913 shows receipts of \$15,819 and expenditures amounting to \$6445. There is also due from the White Caps Leasing Co. \$1674 in royalties. The total production of the property since 1911 is stated to have been 12,004 tons, mined and milled averaging \$24.30 gross and 4500 tons on dump averaging \$14 per ton. It is also estimated that the mine has 16,679 tons of \$14.35 ore developed.

## PERSONALS

Kirby Thomas has returned to New York.

W. M. Henderson has left for England on a vacation.

John M. Fox is in Colorado on mine examination work.

B. B. Thayer went to Butte last week and will be absent from New York until September.

Joseph A. Insee has changed his address to Casilla 378, La Paz, Bolivia, care Andes Tin Co.

Prof. J. F. Kemp has gone to Cuba to do some geological work, which will occupy him about a month.

R. M. Henderson, manager of the Wellington Mines Co., Breckenridge, Colo., has been in Denver on business.

Louis C. Jaquish has left Spokane for Liberty, Wash., where he has taken a lease on the Cedar Valley placers.

S. J. Lewis has moved from his temporary quarters at Calle Gante, 14 to a permanent office at 2a San Agustin, 56, Mexico City.

W. G. Carpenter has resigned his position with the Goldfield Consolidated mill to accept one with the Syndicate Mining Co. in the Philippines.

S. H. Conner has returned from Philadelphia to the Lardo River, B. C., to resume work in connection with efforts to recover gold by dredging.

B. Wallis Knowles, of Hedley, B. C., with the Hedley Gold Mining Co., was married on June 1, at Keremeos, B. C., to Miss Ellen Corrigan, of Hope.

Persifor G. Spilsbury, manager of the Aguacate mines, has returned to San Mateo, Costa Rica, after a two months' holiday in the United States and England.

F. Lynwood Garrison has gone to Nome, Alaska, where he will remain until the end of the season. He expects to return to Philadelphia early in November.

Morton Webber, who was recently engaged in the examination of a large low-grade gold deposit near Pioche, has gone to Idaho to examine a placer deposit.

J. D. MacMaster, of Rochester, N. Y., managing director of the Queen's Head Mining & Milling Co., is directing work at the company's Martney mine, near New Denver, B. C.

Arthur C. Terrill has been appointed field representative of the State Museum of New York, to be engaged in making preparations for the exhibit at the Panama-Pacific Exposition.

J. V. N. Dorr was given the honorary degree of Mining Engineer at the recent commencement of Rutgers College, New Brunswick, N. J., in recognition of his contributions to gold and silver metallurgy.

O. E. Cary and W. E. Henry, of Denver, Colo., each representing a zinc purchasing company, have been visiting mines in Slocan district, British Columbia, with the object of buying zinc ores there.

William Thomlinson, of New Denver, B. C., is collecting ore samples from mines in the Skeena country, Cassiar district, B. C., for the Canadian exhibit to be made at the Panama Exposition at San Francisco.

Vernon Freeman Marsters, geologist to the New York & Honduras Rosario Mining Co., was married June 17 to Miss Mary Effie Coleman, of Yonkers, N. Y. After Sept. 1 they will be at San Juancito, Honduras.

Dr. Hans Goldschmidt, the inventor of the Thermit Process and president of the Goldschmidt Thermit Co., is now paying his annual visit to the United States in order to keep in touch with his numerous interests in this country.

T. H. Jenks, of Denver, having completed some examinations in New Mexico, is now engaged upon professional work in the Globe district, Arizona. From there he will go to Las Cruces, N. M., before returning to Denver about the end of July.

H. G. Young, manager of the Trethewey Silver-Cobalt Mine, Ltd., has resigned to take the position of consulting engineer to the Algonican Development Co., Ltd., and general manager to its subsidiary companies. Mr. Young will leave Cobalt about the end of July.

Dr. Edward Dyer Peters has received the honorary degree of Doctor in Engineering from the Royal School of Mines, Freiberg, Saxony. The degree was conferred upon Prof. Peters in recognition of his distinguished academic and practical services and learned writing in the department of the metallurgy of copper.

C. V. Hopkins, chief engineer for the United Verde Copper Co., left on June 21 for San Francisco, from which point he will sail for Honolulu and Japan. Mr. Hopkins has been chief engineer for the United Verde Co. for 11 years, and for the past five years has never left his post. He is now taking a vacation for the benefit of his health.

At the recent commencement of Tufts College, Massachusetts, Dean Frank D. Adams, of McGill University, received an honorary degree. Incidentally, Dean Adams was the chief speaker at the annual dinner of the Association of Harvard Engineers, and Dr. and Mrs. Adams were also the guests of the Greater Boston geologists at a dinner at the University Club.

W. H. Storms, of San Francisco, formerly state mineralogist of California, was banqueted by the San Francisco Commercial Club on his return from Mt. Lassen. Mr. Storms gave a description of what he had seen at Lassen Peak at the time of the recent eruption, and stated that the eruption was strictly volcanic and really a volcano in embryo, sure to increase in proportions and repeat its spectacular performance. Mr. Storms did not predict that lava would flow from Lassen Peak, which he said was not necessary for a real volcano.

## OBITUARY

John I. Mayers, a mining engineer of Ouray, Colo., died at the Mercy hospital in Denver, June 29, from injuries caused by a fall from a window while delirious from fever. He was a native of Wales, but had lived in Colorado many years, and had held some responsible positions as a mining engineer.

On June 29 Arthur Austin, chief testing engineer at the International Smelting Works, Tooele, Utah, was testing an oil burner for use on the assay furnaces. A steel oil barrel containing the oil was under a high air pressure, and the barrel exploding in every direction, covered him with oil, which was immediately inflamed from the fire a few feet away. He was most seriously burned, so that death occurred the same afternoon. He leaves a widow and a young child. He was the only son of L. S. Austin. He was a graduate of the Colorado State School of Mines and of the Michigan College of Mines. He had been with the Anaconda Copper Mining Co. since 1906, having been transferred in 1911 to the Tooele plant.

## SOCIETIES

**Lehigh University**—The annual summer school fieldwork in mine surveying was done at Hazleton, Penn., during the week beginning June 14. This work is required of students in the mining course at the end of the junior year, and this year there were sixteen men taking part in the surveying of a section of the Wharton coal seam.

**Colorado Metal Mining Association**—A chapter has been organized at Denver, not because there are mines there, but because many mine owners and others interested in mining live there. Incorporators are W. G. Haldane, A. B. Frenzel and Harry W. Robinson. Directors named for the first year are Samuel D. Nicholson, Western Mining Co., Leadville; George A. Stahl, E. A. Colburn, Ajax Mining Co., Victor; John T. Barnett, Brad P. Morse, of Morse Brothers Machinery Co.; President Haldane, of the Colorado School of Mines; Allen L. Burris, of El Paso Gold Mining Co., Cripple Creek.

**American Iron & Steel Institute**—The directors of the American Iron & Steel Institute, at their monthly meeting in New York, June 26, decided to hold the autumn meeting of the Institute at Birmingham, Ala., on October 29 and 30. With the new hotel accommodations that have been provided in Birmingham in the past year it is believed the members can be taken care of comfortably. The important construction of iron and steel and coke plants that has added to the capacity of that district in the past five or six years should make the inspection features of the meeting of peculiar interest.

**Dredgemasters' Association of Yuba County**—This association was organized last winter by the dredgemasters in the Yuba basin district, California, with the object of promoting efficiency in the gold-dredge industry. The officers are George E. Sibbett, president; M. L. Summers, vice-president;

W. Wiltse, secretary. The membership is not confined to dredgemasters, but includes superintendents and heads of departments. The meetings are held twice a month at Ham-monton, and the attendance is not confined to the membership. Superintendents and dredgemasters and others, both mining and mechanical engineers, in any way interested in the dredge industry are welcome at the meetings and are invited to participate in the discussions, so that there is usually an attendance representing the dredge industry in the Feather River and the American River districts and some other parts of the state. A great many mining engineers from foreign countries come to California to study the dredging industry, and these meetings are frequented by the foreign engineers. Informal talks are given on various phases of dredging, followed by general discussion. The following subjects recently presented at the meetings illustrate the character of the work being done by the association: "Care of the Electrical Apparatus," by Edward Thunen, electrical engineer, Yuba Consolidated Gold Fields. "First Aid as Applied to Accidents Usually Made in Dredge Work," by Dr. Gray. "Manganese Steel," by R. D. Chapaman, Western manager Taylor-Wharton Iron & Steel Co. "Safety First and Accident Devices," by George J. Carr, superintendent, Yuba Consolidated Gold Fields.

**International Congress of Mining and Metallurgy**—The Sixth International Congress of Mining, Metallurgy, Engineering & Economic Geology will be held in London, July 12 to July 17, 1915. The Congress will be divided in the following sections: I, Mining; II, Metallurgy; III, Engineering; IV, Economic Geology. Participants in the Congress may be: (a) Honorary members; and delegates of foreign states. (b) Supporters of the congress, contributors of not less than \$25 to the Fund. (c) Ordinary members who pay a congress fee of \$5, which entitles them to registration in any one of the four sections. These may register in any other sections by making a further payment of \$1.25 for each section. The honorary members of the Congress and the supporters will receive all publications of the Congress. Ordinary members will receive the "Transactions" of that section in which they may elect to register by payment of the fee, \$5. They can, however, receive the "Transactions" of any other section on payment of the additional charge of \$1.25 per section referred to above. The authorized languages at the meetings are English, French and German. The official language of the Congress is English. The Executive Committee has drawn up a list of selected subjects for discussion at the Congress and has invited authorities to prepare papers thereon. In addition to these the committee is prepared to accept a limited number of other papers, if found suitable for the objects of the Congress. All papers must reach the committee not later than Jan. 31, 1915. Papers may be submitted in any of the three authorized languages, (English, French, German) and must be accompanied by a short abstract in the same language as the paper. The papers will be printed in one of the three languages, and the abstracts will be printed in all three languages. At the meetings of the sections of the Congress the papers will not be read, but authors will be invited to introduce the subjects of their papers for purposes of discussion. Except in special cases, the time allowed to authors for the introduction of their subject shall not exceed 15 minutes. Copies of the papers will be circulated in advance, and the abstracts will, as far as possible, be placed at the disposal of the members of the Congress at the opening of each meeting at which the papers are to be discussed. Any inquiries for further information should be addressed to the Secretary of the International Congress, 28 Victoria St., London, S. W., England.

## INDUSTRIAL NEWS

The Western Engineering Specialties Co. announces the removal of its office from 1727 Wazee Street, to 523 Boston Bldg., Denver, Colo.

Iron and Steelworks Mark, Wengern-Ruhr, Germany, manufacturers of carbonless metals and alloys, has appointed C. W. Leavitt & Co., 30 Church St., New York, as its American selling agents.

Taylor-Wharton Iron & Steel Co., High Bridge, N. J.; Wm. Wharton Jr. & Co., Inc., Philadelphia, Penn., and Tioga Steel & Iron Co., Philadelphia, Penn., announce the removal of their Seattle office to 1604 L. C. Smith Building.

The General Electric Co. reports an order received from the Calumet & Arizona Mining Co., Gila, Ariz., for a belt-

driven electrolytic generator, 2400 amp. at 24 volts or 4800 amp. at 12 volts, with direct-connected exciter.

The Nordberg Manufacturing Co., of Milwaukee, Wis., is now building Diesel engines, particularly of the largest sizes, having recently entered into an exclusive manufacturing arrangement with Usines Carels Freres, of Belgium, builders of the Carels engines.

Owing to accidental destruction of current files, manufacturers of mining machinery and appliances are requested to send complete catalogs to the H. S. Renshaw Co., Ltd., New Orleans, La. This firm is exporter and purchasing agent for large mining interests in Latin America.

The Sullivan Machinery Co. announces that J. C. West, hitherto local manager at San Francisco, has been transferred to the general offices at Chicago, in the capacity of general sales engineer. Ray P. McGrath, for several years associated with the New England sales office of this company, at Boston, has been appointed district manager at San Francisco.

Harvey W. Bell, founder of the Bell Locomotive Works, Inc., is now working with the H. K. Porter Co., of Pittsburgh, Penn., in the manufacture of a gasoline-steam locomotive. This new class of locomotive equipment is particularly adapted for mining and tunnel construction service, but it is excellently suited for all operations requiring light compact locomotive equipment.

The Traylor Engineering & Manufacturing Co., of Allentown, Penn., has supplied to the Hercules Mining Co., of Idaho, a special "Traylor" 7x6-ft. tube mill, and some standard tube mills to the Colorado Mining Co., in the Philippines. The Traylor company has also received an order from James Breen for a 20-stamp mill and equipment for treating a free-milling gold ore in Montana; high-pressure three-stage pumps for the Timber Butte Mining Co., and a 30-in. centrifugal pump for the Gaston Gardens Co. of Oregon; this pump will be used for irrigation purposes.

## TRADE CATALOGS

Buckeye Engine Co., Salem, Ohio. Bulletin No. 111-B. Buckeye-mobile. 16 pp. Ill. 8x10½ inches.

The Bury Compressor Co., Erie, Penn. Catalog, Noiseless Air Compressors. Four pages; illus., 9x6 inches.

H. K. Porter Co., Pittsburgh, Penn., catalog. Modern Compressed Air Locomotives. 80 pp. illus. 9x6 inches.

Bucyus Co., South Milwaukee, Wis. Bull. No. M-125. The Bates Rail Clamp for Steam Shovels. 2 pp. Illus. 11x8½ in.

The Lagonda Manufacturing Co., Springfield, Ohio. Bulletin. Automatic cut-off valves. 18 pp., illus., 8x10 inches.

Western Electric Co., 463 West St., New York. Catalog, Western Electric inter-phones and accessories. 48 pp. Ill. 8½x11 inches.

Sandycroft, Ltd., Chester, England. Catalog Single Speed Cascade Induction Motors Without Slippings. 164 pp. Illus. 9½x7½ inches.

American Concentrator Co., Springfield, Ohio. Catalog. New Century Disintegrating and Washing Screen. 12 pp.; illus.; 9x6 inches.

Ottumwa Iron Works, Ottumwa, Iowa. Catalog No. 30. Electric and steam hoisting engines and mine equipment. 116 pp. Ill. 7½x10 inches.

Schütte & Koerting Co., 12th and Thompson Sts., Philadelphia, Penn. Catalog 8, Section H. Schnicke Hydraulic Operating Valve. 4 pp. Illus. 11x8½ in.

Chicago Pneumatic Tool Co., Fisher Building, Chicago, Ill. Bulletin No. 34-C. "Chicago Pneumatic" gasoline and fuel oil engine driven compressors. 16 pp. Ill. 6x9 inches.

Lumen Bearing Co., Buffalo, N. Y., Booklet. Lesoyl, 8 pp. 6x3 inches. This booklet describes a new lubricant, a graphite concentrate, called Lesoyl, manufactured by the Lumen Bearing Co.

Sullivan Machinery Co., Chicago, Ill. Bull. No. 66B. Sullivan Rock Drill Mountings and Accessories. Thirty-six pages; illus., 9x6 in. Booklet No. 113. Core Drilling by Contract with Sullivan Diamond Core Drills. Thirty-two pages; illus., 5½x3½ in.

Ingersoll-Rand Co., 11 Broadway, New York, N. Y. Bull. "Little David" Riveting Hammers. Sizes, 50, 60 and 80. Eight pages; illus.; 9x6 in. Rivet Set Retainer for "Little David" Riveters. Four pages; illus.; 9x6 in., and Leyner-Ingersoll Water Drills, 32 pp.; illus.; 9x6 inches.

## Editorial Correspondence

### DENVER—July 3

**Roosevelt Tunnel New Work** is slow owing to an unusual increase, this spring, in the flow of water. The enlargement of the ditch at the side of the tunnel and the laying of track has been difficult. There are several hundred feet of this work still to be done before the breast can be attacked and the bore advanced according to new plans.

**Good Roads at Leadville** are the cause of an annual celebration, a "good roads day" being observed in mid-June or as soon as winter's accumulation of snow and ice can be removed and road materials handled. Wagon roads about the city require more than ordinary attention since they are subjected to extremely heavy traffic, while the climate of the region makes frequent repairing necessary. This year three roads were dressed by large gangs of volunteers who worked without compensation one full day. These roads lead from the city to three important sections of the adjacent country and are known as the Little Strayhorse, Jonny, and California Gulch roads. Business men who could not personally undertake such labor furnished substitutes and the canvass for such laborers developed the fact that there are no idle men in Leadville, at least none necessarily so.

### BUTTE—July 2

**Labor Trouble Will Be Ended at Butte** if the officers of the Western Federation of Miners remain away and "Muckie" McDonald and his followers are not interfered with, or called to account for what they have done in a dynamiting way, and are permitted to run Butte according to their own ideas, so far as the miners are concerned. There will be no more murder or dynamiting. That has been promised by McDonald himself and by Lewis J. Duncan, ex-preacher, former advocate of direct action, and for three years mayor of Butte. Governor Stewart appealed to the mayor for protection for some of the federation officers who desired to return to their homes in Butte, but the mayor advised the men to remain away because they started the trouble before, and McDonald added that Moyer had escaped once, but he would not again if he came back. To make the thing look right, the mayor and the city council offered a reward for the apprehension of the men who actually committed the murder during the last dynamiting riot at Butte, and for the discovery of the men who threw Acting Mayor Curran from the second-story window of the miners' union hall while Mayor Duncan was out of the state preaching Socialism and Vice-Mayor Smith was on a fishing trip. The county authorities are prosecuting an ex-convict and "dope fiend" for dynamiting the miners' union safe, and they are looking for the man who got the money, but nothing is said about the rebel leader who rode on top of the safe through the principal streets of Butte and harangued the crowds as he passed, and then superintended the dynamiting of the safe and the counting of the money taken from it. There has been a tendency to criticize the sheriff for his inaction and failure to handle the situation when the mayor refused to do so. The new miners' union, or rather leaders and speakers for that body, exhibited their real purpose when they issued a "statement" of their cause and grievance, devoting the entire statement to an attack on the Amalgamated Copper Co., which was blamed for everything. The chief accusation against the company is that it dominated the old union, put in its own officers, and corrupted the control. The Amalgamated may have been too largely interested in the union, for it is rather active in all affairs locally, even in school affairs and the nomination and election of trustees, but its property interests are also large and it has a right to look after matters that affect its interests. The fact is, however, that in all the history of mining and unionism in Butte there has never been a just grievance against the mining companies regarding working conditions, wages or hours of labor, and Butte has ever been pointed to by wage workers the world over as having ideal conditions and to the Amalgamated as the ideal corporation employer. Yet, at the conclusion of the rebel meeting a few nights ago, one of its members visited a newspaper office and gave vent to this expression: "We have the Amalgamated on the hip and by the throat. They may shut down the mines on us, but if they do we'll blow them up from the Silver Bow to the Butte & Bacorn." But the mines are being operated in the usual

way, and the companies refuse to be drawn into the miners' troubles. The rebels say they will soon demand the abolition of the "rustling card" system, and later will ask for an increase in wages. When they do that the companies may be forced into the controversy. The Butte labor war may be over, or it may not yet have fairly started. [It is reported in the East that during the height of the rioting the Anaconda company purchased all arms of all descriptions and all ammunition in Butte at a total cost of \$31,000 and secured agreements from all dealers in arms not to ship any more into Butte until the trouble is settled. A telegram from Butte states that Mayor Duncan was seriously but not fatally stabbed, July 3, by Eric Lantala, a Finn, I. W. W. leader, and a rebel, who attacked the mayor because he would not order Frank Aaltonen of Hancock, Mich., editor of the Finnish paper "Tyomies," to leave Butte. Aaltonen opposed I. W. W. leadership, rioting and dynamiting.—Editor.]

### SALT LAKE CITY—July 2

**Assay Offices in Utah, Montana and Nevada** will be continued for another year, according to action taken by the conference committee on the legislative appropriation bill, June 29. The appropriation for the Salt Lake office is \$60,000. The Helena appropriation was reduced from \$9,900 to \$8,900. The effort to continue the assay offices was led by Senator Warren of Wyoming.

**Recently Declared Dividends** from the Utah Copper, Daly-Judge, and Silver King Consolidated, with that just declared by the Utah Consolidated, will bring the total of dividends thus far in 1914 to \$3,462,560. This is the second dividend this year from the companies above mentioned, and the Iron Blossom has also made two payments. The other companies which paid dividends are the Bingham-New Haven, Chief Consolidated, Gemini, Grand Central, and Eagle & Blue Bell. The total of dividends paid by these mines amounts to \$40,944,947.

**Utah Power & Light Co.**, which recently consolidated most of the power plants in Utah and surrounding states, has completed its first year. During the period it has improved and brought up to date the plants under its control, as well as built extensive transmission lines. In all, the company owns 24 plants, and supplies power for mining, industrial enterprises, transportation, and agriculture throughout the intermountain region. Bingham, Park City, Eureka, and other camps are supplied. The Utah Copper uses 9000 kw., and now that a constant source is available more mining companies are substituting electricity for steam, gaining efficiency and economy. About 6000 kw. is used by two inter-urban lines, portland cement plants, etc. The company is developing new markets, and has ended the year with a net profit. D. C. Jackling was largely instrumental in effecting the organization of the company.

### HOUGHTON—July 6

**Mohawk's Expectations** from the southern shafts are likely to be realized within the next few years. No. 6 shaft is being sunk below the eleventh level and is coming into the same formation that is mined at the North Ahmeek Nos. 3 and 4 shafts, sinking of which has been resumed. No. 3 shaft is to be sunk to the sixteenth level.

**Calumet & Hecla** has not renewed its option on the Nonesuch property, adjoining the White Pine. Notwithstanding the proved richness of the White Pine and the assurance of the Calumet & Hecla that its work will be successful in that field, no effort seems to be made on the part of the company again to secure control of the Nonesuch, at which there is now no work going on. The erection of the stamp mill to handle White Pine rock is being rushed. The mill will be close to the shaft houses and will differ from other plants in other respects. The rock will be crushed but little in the shaft houses, but will go to the gyratory crushers in the mill. The mill first will crush 40,000 tons of stockpiled rock that has accumulated during the opening of the two shafts, one of which has reached a depth of 1200 ft. and the other 600 ft.

**Production at the Quincy**, which is again operating three shafts at regular production rates, may within a month or six weeks reach normal. No. 2 shaft resumed operations

July 1, after being out of commission since March. During this period of enforced idleness underground conditions were greatly improved. Timber was used extensively in many openings, which formerly were without timber. Unusual efforts were made to make the workings safe against those disturbances generally called "airblasts" by local miners. In some instances the timbering was carried back 200 ft. in the foot wall. These airblasts have been the cause of much concern to Michigan copper miners within recent years. The Quincy has suffered more from them than any other mine. The deepest mines are the most seriously troubled, and it seems impossible to determine in advance when they are likely to occur or how much damage they are likely to do. Fortunately, there has been no loss of life due to the airblasts, owing to the care which the mining companies exercise in warning the men at the first signs of a blast. An idea of the damage that these blasts do may be gained from the fact that this important producing shaft of the Quincy mine has been out of commission since last March while the work of timbering, making safe and clearing up has been going on. Quincy is producing from three shafts, Nos. 2, 6 and 8, employing the normal force of workmen. An increase in rock tonnage was made early this month, which will be further increased from now on for the next two months as fast as the underground force can be increased. It is too much, however, to expect that the Quincy will get back to regular output of copper before September unless there is a run of unusual good luck. All three shafts of the Quincy are at present opening a grade of rock that is a little better than the average of the Pewabic lode. In fact, all of the newer openings are showing well mineralized ground. The Quincy is now producing the bulk of its rock from a depth of between 6500 and 7000 ft. During June the two producing shafts, No. 6 and No. 8 or Mesnard broke all record for two-shaft tonnage in the history of the mine. Of further importance was the increase in the production of mass copper on the lower levels. During June over 100 tons were taken from these two shafts. The Quincy always was a heavy producer of silver and mass copper, and the coming in of mass copper again brings up the silver production. No plans for the resumption of the opening of the Pontiac shaft have as yet been settled, although the management has them under consideration. The Pontiac was shut down when the strike started and has not yet resumed. The installation of the permanent hoisting plant and engine is likewise held in abeyance. The Pontiac is the youngest mine of the Quincy's properties. It is farthest north of the last land purchased from the St. Mary's Mineral Land & Canal Co. The value of the Pontiac tract is generally known, because the Mesnard drifts were extended well over to the Pontiac boundary line before the Pontiac started to sink, and at the time the strike broke out it was becoming something of a helper in the grand total of Quincy's rock tonnage.

#### DULUTH—July 3

**Niles-Chemung-Oliver Suit** is being heard before the Federal court at Duluth. In 1902 the Niles Land Co., owners of the property in question, gave a mining lease to the Chemung Iron Co. on certain Mesabi range iron ore land; the latter company in turn sub-leased to the Oliver Iron Mining Co. Under the terms of the lease, an annual minimum royalty of \$18,500 is being paid at present, or a total of \$175,000 during the first 12 years of the 50-year lease. In addition, the Oliver company has expended \$108,000 in explorations and \$40,000 for taxes. Suit is brought specifically for the purpose of making the lessees or sub-lessees actually operate the property and pay thereon the royalty per ton, instead of paying the annual minimum royalty each year. The complainant claims that a lease of mining land, the rent for which is to be paid as royalty on the tonnage, with a provision for minimum royalty under any condition, carries with it an implied warranty on the part of the mining company to work the property. On the contrary, the defendant avers that leases which require actual mining must contain a clause so stating, and cites many leases with such a clause. Incidentally, the presiding judge has been called upon to decide whether the word "license" as used in this particular instrument means the same as the word "lease," which is customarily used, or, in other words, whether a mining license carries with it the same obligations and privileges as a mining lease. The property in question contains upwards of 20,000,000 tons of ore, of which none has been opened for removal. The Chemung Iron Co. is a Minnesota corporation, Chester A. Congdon, Duluth, treasurer and managing director. The court's decision in this matter will have a far-reaching effect in the iron districts of Minnesota, where but a small percentage of the mining land is not leased, and in many cases sub-leased several times. The system of leasing with the mini-

mum royalty payment stipulation in lieu of actual mining has usually been held to be a desirable feature in iron ore circles, as, if each lease carried a clause demanding actual mining operations within a definite period, a surplus would rapidly accumulate and the lease would defeat its own object. However, the matter is being closely watched by iron mining men generally.

#### BRAINERD—July 3

**Liquor Prohibition in Iron Mining Camps** is an innovation. The town of Crosby, from whence comes most Cuyuna range tonnage, has recently been made "dry" through court proceedings following a recent election. A recent interpretation of a treaty made with the Indians in 1855 places the cities of Brainerd, Bemidji, Hibbing and Grand Rapids in Indian territory and hence prohibits the sale of liquor therein. This district includes the entire productive part of the Cuyuna range and a considerable portion of the Western Mesabi. The decision is being protested.

#### MARQUETTE—July 3

**Largest Ore Carrier** ever to take a cargo from the docks at Escanaba was the S.S. "William Grant Morden," of the Canadian Steamship Line, Montreal. On her recent maiden trip the vessel cleared from the Chicago & Northwestern piers for Port Colborne, Canada, with 12,606 gross tons. The ship drew 19 ft. 9½ in. of water.

**Longest Train of Loaded Ore Cars** ever hauled over a railroad in upper Michigan by a single engine was pulled into the Chicago & Northwestern's yards at Escanaba by one of that company's class "Z" locomotives. The train consisted of 136 cars, containing upward of 6000 tons of ore. The train was hauled into the yards at regulation speed and apparently without effort. Ninety of the cars were hauled by the single engine from the Menominee range and at a siding seven miles out of Escanaba the additional 46 cars were picked up. The train was nearly a mile in length.

**Stripping the Balkan Property** of Pickands, Mather & Co., of Cleveland, in the Alpha field of the Menominee iron range, involves excavating at the rate of 150,000 cu.yd. per month. The method employed is as interesting as it is unusual. Two drag-line machines are used, each working day and night. Clay, gravel and sand constitute the overburden. So much stripping is to be done and so deep will be the pit to be created that an area of 40 acres has been set aside as the dump, which tract will be wholly covered when the work is completed. The Balkan will enter the shipping ranks next year. It will be the second big open pit in upper Michigan at which mining will be done by steam shovel.

#### TORONTO—July 4

**Mond Nickel Co.**, according to a circular recently sent to shareholders, has had a satisfactory financial year. It is estimated that the net profits will show an increase over the previous year of about £50,000. On account of the present position of the company's resources, the directors will recommend a reorganization of the company's nominal capitalization in order to make the same more nearly equivalent to the real value of its assets, as, in the opinion of the directors, the company's properties in Sudbury have a much greater value than the figures that appear on the books of the company. The proposed reorganization will abolish the deferred shares, the owners of which will exchange for ordinary shares so that the company's new capital will consist only of cumulative and noncumulative preference and ordinary shares. The present holders of 10,000, 7% cumulative preference shares of £5 each will receive for each preference share now held, five cumulative preference shares of £1 each, fully paid, carrying the same rate of interest. The present holders of the 300,000 shares of £1 each, which have a preferential right to a non-cumulative dividend of 7% per annum, will be entitled to receive one 7% noncumulative £1 fully paid preference share of the new stock for each fully paid ordinary share that they now hold and in order that holders of the ordinary shares in the company may participate in the same proportion of the surplus profits as at present, they will in addition receive 1½ fully paid ordinary shares of £1 each for one ordinary share they now hold. On the basis of the reorganization, the ordinary share capital will be 900,000 shares of £1 each of which the ordinary shareholders are entitled to receive £450,000 and the preferred shareholders the remaining £450,000. This allocation will give to each class of shareholders the right to receive half the surplus profits of the new company representing the same proportion as that to which they are entitled in the existing company. In order to carry these proposals into effect, the directors advise that it will be necessary to liquidate the present company and to transfer its assets to a new company to be known as the Mond Nickel Co., Ltd.



# The Mining News

## ALABAMA

### Jefferson County

**TENNESSEE COAL, IRON & R.R. CO.** (Birmingham)—Bessemer rolling mills will be electrified, a contract having been made with Alabama Power Co. for current. A continuous heating furnace for heating steel, thereby securing a nearer approach to uniformity of product and reduced cost will be installed. Hot beds will be installed which will also improve product. These improvements will cost \$55,000.

### ALASKA

**EBNER** (Juneau)—More machinery is being purchased. **CYMRU**—Shipment of 150 tons of copper ore from property on Moira Sound to Tacoma smelter will be made soon.

**GRANBY CONSOLIDATED** (Anyox, B. C.)—It and Dean mines, on Kasaan Bay, have been taken over and underground work is in progress.

**TYNDALL & FINN** (Cordova)—Building of a stamp mill and installation of other equipment on property on St. Patrick Creek, are being considered.

**LYLE & CARLSON**—A strike has been made by these operators on old channel of Copper Creek. Coarse gold encountered at grass roots was followed to a depth of 20 feet.

**OLD GLORY**—This group of claims on Smuggler's Cove has been taken over by Alaska Venture Syndicate, Ltd., of London. A 3-drill air compressor and power plant are being installed.

**JAMES CLAIMS** (Chisana District, P. O., McCarthy)—F. T. Hamshaw, who last year acquired largest holdings in Chisana, after systematic prospecting by crosscutting channels of Eldorado and Bonanza Creeks from shore to shore, with five thawers and 18 men has bought out Manley, Price & Ives, recent purchasers of James properties for \$560,000. Hamshaw arrived in camp this year, with largest outfit including a sawmill and mining equipment and supplies. In four weeks he has cut 65,000 ft. of lumber, built three automatic dams and has all flumes and sluices completed ready for operating July 8. Season is backward because of frost. Property consists of 14 placer claims and four quartz claims. Depth of pay gravel is from two to five feet and width 50 ft. There is plenty of water.

## ARIZONA

### Cochise County

**CALUMET & ARIZONA** (Warren)—Drift being driven from Cole shaft to Higgins claim is expected to show up some good new ground. So far drift has been driven 200 ft., last 50 ft. being through a hard limestone, making progress slow.

**COPPER QUEEN** (Bisbee)—Churn drilling on Sacramento Hill is advancing rapidly. Three drills are running, two electric and one steam. Two more electric drills are expected to arrive soon and work should be completed in six months. Test mill below Sacramento shaft is rapidly nearing completion. Low-grade ores from upper levels of Queen mines, are to be treated. It is expected that mill will be placed in operation early in July.

### Gila County

**INTERNATIONAL SMELTING CO.** (Miami)—All steel for 300-ft. stack at smelter site is now on ground, but erection will probably not be started until bedding bins and waste-heat boilers have been completed. Work has been resumed on this boiler house and should be finished in a few days. Foundations for turbo-generators and blowing engines in engine house have been completed and erection of forms for exterior walls continues.

**INSPIRATION CONSOLIDATED** (Miami)—Test mill had not been in operation week ended July 2 due to breaking down of a high-speed turbine at Roosevelt. Enough power, however, has been supplied to keep mine plant in operation and power system should be able to meet full-load requirements in another day. Considerable trouble was experienced also during that week by breaking of launder that carries away surplus water from behind tailings dam. Several thousand sacks of sand were required finally to stop flow, but even with flow checked it is liable to break out anew, as whole mass of tailings is thoroughly soaked with water and will run like quicksand. A new drain launder has been put in, but does not pass underneath dam, and hence is not exposed to excessive pressure. Pneumatic-flotation machines and agitation tanks are now installed and will be put in operation as soon as power is available. Dorr thickener is also ready to be tried out, purpose being to compare it with the tank system for dewatering concentrates. Knight-Trent filter is undergoing several changes to increase its efficiency and a new vacuum pump has also been installed. A temporary, yet extensive water system for fire protection has been put in at concentrator. Steel shelving for warehouse is fast being assembled and should be ready to be put in use in a week or two. Offices of storekeeper and warehouse clerk have been finished and are now being occupied. Excavations are completed and forms have been erected for foundation of 35,000-gal. steel fuel-oil tank for locomotive use. This tank is near west end of trestle on low line, also being near locomotive water supply. Test hole for second well on Kiser ranch has been drilled and reaming out of hole is now under way. This hole is 12 in. in diameter and is 404 ft. deep. When reamed it will be 24 in. in diameter. All holes are lined with casing, either blank or perforated, depending on nature of formations passed through. A good flow of water is expected from this well.

## Mohave County

**CAFFERY** (Kingman)—Braley & Suffer are shipping one ton of copper-gold ore per day. Mine is near Layne Springs.

**GOLDEN STAR** (Cerat)—It is reported that this old mine is to be unwatered and opened to another level by O. F. Kuencer.

**SCHUYLKILL** (Chloride)—Mine is being unwatered by same group of men that optioned old Distaff mine where a compressor and drills are being installed.

**SOUTHWESTERN** (Copperville)—Management is considering installation of rolls and dry concentrators which were recently tried out in a testing plant. Shaft is to be continued to 500-ft. level.

## Pinal County

**MONITOR**—(Ray)—Haley & Soufferin are retimbering the shaft.

**RIGGINS** (Ray)—Tunnel being driven to cut main vein of recent gold strike at Gold Creek is 100-ft. in and has cut the first of several parallel veins. Oreshoot is 4 ft. wide. Heading is still 140-ft. from main vein.

**KELVIN-SULTANA** (Kelvin)—Two carloads of equipment, comprising coarse crushing equipment, for new concentrator, were recently received. Greater part of concrete work is completed. Timbering in No. 2 shaft has been completed and old drifts and stopes are being opened. Prospecting for faulted end of vein in west drift of second level from this old shaft has located vein which will be explored by drifting. As soon as pump station on 500-ft. level of main shaft is completed crosscutting will be started.

## Yavapai County

**SANTA MARIA VALLEY MINING CO.** (Cottonwood)—Big Stick 20-stamp mill has been tried out on Santa Maria ores. New wagon road from Cottonwood is completed and development work is in progress.

**SWASTIKA** (Mayer)—A 2-ft. vein of lead-silver ore has been cut on 400-ft. level, ore being of same nature as that from upper levels from which several cars were shipped assaying 800 oz. silver per ton.

## CALIFORNIA

### Amador County

**HARDENBERG** (Jackson)—Crosscuts are being driven to develop oreshoots and to provide for economic mining.

### Butte County

**DREXLER DREDGING GROUND** on Butte Creek, near Chico, is reported to have been taken over by Guggenheim Interests. O. C. Perry, of Oroville, who is in charge of Guggenheim interests in California, it is said, will begin construction of a bucket-elevator dredge at a cost of \$100,000.

### Nevada County

**NORTH STAR** (Grass Valley)—Recent work has shown great development and production; 350 men are employed, and monthly pay roll exceeds \$100,000.

**EXCELSIOR** (Truckee)—Mine is being reopened. New boarding house has been erected, as it is purpose to continue work throughout summer and possibly during winter. Property is owned by Worcester, Mass., men.

**BRUNSWICK CONSOLIDATED GOLD MINING CO.** (Grass Valley)—Dividend of 6c. per share, aggregating \$18,000, was paid June 15. Brunswick has been developed into a dividend producer within last year. Stock is listed on San Francisco exchange, and is only local stock that is so listed.

### Plumas County

**ENGLE** (Keddie)—Three machine drills are operating, and 65 men are employed in mine and on surface. Saw mill has been installed. Ore will be concentrated and concentrates shipped to Salt Lake City.

### Shasta County

**MOUNTAIN COPPER CO.** (Keswick)—Camp at Minnestota station is completed and work of construction of concentrating plant has begun.

### Sierra County

**MONARCH** (Sierra City)—Machinery for new hoisting plant, sawmill, and 10-stamp mill is being rapidly assembled, and deep development is being done on high-grade vein. Lee Bros. are owners, R. D. Gillespie, of Pittsburgh, operating under bond.

**ALHAMBRA** (Downieville)—A sawmill has been built, and mill buildings are being erected. It is anticipated that mill will be running early in August at this Jim Crow Cañon mine. Richardson & Rixey, with Downieville associates, own and operate property.

**TIGHTNER**—(Alleghany)—Drifting is in progress from shaft, and exploration work is being carried on along serpentine contact toward Red Star ground. Shoot is being stoped from a crosscut from main working level, supplying 20-stamp mill and bullion shipments are regular.

**GOLD STAR** (Alleghany)—A new company has been organized for operating this drift mine, and it will be reopened by July 15. Mine was formerly operated by Chinese who made good pay. A deposit of gravel extending full length of claim was overlooked by them, and this will be developed through one of the long tunnels which will be extended to give access to it.

## COLORADO

## Clear Creek County

**MINT (Empire)**—Development force has been increased. Company contemplates improvements and additional equipment in mill.

**VINDICATOR (Idaho Springs)**—Contractors are driving tunnel. Tom Tuck vein is being developed and stoping will begin soon as surface tramway is built along mountainside to mill.

**LUCANIA (Idaho Springs)**—Samuel Sternberger of Philadelphia has purchased this large group from master in chancery and will merge it with his Lotus group, to be hereafter operated by Pennsylvania Mining Co. Lucania group numbers 356 patented and 60 unpatented lode claims, numerous placer claims and millsites, making in all 2000 acres. Lucania tunnel will be main opening of proposed mine operations. This is already in 8000 ft. and will be extended 500 ft. to cut Pendleton vein.

## Gilpin County

**GUNNELL (Central City)**—Mine dump is to be treated in 5-stamp mill being erected by J. Flynn, lessee. Bumping tables still appeal to Gilpin County miners and will be installed in this little plant.

**RANDOLPH MILL (Black Hawk)**—This mill has been leased to Arthur Most, manager of Colorado-Carr mine. He is remodeling mill to do custom work as well as treat ore from company's mine.

**SQUARE DEAL (Central City)**—Because of a serious water inflow, East Notaway shaft-sinking has been temporarily discontinued. Shaft is 940 ft. deep, but is planned to go 60 ft. deeper. Numerous sets of lessees keep up good production in upper workings.

## Lake County

**VIRGINIUS (Leadville)**—Discovery of high-grade silver ore has been made in this Sugar Leaf Mountain adit. Because of caving in, back of adit required retimbering and ore was found lying beyond previously supposed wall of vein.

**BIG FIVE (Leadville)**—Equipment of Latshaw tunnel west of Euena Vista, on Mt. Princeton, including compressor, boilers, piping, rails and tools, has been purchased by George W. Boyce, manager of the Big Five Mining Co., and will be immediately shipped.

## La Plata County

**WILFLEY-MEARS MILL (Silverton)**—Starting up has been delayed by owners of claims along flume-line from Silver Lake to mill. Right-of-way is now secured and mill should begin to receive its supply of Silver Lake mine tailings soon.

## Summit County

**MEKKA (Breckenridge)**—One lease is operating three hydraulic giants.

**BOSS (Breckenridge)**—Lessees recently dug 4800 lb. of silver ore from one pocket.

**DREADNAUGHT (Breckenridge)**—E. W. White, owner, recently shipped one carload of lead ore carrying good silver and a small amount of gold.

**LUCKY (Breckenridge)**—This Mineral Hill mine is being developed by a second level to expose Paducah vein carrying lead and zinc. It produced well in upper level.

**D. C. W. (Breckenridge)**—Claim, named after owners, Dyer, Cogswell & White, is on Mt. Baldy, where climatic conditions are bad, but this summer is producing silver ore on a small scale. General impression prevails that Breckenridge produces only gold, but truth of matters is that silver and lead are also important products.

## IDAHO

## Bonner County

**IDAHO-CONTINENTAL (Port Hill)**—Oreshoot recently encountered in raise between No. 4 and No. 1 levels has steadily increased, both in grade and size. There are now 6 ft. of high grade and 6 ft. of mill ore showing. Raise is up 330 ft. and will be completed within 30 days, three shifts being employed on work. The 200-ton concentrator has been completed, also hydro-electric station on Boundary Creek, midway between Port Hill and mine, 26 miles from town, together with transmission line, and entire equipment is ready for service. Considerable high grade is stored in bins at mine and a large amount of concentrating ore, which mill will begin treating July 15. Shipping of crude ore and concentrates at the rate of about 50 tons daily will probably be started Aug. 1, when wagon road to Port Hill is completed. To facilitate transporting ore to railway and also to reduce costs an aerial tram about 1500 ft. long will be installed over Kootenai River at Port Hill, emptying directly into shipping bins at railway. Contracts for equipment has been let to Riblett Tramway Co. Tram will be completed and ready to operate by time road is repaired. Ore will be hauled to river with caterpillar engines of the latest type, drawing trailers of 15 tons capacity, making one trip daily.

## Coeur d'Alene District

**NORTH BUNKER HILL (Wardner)**—At a meeting of directors it was decided to resume work on property and develop as rapidly as possible. Long lower tunnel should soon cut ore.

**RAINBOW MINING CO.**—Work on claims on North Fork will be resumed soon. Crosscut tunnel, on which work will be done, is in 300 ft. It is thought vein will be cut within next 25 ft. This will give a depth of 175 ft. Vein is 6 to 20 ft. wide where cut in places above crosscut tunnel level.

**LITTLE NORTH FORK MINING & MILLING CO.**—This property, better known as the Handspike, has been bonded for five years to Jerome J. Day, president of Tamarack & Custer Consolidated Mining Co. Plans regarding property are not generally known, but it is believed that a railroad will be built to haul ore, as roads are practically impassable for teams. Property is 12 miles up Little North Fork, and 17 miles from Enaville. Under terms of bond and lease lessees

are to work at least two men 20 shifts each month, starting within 15 days after bond is accepted. Lessees are allowed to ship ore from start and keep all proceeds first year, paying 15% royalty, remaining four years, this to apply on bond. Handspike is a copper property with, it is said, \$200,000 worth of copper ore in sight.

**FEDERAL MINING & SMELTING CO. (Wallace)**—Justice Philbin in his recent decision dismissing complaint of Sidney Norman and others, minority stockholders of company, against American Smelting & Refining Co. for purpose of having a contract between the corporations in 1905 set aside, found that all charges of fraud and unfairness of contract were unfounded. Contract provided that American Smelting should purchase Federal Mining output at certain rates for 21 years from 1909. This was substantially same as a prior contract made in 1903, and court pointed out that no question had ever been raised as to propriety or fairness of first contract. When first contract was made the Federal was entirely independent of American Smelting, but when the second contract was entered into American Smelting interests controlled a majority of Federal stock, and a majority of its directors were officials or employees of American Smelting company. Judge Philbin decided that the fact did not affect validity of contract, because defendants had not been guilty of any fraud and contract was not detrimental to minority stockholders' interests. Entire interest of plaintiffs amounted to only 2% of stock of company and there was no evidence that any of said shareholders wished to join in plaintiffs' protest or were in sympathy with it.

## MICHIGAN

## Iron

**PURCELL (Iron River)**—McGreevy Steel Co. has forfeited its right to this property. Mine has been turned over to a local company now being organized. Considerable new machinery will have to be bought if mine is to be operated, and management plans on a new hoist and compressor. Shaft has been sunk 220 ft. and much drifting has been done. About 2000 tons of ore have been shipped since mine opened.

**OLIVER IRON MINING CO. (Ishpeming)**—Lake Superior Iron Co., a subsidiary of Oliver Iron Mining Co., has closed down No. 7 hard ore mine and workings are now filling with water. Pumps were not removed. About 100 men were thrown out of employment. This is first curtailing to be done at Ishpeming, but Oliver company suspended one shift at Prince of Wales mine at Negaunee two weeks ago. Order to reduce expenses not only hit hard ore mine, but all surface plants as well. Between 50 and 60 men were laid off in machine, blacksmith and carpenter shops, laboratory and office. Some men who were let out had been employed by company for 30 years. Places will be found for some at Lake Superior Hematite mine, which will add another shift. Some married men will be given work at Section 16 mine, and single men will be let out. Orders from President Olcott were to reduce to minimum. No. 7 is in fine shape under-ground, with much ore in sight, but stockpiles are filled and only a few shipments have been made.

## MINNESOTA

## Cuyana Range

**CUYUNA-SULTANA IRON CO. (Crosby)**—Company is sinking an exploratory shaft on its property northwest of Ironton.

## Mesabi Range

**MESABI RANGE SHIPMENTS**—Aside from Leonard shaft and pit, Mahoning is largest shipper in Hibbing district just now, shipping 250 cars per day and working day shift only. Hull-Rust pit, for some years heaviest producer on Mesabi range, is now loading but 150 cars daily, with facilities for loading 2000 cars. At Nashwauk, Hawkins washing plant is shipping 100 cars daily, and Harrison and Quinn combined properties, operated by Butler Bros., are shipping 50 cars daily. More activity is now noticeable around Virginia. Pickands, Mather & Co.'s Hudson pit, at Aurora, started operations with three shifts and one shovel June 29. At Meadow mine of Inter-State Iron Co., at Aurora, shipping has started from 50,000-ton stockpile.

**IRON ORE SHIPMENTS FOR JUNE**—It is surprising to note that June, 1914, shipments from head of lakes totaled to about 70% of shipments for June, 1913. A comparative tabulation follows:

Dock.	JUNE SHIPMENTS	
	1914.	1913.
Great Northern, Superior, Wis.....	1,944,601	2,231,117
Duluth, Missabe & Northern, Duluth, Minn.	1,045,786	1,895,728
Duluth & Iron Range, Two Harbors, Minn.	1,075,193	1,548,726
Chicago & Northwestern, Ashland, Wis. . . .	441,261	649,763
Soo Line, Superior . . . . .	50,569	145,955
Northern Pacific, Superior . . . . .	19,492	.....
	4,576,972	6,471,289
FOR SEASON TO DATE		
Great Northern . . . . .	3,871,367	4,474,133
Duluth, Missabe & Northern . . . . .	1,779,875	3,995,948
Duluth & Iron Range . . . . .	1,767,689	3,081,666
Chicago & Northwestern . . . . .	716,878	1,254,123
Soo, Superior . . . . .	96,854	203,206
Soo, Ashland . . . . .	166,203	255,579
Northern Pacific, Superior . . . . .	36,829	.....
Totals . . . . .	8,436,695	13,264,655

**SHENANGO (Chisholm)**—Mine shut down June 29. Officials say it will probably reopen in two weeks. No reason has been assigned for action. Mine is one of the large shippers of district.

**LEONARD (Hibbing)**—Output from this pit and shaft operation will no doubt exceed all others on Mesabi range this season. Property is controlled by Great Northern Ore Securities Co., and is under lease to U. S. Steel Corporation, whose lease expires by cancellation Jan. 1, 1915. This is reason for activity. Five shovels are being operated on day shift and four at night, and an average of nearly 600 cars per day are being loaded. This mine is shipping practically one-fifth of entire product of Hibbing district at present.

## MONTANA

## Beaverhead County

**BOSTON & MONTANA DEVELOPMENT CO. (Butte)**—Due to prospects that construction work on proposed railroad to Elkhorn mines of this company will soon be started, development work at these properties is being done. Tunnel is nearly 400 ft. in and is being extended at rate of 8 ft. per day. From 141-ft. mark quartz stringers carrying ore have been showing.

## Deer Lodge County

**ORO FINO (Southern Cross)**—By recent addition of a 3-drill Ingersoll-Rand air compressor to electric hoist already in place, equipment of this mine is now complete for operations on a commercial scale. Regular shipments of gold ore will be made from this property, which is close to Southern Cross mine, owned and operated by Anaconda company.

## Silver Bow County

**CLARK-MONTANA REALTY CO. (Butte)**—Company has brought suit in equity in Federal court to quiet title to seven acres of placer ground against W. H. Ferguson and associates, who claim an interest in land. Placer is in southern portion of Butte district. Company claims to have purchased property July 28, 1909, from holders of original patent and therefore to hold a clear title in fee simple.

**ALICE VS. ANACONDA (Butte)**—Arguments were begun in Federal court at Helena June 25, after taking of testimony in suit brought by minority stockholders of Alice company to have annulled action of majority stockholders who transferred stock to Anaconda company, receiving Anaconda stock in payment. Senator Walsh, for plaintiffs, contends that transaction is in violation of Sherman anti-trust law and should therefore be declared void. According to estimates of complainants, stock involved is worth several million dollars.

**BUTTE-MILWAUKEE (Butte)**—At a special meeting of stockholders held June 29 sale of entire properties and assets of company for \$500,000 was authorized. Butte & New York company, a holding company, made an offer of \$500,000 for the Butte-Milwaukee. Butte & New York company is capitalized at \$4,000,000 and majority of stock is held by Butte & Superior company. Properties of Butte & New York company, when sale is consummated, will consist of ground adjoining Butte & Superior with a 1200-ft. shaft on it that connects with Butte & Superior underground workings. By contract last-named company is to carry on active development work in Butte-Milwaukee ground.

**BUTTE & LONDON (Butte)**—In response to a general demand by stockholders as to exact relation of company to Greendale Exploration and Rainbow Development companies, following statement has been given out by officers of company: "Though the company owns its property and has no debts, only a few thousand dollars in cash were in the treasury and the company was unable to raise new capital for necessary exploration and development work. There were, therefore, no prospects of a resumption of operations. Then the Rainbow Development Co., organized by Thomas F. Cole and others, offered to equip and develop the Butte & London properties in consideration of a stock interest in the company. As it was not practicable to recall a major portion of the Butte & London stock outstanding, the Greendale Exploration Co. was organized, and to it was transferred the property of the Butte & London Co." In payment for development work executed under contract by Rainbow company, latter is to receive 51% of stock of Greendale company. Every 60 days 50% of amount of Greendale stock Rainbow company is entitled to receive, proportionate to amount of development work done, is to be transferred. It is estimated that cost of installing electric hoist, power plant, pumps, etc., and unwatering shaft, sinking it to an additional depth of 500 ft., and crosscutting 2400 ft., will be approximately \$500,000. This means that Rainbow company is paying this sum for a 51% interest in Butte & London properties, and that the money is being used to equip and develop that property. John D. Pope, of North Butte company, under whose direction work is being done, states that shaft sinking will begin in six weeks.

**BUTTE & BACORN (Butte)**—This company was organized in 1906 and acquired title to 278 acres of land in northernmost section of Butte district. A shaft was started on Calumet ground which was held under option. In December, 1907, work was suspended for lack of funds. From that time on to 1910 various unsuccessful attempts were made to reorganize company and raise money to resume operations. Eventually an arrangement was effected whereby a mortgage for \$50,000 was placed on property, which provided funds for maintenance of property for one year. In October, 1911, property was turned back to directors. From October, 1911, to November, 1913, no work was done, but money was raised by Bacorn to purchase Calumet ground, on which main working shaft was started. Encouraged by recent revival of activity in northern part of Butte district, many plans for resumption of operations have been discussed. One was adopted and communicated in a circular letter sent to stockholders last January. According to this plan no stockholder is compelled to put up money or to pay an assessment, and each stockholder can exchange his stock at a valuation of 8c. per share for stock in the Great Northern Ore Co., which will be name of company after reorganization. It is believed that this arrangement will provide necessary funds for resumption of operations. New company is to start out by acquiring Calumet ground for \$150,000 of its own stock at par. It must have in treasury at least \$140,000. Syndicate putting up this money is to receive stock at par for this amount and will have right to buy at par remainder of all issued stock of Great Northern Ore Co. How much of this stock is to be issued will depend on how much is taken by Butte & Bacorn stockholders. Plan amounts to a half-interest being given up for enough money (\$670,000) to thoroughly develop property. Great Northern company will have a lease on Butte & Bacorn property, and any Butte & Bacorn stockholder can take his share of royalties or participate in profits of leasing company, just as he prefers. Lease for legal reasons stands now in name of F. W. Bacorn, but must be assigned to Great Northern company on organization of syndicate.

## NEVADA

## Churchill County

**SCOTIA MINING CO. (Terrell)**—Hoisting plant, destroyed by fire some time ago, will be rebuilt and development work will be continued.

## Douglas County

**LONGFELLOW MINING & MILLING CO. (Gardnerville)**—It is expected that mill will be in operation soon.

**WAR HORSE (Gardnerville)**—Negotiations for purchase of this property in Red Cañon by Oakland, Calif., men have been closed and work will start at once. Old 200-ft. incline shaft will be repaired and hoist installed. This property was operated successfully in early days.

## Elko County

**ELKO PRINCE (Gold Circle)**—It is reported that this property has been sold to an English syndicate. Former deal was not completed on account of death of head of company intending to purchase.

## Esmeralda County

**GREAT WESTERN CONSOLIDATED (Goldfield)**—Shaft is being retimbered between 300- and 500-ft. levels and from 50-ft. level to surface. When this work is completed and some repairs made, crosscutting south on 1125-ft. level will be started.

**JUMBO EXTENSION (Goldfield)**—Mine production has averaged 600 tons per week since ore has been milled at Goldfield Consolidated company's mill. It is hoped to increase production to 100 tons per day. Development work on Velvet claim through Polverde workings is progressing with satisfactory results.

**GOLDFIELD CONSOLIDATED (Goldfield)**—Company exercised June 25, its option on Aurora Consolidated Mines Co., of Aurora, Nev. Goldfield acquires 592,000 shares, or 87% of issued stock, for \$763,000, or \$225,000 less than original option which expired several weeks ago. Aurora consists of 52 patented claims in the Aurora camp, one of boom camps over 50 years ago. Mark Twain was a pioneer in first rush. Aurora began operations over a year ago, and it is estimated there are blocked out over 1,000,000 tons averaging \$5 per ton. Including mill, there has already been spent over \$300,000. New owners will shortly issue a statement giving details as to ore reserves.

## Humboldt County

**PLACER STRIKE IN LEONARD CREEK DISTRICT** is proving to be good. Best gravel has been found on Tepee Creek, a tributary to Leonard Creek. Prospecting to bedrock is greatly hampered by large flow of water.

**HUMBOLDT (Lovelock)**—Water has been struck at 115-ft. level in incline shaft and Huntington mill will be started.

## Lander County

**ACTIVITY IN McCOY**, a new gold camp in western part of county, is now showing. On J. H. McCoy ground, 15 subdivisions have been made for lessees, and several leases have been granted. Several other gold strikes have been made and over 300 claims have been staked.

## Mineral County

**GOLD-SILVER STRIKE NEAR SODAVILLE** has been made. Discovery was made in Calico Cañon, 2½ miles north of Sodaville.

**WAGNER AZURITE COPPER CO. (Luning)**—New copper-leaching plant is being operated and satisfactory results are being obtained. Iron has been used as a precipitant, and old railroad rails will now be tried, five tons having been purchased from Southern Pacific R.R.

## Nye County

**WHITE CAPS (Manhattan)**—Compressor and 75-hp. hoist have been installed. Sinking of vertical shaft will be resumed and other extensive development work done.

## Ormsby County

**CONTENTION OF TAX COMMISSION** that depreciation is not a legal deduction from value of gross yield of mines for purpose of determining net yield for assessment and taxation has been sustained by attorney-general.

## Storey County

**COMSTOCK PUMPING ASSOCIATION (Virginia City)**—Extensive changes are being made in ventilation and drainage system on 2500-ft. level of C. & C. shaft, which is following recommendations made by an arbitration committee appointed by Pres. William C. Ralston, of association. Repairs are also being made to Ophir shaft, used as upcast of northend Comstock mines, all of which will improve the physical conditions.

## NEW MEXICO

## Grant County

**GIPSY QUEEN MINING & DEVELOPMENT CO. (Animas)**—A new shaft will be sunk on south end of No. 1 claim, 500 ft. to water level.

**85 MINING CO. (Lordsburg)**—Four carloads of siliceous copper, gold and silver ore are being shipped via Lordsburg to Douglas, Ariz., daily. Foundations are being built for new machinery. Ore bins and tramway from mine are under construction. Company is increasing its output and is encountering good ore on lower levels. Contract has been awarded Scott Auto Co. for hauling ore from mine to railroad.

**RIO CHAMPA PLACER MINING CO. (Abiquiu)**—Extensive tests have been made on ground and property leased by Colorado men from Henry Grant, totaling 1700 acres. Company is going to install steam shovel, to work gravel on benches above river, of 1000 yards daily capacity. Water for washing gravel will be pumped to bench level. Installation of dredge is planned to work sands of Champa River.

## NEW YORK

## St. Lawrence County

**ST. LAWRENCE TALC CO.** (Natural Bridge)—This new company has lately increased its capacity by installing long, continuous-feed, tube mills to be used in connection with Hardinge conical mills. Tube mills are similar to those used in No. 6 talc mill of International Pulp Co. at Halesboro, N. Y.

**NORTHERN ORE CO.** (Edwards)—Zinc concentrator was destroyed by fire June 26, with a loss estimated at \$150,000. Building was a new one and elaborate concentrating machinery was result of two years of expensive experimenting for apparatus that would separate zinc blende and pyrites. Mill had only been running regularly a short time. Fire was discovered at 2 a. m. and is believed to have started from two barrels of lime. Loss is partially covered by insurance. It is said mill will be rebuilt. Company is controlled by Pilling & Crane, of Philadelphia. Underground developments of zinc deposits show unusually rich ore and a fair amount has been blocked out. Arrangements had been made to obtain power from a water-power company at South Edwards.

## Wayne County

**ONTARIO IRON ORE CO. vs. NEW YORK CENTRAL R.R.**—In this case, Interstate Commerce Commission has handed down an opinion that present rate of \$1.10 per gross ton for transportation of iron ore in carloads from Ontario region of New York to Emporium, Penn., and rate of \$1.60 per gross ton on same traffic to Earlston, Saxton, and Riddesburg, Penn., have not been shown unreasonable or unjustly prejudicial. Present rate of \$1.60 per gross ton to Curtin, Milesburg and Bellefonte, Penn., is, however, found unreasonable, and reduced to \$1.40 per ton. These places are in central part of Pennsylvania. At Fruitland and Ontario complainant owns and operates iron mines. Rates from both places are same and mining transportation conditions at both mines are similar. Ore is low-grade hematite, which is sold upon basis of guaranty of 44% iron. It comes in direct competition with Mesabi ore in Minnesota, which is sold upon a guaranty basis of 52½% iron. It is alleged by complainant that its ore also meets competition from Benson mines, in New York, which ore is shipped and sold as a concentrate under a guaranty of 65% iron. Benson mines are 150 miles northeast of Fruitland and on New York Central lines. Value of complainant's ore at points of destination is from \$3.80 to \$4 per gross ton; Mesabi ore is valued at same place at from \$4.15 to \$5.50 per ton; concentrates from Benson mines from \$5.50 to \$6.50 per ton. It costs complainant from \$1.50 to \$1.80 per ton to place ore on cars at its mines, and its cost of loading is greater than at Mesabi or at Benson mines.

## OREGON

## Baker County

**RED LEDGE** (Baker)—These claims have been taken over by an English syndicate, which will immediately start development work.

## Douglas County

**OLD PINEY MOUNTAIN NICKEL** (Riddle)—This company is contemplating installation of new machinery.

## UTAH

## Salt Lake County

**UTAH APEX** (Bingham)—During May gross receipts were \$66,153 and operating expenses \$37,836, leaving \$28,316 profits from operation. Deducting \$3288 for construction, net returns, exclusive of Eastern office expenses, \$25,033.

**MONTANA-BINGHAM** (Bingham)—This company's tunnel is in 3200 ft., and is now in Bingham Amalgamated ground. After passing through hard quartzite, face is again in softer, slightly mineralized ground. A vein carrying pyritic ore of medium grade was cut a short time ago, and will be driven on and prospected, when tunned has been completed.

**UTAH COPPER** (Bingham)—The May output was 13,616,933 lb. copper, as compared to 13,133,770 lb. in April, up to that time the record month. Grade of ore has improved, being 1.3411% copper during first quarter of 1914 as compared to 1.2165% in the last quarter of 1913. In April of this year ore ran 1.5% copper, and a recovery of 19.43 lb. per ton was made. According to reports an increase in dividend rate, after December of this year, is probable, on account of increased earnings.

**UTAH CONSOLIDATED** (Bingham)—A quarterly dividend of 50 c. per share, amounting to \$150,000, has been declared, payable July 27. On March 31, \$1 per share was paid, or \$300,000, making \$450,000 this year. Total of dividends paid by company will amount to \$9,550,000, or \$31 per share on 300,000 shares. Ore reserves at beginning of year were placed at 287,038 tons, averaging 1.9% copper, \$1 gold, and 0.7 oz. silver. There was also in reserve 51,409 tons of lead ore averaging 15.3% lead, 3.27 oz. silver, \$1.08 in gold, and 0.98% copper.

## Summit County

**PARK CITY** shipments for the first six months of 1914 were 33,225 tons; those for June amounted to 5622 tons, and during the week ended June 27 there were shipped 2,961,510 lb., largest week's output since February.

**SNAKE CREEK TUNNEL** (Park City)—Tunnel is in over 3000 ft., and daily progress of 12 to 14 ft. is being made. Two shifts are working.

**SILVER KING COALITION** (Park City)—This company is planning to sink its Silver Hill shaft several hundred feet from 255-ft. level, where it is in limestone. Bids are being advertised for. Ore of same character as that of large shoots opened on 900-ft. level has been found on 1100. Extent has not been determined.

**SILVER KING CONSOLIDATED** (Park City)—A winze from 1550-ft. level has been sunk 200 ft. This follows a bedded vein on its dip, and is in ore all way, with ore still strong in bottom. A new stope has been opened just above 1550 level near winze, which shows 4 ft. of high-grade carbonate-galena ore 40 ft. from mineralized fissure. Property is in excellent condition, 30 to 40 tons daily are being shipped, or 1000 tons per month. West drift on 1700 level, which is following fissure has begun to show strong mineralization.

## WASHINGTON

## Ferry County

**QUILP** (Republic)—After idleness of nearly two years this mine, one of the oldest developed properties in Republic, and first one located in the camp, will resume operations soon. Quilp originally was located as San Poil in 1896, subsequently relocated as Quilp, and later transferred to Quilp Gold Mining Co., which operated it 10 years, developing it extensively and paying \$22,500 in dividends. About 1½ miles of underground workings have been opened, attaining a depth of approximately 500 ft. Three years ago it was bonded to J. L. Harper, who transferred bond to Republic Mines Corporation, which afterward forfeited it. Immediately afterward the Republic Mines company sunk an incline shaft on Surprise claim, adjoining, drifting over to Quilp lines, and began extracting ore, which it claimed under apex rights. Quilp company carried matter into courts, and in November, 1912, secured an injunction restraining Republic company from operations in property. A further settlement with that company of litigation then pending, involving four separate suits, resulted in absolute title being obtained by Quilp company to disputed territory and also a part of the original Surprise holdings.

## WISCONSIN

## Zinc-Lead District

**PIERCE**—Alexander N. McMillan, of Platteville, has proved a strong range of zinc ore by extensive churn drilling on William Pierce farm of 200 acres, just south of Cleveland mine at Hazel Green; shaft sinking will be started at once.

## WYOMING

## Fremont County

**WYOMING COPPER CO.** (South Pass City)—Crosscutting on 500-ft. level is expected soon to cut vein.

**WORKING WONDER** (Miner's Delight)—Unwatering this old mine is in progress with view to resuming operations.

**X. L. (Lander)**—Ranchers have made complaint concerning mill tailings and property is closed pending litigation.

**IRISH JEW** (Grosvenor)—John Eilman has been doing development work for several months and now has ore ready for shipment.

**HELEN G.** (Lewiston)—A. E. Minium of Denver, Colo., has acquired this mine from James Anderson and has workmen developing mine and erecting mill.

## CANADA

## Ontario

**STRIKE AT SESEKINKA** was made by J. D. Smith and Labine Bros. while working on their claims one mile north of Sesekinika. There is an abundance of free gold, but most of it is found with telluride. A considerable amount of silver is also found. So far four veins ranging in width from 1 to 4 ft. have been uncovered for a distance of 1000 ft. First assay, made from ore containing no visible gold, showed \$1203 per ton in gold and \$123 per ton in silver. Since find was made great excitement has prevailed. Though country was staked for several miles around after discovery of placer gold on adjoining Maloof property last winter, yet crowds of prospectors are coming in to see if there is anything left for them. During the last nine years many claims have been staked and restaked here, but not till a year ago was gold discovered in encouraging quantities. Since then renewed interest has been taken, culminating in discovery of placer and telluride gold. Sesekinika now expects to become a mining town, not only on account of the gold find, but copper, nickel, zinc and lead are found there as well. Sesekinika is on height of land or watershed between Hudson Bay and Lake Huron. It is 1300 ft. above sea level, 300 miles north of Toronto and 60 miles east of Porcupine.

**NIPISSING** (Cobalt)—Profits for May were \$150,000. High-grade mill will increase amount of customs ore treated.

**HUNTER** (Kirkland Lake)—Diamond drills on this property are reported to have cut a large section of mineralized ground carrying low-grade gold ore.

**ONTARIO PORCUPINE GOLD FIELDS**—Report shows a debit to development and general expenditure of £38,056. Cash balance at Dec. 31, 1913, was £6668.

**MILLER LAKE-O'BRIEN** (Gowganda)—A new high-grade ore shoot has been opened on 250-ft. level. This property is earning \$250,000 net a year and is only property of much importance working in district.

**SOUTH THOMPSON** (Timmins)—This property has been purchased by an English syndicate and will be amalgamated with Krist adjoining, giving new company 128 acres in vicinity of Hollinger and Porcupine Crown mines.

## MEXICO

## Chihuahua

**AMERICAN SMELTING & REFINING CO.**—Only obstacle to immediate opening of plant at Chihuahua is difficulty of obtaining adequate transportation for materials and supplies, as most rolling stock of Northern Mexico is in southward movement of constitutional army. As company enjoyed excellent traffic relations while operating under Villa's protection before last shutdown, it is expected necessary traffic arrangements will be made. Since company ordered its men to leave Mexico it has not been in direct communication with its Mexican properties, but reliable reports from outside sources state that little damage has been done. Evacuation of Aguascalientes by federals brings last of company's plants into constitutionalist territory.

## Sonora

**GREENE-CANANEA**—Mexican employees numbering 2500 went on strike July 1, their demands being 25% increase in wages, 20% reduction in prices of various commodities at company's general store and a weekly payday. Protests were made against establishment of a so called labor bureau and maintenance of a black list. It is reported that on advice of local Mexican officials, officers of company will at least temporarily grant demands to avoid further trouble.

# The Market Report

## METAL MARKETS

NEW YORK—July 8

More activity is evident in the metal markets, with some increase in buying and increased firmness of prices; in some cases actual advances.

### Copper, Tin, Lead and Zinc

**Copper**—During the past week the market has been firm and active. A large business has been consummated, estimated in the trade to amount to about 75,000,000 to 100,000,000 lb. The bulk of the purchases was made by European buyers, who purchased for shipment over the next three months. American consumers also bought some fair quantities, for early shipment, but it is reported that there is still considerable near-by copper to be covered.

With the stimulus of this large buying the price naturally advanced, but the upward movement was not quite so impressive as was heralded on the tickers. The producers, who had been pressing copper for sale but a few days previous, began to dangle asking prices over the heads of buyers, which gave them a chance to knock off 1/8c. or so in trading. On Tuesday and Wednesday, 13 3/4c., delivered, usual terms, was asked, but copper in large quantity was to be had at 13 3/4c.

On July 7 the Calumet & Hecla was reported as raising the price for its special brand from 14c. to 14 1/4c.

The average of electrolytic quotations for the week is 13.465 cents.

The report of the Copper Producers' Association for June showed an increase of about 22,000,000 lb. in the stock. Certain producers characterized the June report as "a good one." An outsider inquired, "What would have been a bad one?"

The London market has also been strong. On July 2, spot standard was £61 12s. 6d., and three months £62. On Monday, July 6, spot advanced to £62 10s., and three months to £62 17s. 6d. On realizations the market eased off somewhat, on Tuesday spot going to £62 5s., and three months to £62 12s. 6d. On July 8, spot closed at £62 6s. 3d., and three months at £62 12s. 6d. per ton.

Base price of copper sheets is now 19c. per lb. for hot rolled and 20c. for cold rolled. The usual extras are charged and higher prices for small quantities. Copper wire is 14 1/2 @ 15 1/2c. per lb., carload lots at mill.

Copper exports from New York for the week were 8958 long tons. Our special correspondent reports exports from Baltimore for the week at 3673 tons.

Imports of copper in Germany five months ended May 31 were 99,785 tons; exports, 2969 tons; net imports, 96,819 tons, an increase of 1214 tons over last year. Of the imports this year 87,684 tons were from the United States.

**Visible Stocks of Copper in Europe** on June 30 are reported as follows: Great Britain, 14,720; France, 5740; Rotterdam, 3050; Hamburg, 3480; Bremen, 1080; other European ports, 600; total, 28,670 long tons, or 64,220,800 lb. This is an increase of 1410 tons over June 15. In addition to the stocks as given 1650 tons are reported afloat from Chile and 3550 from Australia, a total of 5200 tons, or 1050 tons than on June 15. The total on June 30, including copper afloat, was 33,870 tons.

**Tin**—The improvement in sentiment, which found expression in a much better market for metals generally, has also not failed to have an effect on tin. The efforts of buyers to depress prices having entirely ceased, the market became strong and advanced from day to day in an orderly fashion. The favorable statistics published at the beginning of this month were also an assisting factor. Consumers in this market who have bought liberally at the lower levels, have desisted from purchasing additional quantities, and the business, which some days last week was very active, was mostly between dealers. The market did not hold its entire advance, but closes steady at £146 5s. for both spot and three months, and about 32c. for July tin here.

**Visible Stocks of Tin on June 30** are reported as follows: London, Straits and Australian, 7657; other kinds, 3080; total London, 10,737; Holland, 1188; United States, excluding Pacific ports, 4102; total, 16,027 long tons, which is a decrease of

1835 tons as compared with May 31, but an increase of 4926 tons over June 30, 1913. The stocks include tin afloat.

**Lead**—The market is quiet with somewhat lower offerings of Western lead, St. Louis being quoted 3.72 1/2 @ 3.75c. New York is unchanged at 3.90 cents.

The London market is quiet, Spanish lead being quoted £19 7s. 6d.; English lead 2s. 6d. higher.

**Spelter**—The market is featureless and remains quiet at last prices, 4.75 @ 4.80c. St. Louis and 4.90 @ 4.95c. New York.

The London market is a trifle easier, good ordinaries being quoted £21 10s. and specials £22 5s. per ton.

Base price of zinc sheets is now \$7 per 100 lb., f.o.b. Peru, Ill., less 8% discount, with the usual extras.

### DAILY PRICES OF METALS

#### NEW YORK

July	Sterling Exchange	Silver, Cts. per Oz.	Copper		Tin		Lead		Zinc	
			Electrolytic, Cts. per Lb.	Cts. per Lb.	New York, Cts. per Lb.	St. Louis, Cts. per Lb.	New York, Cts. per Lb.	St. Louis, Cts. per Lb.		
2	4.8750	56 1/2	@ 13.30 @ 13.35	31	3.90	3.72 1/2 @ 3.77 1/2	4.90 @ 4.95	4.75 @ 4.80		
3	4.8760	56 1/2	@ 13.30 @ 13.40	31 1/2	3.90	3.72 1/2 @ 3.77 1/2	4.90 @ 4.95	4.75 @ 4.80		
4	.....	.....	.....	.....	.....	.....	.....	.....		
6	4.8765	56 1/2	@ 13.35 @ 13.55	32 1/2	3.90	@ 3.72 1/2 @ 3.75	@ 4.90 @ 4.95	@ 4.75 @ 4.80		
7	4.8770	56 1/2	@ 13.55 @ 13.65	32	3.90	@ 3.72 1/2 @ 3.75	@ 4.90 @ 4.95	@ 4.75 @ 4.80		
8	4.8770	56 1/2	@ 13.55 @ 13.65	32	3.90	@ 3.72 1/2 @ 3.75	@ 4.90 @ 4.95	@ 4.75 @ 4.80		

The quotations herein given are our appraisal of the markets for copper, lead spelter and tin based on wholesale contracts; and represent, to the best of our judgment, the prevailing values of the metals specified as indicated by sales by producers and agencies, reduced to basis of New York, cash, except where St. Louis is given as the basing point. St. Louis and New York are normally quoted 0.15c. apart.

The quotations for electrolytic copper are for cakes, ingots and wirebars. Electrolytic copper is commonly sold at prices including delivery to the consumer. To reduce to New York basis we deduct an average of 0.15c. representing delivery charges. The price of electrolytic cathodes is usually 0.05 to 0.10c. below that of electrolytic; of casting copper 0.15 to 0.25c. below. Quotations for lead represent wholesale transactions in the open market for good ordinary brands. Quotations for spelter are for ordinary Western brands. Silver quotations are in cents per troy ounce of fine silver.

Some current freight rates on metals per 100 lb., are: St. Louis-New York, 15c.; St. Louis-Chicago, 6c.; St. Louis-Pittsburgh, 12c.; New York-Bremen or Rotterdam, 15c.; New York-Havre, 16 @ 17c.; New York-London, 16c.; New York-Hamburg, 18c.; New York-Triests, 22c.

#### LONDON

July	Copper						Tin		Lead		Zinc	
	Silver	Spot		3 Mos.	Best Sel'td	Spot	3 Mos.	£ per Ton	Cts. per Lb.	£ per Ton	Cts. per Lb.	
		£ per Ton	Cts. per Lb.									
2	25 1/8	61 1/2	13.39	62	65 1/2	140 1/2	141 1/2	19	4.13	21 1/2	4.67	
3	26 1/8	61 1/2	13.39	62	66	143	144 1/2	19	4.13	21 1/2	4.67	
4	26	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
6	25 1/2	62 1/2	13.58	62 1/2	66	146	147 1/2	19 1/2	4.18	21 1/2	4.67	
7	25 1/2	62 1/2	13.52	62 1/2	66	145	146 1/2	19 1/2	4.18	21 1/2	4.67	
8	25 1/2	62 1/2	13.54	62 1/2	66	146 1/2	146 1/2	19 1/2	4.21	21 1/2	4.67	

The above table gives the closing quotations on London Metal Exchange. All prices are in pounds sterling per ton of 2240 lb., except silver which is in pence per troy ounce of sterling silver, 0.925 fine. Copper quotations are for standard copper, spot and three months, and for best selected, price for the latter being subject to 3 per cent. discount. For convenience in comparison of London prices, in pounds sterling per 2240 lb., with American prices in cents per pound the following approximate ratios are given: £10 = 2.17c.; £15 = 3.26c.; £25 = 5.44c.; £70 = 15.22c. Variations, £1 = 0.21c.

Other Metals

**Aluminum**—The market continues slow. Sales are not large and there is some competition for business. Quotations are unchanged at 17½@18c. per lb. for No. 1 ingots, New York. The foreign market is also quiet.

**Antimony**—Business is quiet, but prices are firm and unchanged. Ordinary brands—Hungarian, Chinese, etc.—are 5.65@5.90c. per lb. Cookson's is 7.15@7.35c. per lb., with 6.90@7c. asked for other special brands.

**Quicksilver**—The market has been rather slow, both here and in London. Prices are nominally unchanged, but are inclined to be soft. New York quotation is \$37.50@38.50 per flask of 75 lb., with 54@55c. per lb. quoted for jobbing lots. San Francisco, \$37.50 per flask, with about \$2 less for export. London, £7 per flask, with £6 17s. 6d. quoted by second brands.

Gold, Silver and Platinum

**Gold**—Demand for gold is still active abroad, but does not reach the point of paying a premium. The price in the open market in London was 77s. 9d. per oz. for bars. The outward movement from New York has ceased for the present, but many believe it will be renewed very soon.

**Gold in the United States** July 1, as estimated by the Treasury Department: Held in Treasury against gold certificates outstanding, \$1,080,974,869; in Treasury current balances, \$195,381,761; in banks and circulation, \$614,321,674; total, \$1,890,678,304. This is a decrease of \$40,663,805 during June.

**Platinum**—The market is still quiet, but is steady. Dealers ask \$43@44 per oz. for refined platinum, and \$46@51 per oz. for hard metal, according to grade. The foreign market is reported a little more active and inclined to lower prices.

Our Russian correspondent writes, under date of June 24, that demand has been reduced and the market is weaker. Prices are easier, quotations being 9.50 rubles per pood at Ekaterinburg for crude metal, 83% platinum; 36.500 rubles per pood for the same grade at St. Petersburg; equal to \$35.72 and \$35.77 per oz., respectively. Stocks have increased, but are still smaller than is usual at this season.

**Silver**—The market has continued very narrow, fluctuating between 25½ and 26½d. There has been a small but continuous demand from India, while China has been a moderate seller. The market closes quiet but steady at 25½d. in London.

Shipments of silver from London to the East, Jan. 1 to June 25, as reported by Messrs. Pixley & Abell:

	1913	1914	Changes
India.....	£3,653,600	£3,875,000	I. £221,400
China.....	344,500	40,000	D. 304,500
<b>Total.....</b>	<b>£3,998,100</b>	<b>£3,915,000</b>	<b>D. £83,100</b>

Stocks in London have been reduced to £550,000 by shipments to India and to the European Continent.

Zinc and Lead Ore Markets

JOPLIN, MO.—July 4

Blende is \$42 high, a decline of \$2 per ton, the base being \$38@40 per ton of 60% zinc. The metal base range is \$36.50@38. Calamine sold down to \$21 early in the week, selling stronger at the close at \$22@23 per ton of 40% zinc. The average selling price of all grades of zinc is \$36.40. Lead sold as high as \$48.50 per ton on a base of \$46 per ton of 80% metal content, and the average of all grades is \$45.72 per ton.

SHIPMENTS WEEK ENDED JULY 4.

	Blende Calamine		Lead	Values
Totals this week..	9,061,590	1,920,320	1,887,150	\$243,040
Totals 27 weeks..	278,338,670	20,162,980	48,088,890	\$6,847,585
Blende value, the week,	\$178,640;		27 weeks,	\$5,464,530.
Calamine value, the week,	\$21,250;		27 weeks,	\$229,655.
Lead value, the week,	\$43,150;		27 weeks,	\$1,153,405.

PLATTEVILLE, WIS.—July 4

The base price paid this week for 60% zinc ore was \$40 per ton. The base price paid for 80% lead ore was \$46@47 per ton.

SHIPMENTS WEEK ENDED JULY 4

	Zinc ore, lb.	Lead ore, lb.	Sulphur ore, lb.
Week .....	2,897,060	80,000	.....
Year .....	76,640,400	2,862,610	20,708,330

Shipped during week to separating plants, 3,209,280 lb. zinc ore. The net shipment of zinc ore to smelters for the first six months of 1914 showed an increase of 923,650 lb. over the corresponding period of last year.

IRON TRADE REVIEW

NEW YORK—July 8

The iron and steel markets are showing a better tone, though some large interests seem to think it policy to keep up the cry of depression.

**Southern Pig Iron Rates** will be reduced by the decision of the Interstate Commerce Commission on the complaint of the Sloss-Sheffield Steel & Iron Co. The decision finds that rates now charged from Alabama furnaces to Louisville, St. Louis, Chicago and Boston are unreasonable and should be reduced. This also applies to rates to interior New England points. Proportional rates to the Ohio River are maintained, because any change would throw the entire reduction on the Southern lines. No opinion is expressed on the differentials between all-rail and rail-and-water rates to Eastern points. The decision directs that rates shall be revised so that the charge from Birmingham to Chicago shall not exceed \$4 per gross ton, with other rates in proportion. The reduction involved will be from 35c. to 45c. per ton.

PITTSBURGH—July 7

July, which is usually a very dull month in the iron and steel markets, bids fair this time to maintain the record of activity established by June. While in some quarters orders have been slightly reduced the past two business days, the change is ascribed to the holiday and the general prediction is that buying will continue through the month at the June rate, with prospects of a further improvement in August. It is conceded on all hands as practically assured that the second half of the year will show much heavier buying and considerably greater production than the first half, but the opinion is equally strong that there will be little improvement in prices. There is no expectation that prices will decline further, but recovery from the present low and almost unprofitable level is expected to be slow. There have been no noteworthy declines in three or four weeks, but the efforts of mills to secure advances over prompt prices for third quarter and latter half contracts have met with little success. In merchant steel bars some of the mills have yielded to the demand of buyers and have closed contracts at the present market for prompt.

For prompt shipment the market is well established at 1.10c. for bars, plates and shapes; \$1.50 for nails, 1.80c. for black sheets and 2.75c. for galvanized sheets.

A week ago three of the independent sheet and tinplate mills which operate union signed the Amalgamated Association wage scale. The other union mills closed for last week, but in a conference which ended Friday night an agreement was reached on the basis of the old scale. If any concession had been granted the mills previously signing would have gotten the benefit. The union sheet and tin mills comprise less than 20% of the total in the country.

Steel mill operations continue at the rate of about 65% of capacity, a slightly better rate than obtained at the close of May. Very few mills have closed for repairs, and the union sheet and tin mills which closed are resuming again.

**Pig Iron**—The sale of 10,000 tons of basic iron, mentioned briefly in telegram of last Wednesday, was made by the Shenango Furnace Co. (the Snyder interest) to the American Steel Foundries, delivery August, September and October in equal proportion to the Sharon and Alliance works, at an average price of \$13, Valley furnaces. Two or three other sales of basic are mentioned, but without details being divulged. The interest mentioned recently sold 35,000 tons of off basic to the Wheeling Mold & Foundry Company, delivery over two years, for East River tunnel segments. This iron is to run not over 0.50% in phosphorus, 0.05% in sulphur and 2.50% in silicon, an analysis which will cover the bulk of off iron made by a furnace normally running on basic. Bessemer iron continues quiet, but makers regard both basic and bessemer now well established in price and look for slight advances in the near future. Foundry iron is selling fairly well in small lots. We quote: Bessemer, \$14; basic, malleable and No. 2 foundry, \$13; forge, \$12.50 to \$12.75, at Valley furnaces, 90c. higher delivered Pittsburgh, but it is to be noted that one or two furnaces having 75c. freight to Pittsburgh would sell foundry at \$13 at furnace.

**Ferromanganese**—The market continues quiet, as consumption is not heavy and consumers are well covered. The regular price is \$38, Baltimore, with \$2.16 freight to Pittsburgh, but occasionally small lots are picked up at a 50c. concession.



Assessments

Table with columns: Company, Delinq., Due, Amt. Lists various companies and their assessment details.

Monthly Average Prices of Metals

SILVER

Table showing monthly average prices for Silver in New York and London from 1912 to 1914.

New York quotations cents per ounce troy, fine silver; London, pence per ounce, sterling silver, 0.925 fine.

COPPER

Table showing monthly average prices for Copper in New York and London from 1913 to 1914.

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

TIN

Table showing monthly average prices for Tin in New York and London from 1913 to 1914.

New York in cents per pound; London in pounds sterling per long ton.

LEAD

Table showing monthly average prices for Lead in New York, St. Louis, and London from 1913 to 1914.

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

SPELTER

Table showing monthly average prices for Spelter in New York, St. Louis, and London from 1913 to 1914.

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

PIG IRON IN PITTSBURGH

Table showing monthly average prices for Pig Iron in Pittsburgh from 1913 to 1914.

STOCK QUOTATIONS

Table of stock quotations for COLO. SPRINGS and SALT LAKE, listing company names and bid prices.

TORONTO

Table of stock quotations for Toronto, listing company names and bid prices.

SAN FRANCISCO

July 7

Table of stock quotations for San Francisco, listing company names and bid prices.

N. Y. EXCH.

Table of stock quotations for New York Exchange, listing company names and bid prices.

BOSTON EXCH

Table of stock quotations for Boston Exchange, listing company names and bid prices.

N. Y. CURB

Table of stock quotations for New York Curb, listing company names and bid prices.

BOSTON CURB

Table of stock quotations for Boston Curb, listing company names and bid prices.

LONDON

Table of stock quotations for London, listing company names and bid prices.

†Last Quotations.