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# The Engineering and Mining Journal

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## Ore Treatment at the Argo Mill

BY A. H. ROLLER\* AND H. T. CURRAN†

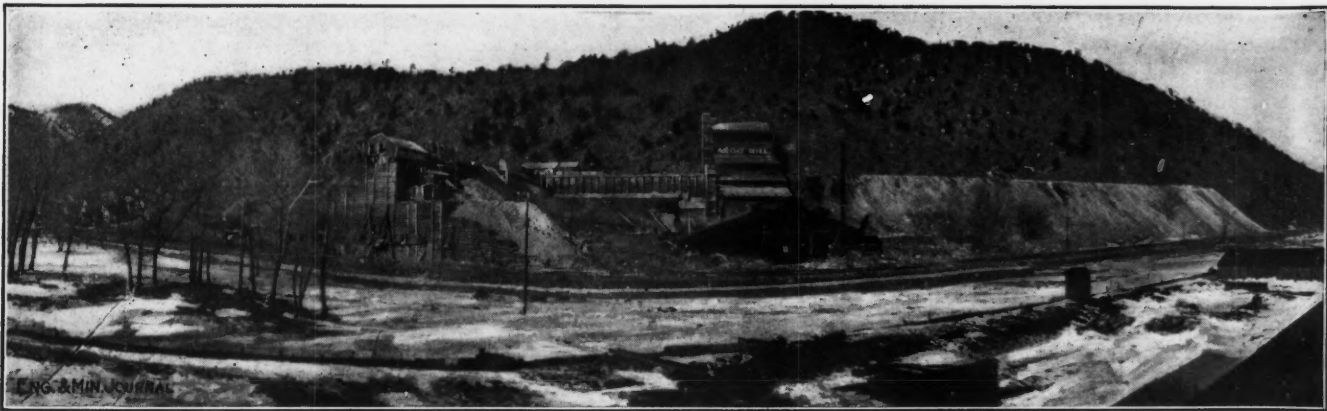
*SYNOPSIS*—A mill for treating the custom ores of the Idaho Springs district of Colorado, in which the principal features are amalgamation in cyanide solution, concentration, continuous agitation of slimes and rejection of concentrated sand. Continuous decantation of slime is followed and the residue is dewatered in a Portland filter. Electrolysis proved the best way of avoiding the action of reducing agents.

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The Argo mill started operations Apr. 1, 1913, and much interest has been manifested in it since that time. With several changes and additions it has proven its

### RECEIVING CRUDE ORES

The receiving bins, 22 in number, with a total capacity of 1600 tons, are connected with the tracks of the Argo (Newhouse tunnel). The cars from the tunnel, carrying three tons each, are run, three at a time, into a revolving tippie, mounted on a movable carriage, all self-contained, and moving on a track over the top of the receiving bins, so that the ore can be dumped where desired. All ores are crushed, sampled and purchased from the shipper upon assay value on a stated schedule, after which they are stored and treated at the convenience of the company.



THE ARGO MILL, IDAHO SPRINGS, COLO.

worth. Rejection of the sands after concentration, the use of an electric cell to compensate the effects of reducing agents, and the addition of ammonium salts, are the three distinctive features which have helped make possible the successful application of the cyanide process on the refractory low-grade sulphides of this district. Aside from the possible elimination of amalgamation, or a change in the manner of practicing it, a successful system is established in the Argo mill, and any future changes will be small details governed by convenience and not by a distinctive metallurgical change.

The ores treated are complex sulphides concentrating 4.9 tons into 1. The average heads for the first six months' period assayed 0.25 oz. gold; 3.01 oz. silver; 0.60% copper; 0.75% lead. The construction of the plant throughout is of steel and concrete, with the exception of wood for the ore bins.

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### CRUSHING AND SAMPLING

Running along the bottom of the 22 receiving bins, is a 24-in. Jeffreys pan conveyor, which delivers the ore over a 1½-in. grizzly into a No. 4 Gates gyratory crusher, dropping by gravity through three Snyder samplers, each taking out a 20% cut. Between each sampler the ore is re-crushed, once by a Eureka crusher and once by a set of rolls. The final sample is sent to the bucking room, where four pulps for assay are used. Twenty per cent. of the ore is retained for resample until final settlement is made with the shipper. The balance of the ore goes to two 50-ft. elevators and is discharged onto a 24-in. conveyor belt, with reversible tripper, distributing in the 1600-ton storage bin at the top of the mill. The elevators are of 14-in. Jeffrey belt with 5x7-in. malleable buckets set staggered, 7-in. centers. So far this arrangement has proved satisfactory.

The sampling plant uses four men on shift, and handles



from 100 to 200 tons per nine hours, according to the physical condition of the ore. Power is furnished by three electric motors using a total of 35.5 hp. Total costs in the sampling department amount to from 20c. to 25c. per ton of crude ore.

STAMPING AND CONCENTRATING

From the 1600-ton bin, improved Challenge feeders deliver this ore to twenty 1050-lb. stamps, in two batteries of 10 each, making 110 drops per minute through 6 in. Stamp crushing is done in 1/2-lb. cyanide solution, using from five to six tons of solution to one of ore, with a cyanide consumption of 1/2 lb. per ton of ore. Twelve-mesh woven-wire screens are used on the batteries, the stamp duty being over six tons per stamp-day, or a total of over 120 tons per 24 hr. The pulp from the stamps flows over four 48x54-in. copper plates. So far amalgamation in cyanide solution has not proven the success that was expected of it. The reasons are discussed later.

After passing the plates the pulp is led to a duplex Dorr classifier, where the overflow slimes are removed, running to a 4x4-ft. spitzkasten, followed by a 14x22-ft. Dorr thickener, while the sands from the classifier are dewatered and delivered to a distributing barrel for table concentration. Solution titrating about 1/2 lb. cyanide is here mixed with the sands to give them the right consistency for proper table work.

There are five standard Card tables now used for the first sands concentration, with provision for installing a sixth table on the same floor. Two finished products are cut out on these tables, a lead and an iron concentrate. The middlings flow by gravity to a 4x10-ft. Stearns-Roger tube mill and a half-size simplex Dorr classifier, operated in a closed circuit. This is made possible without pumping by an extra large scoop for feeding the tube mill.

Sands from the middlings table join the sand tails from the first five tables and flow by gravity to a three-compartment Dorr dewatering and washing machine. The pregnant solution with the small percentage of colloidal slimes contained with the sands is removed in the first compartment. This product flows into a 12x20-ft. Dorr thickener, the clear overflow from which is pumped back to the head of the mill. The thickened underflow from it is lifted by a diaphragm pump into No. 1 agitator, a 12x20-ft. Dorr machine. In the second and third compartments, respectively, of the triplex Dorr classifier, a barren solution and a water wash is given the sands, which are then discharged at 15% moisture, carrying a trace in KCN and dissolved values, and run to waste as tailings, thus eliminating on an average of 56% of the mill tonnage without further treatment. Under normal conditions the gold extractions in the sands averages 90% and the silver well above 85%. The character and grade of the ore treated would make further handling a losing commercial treatment in a mill of this size.

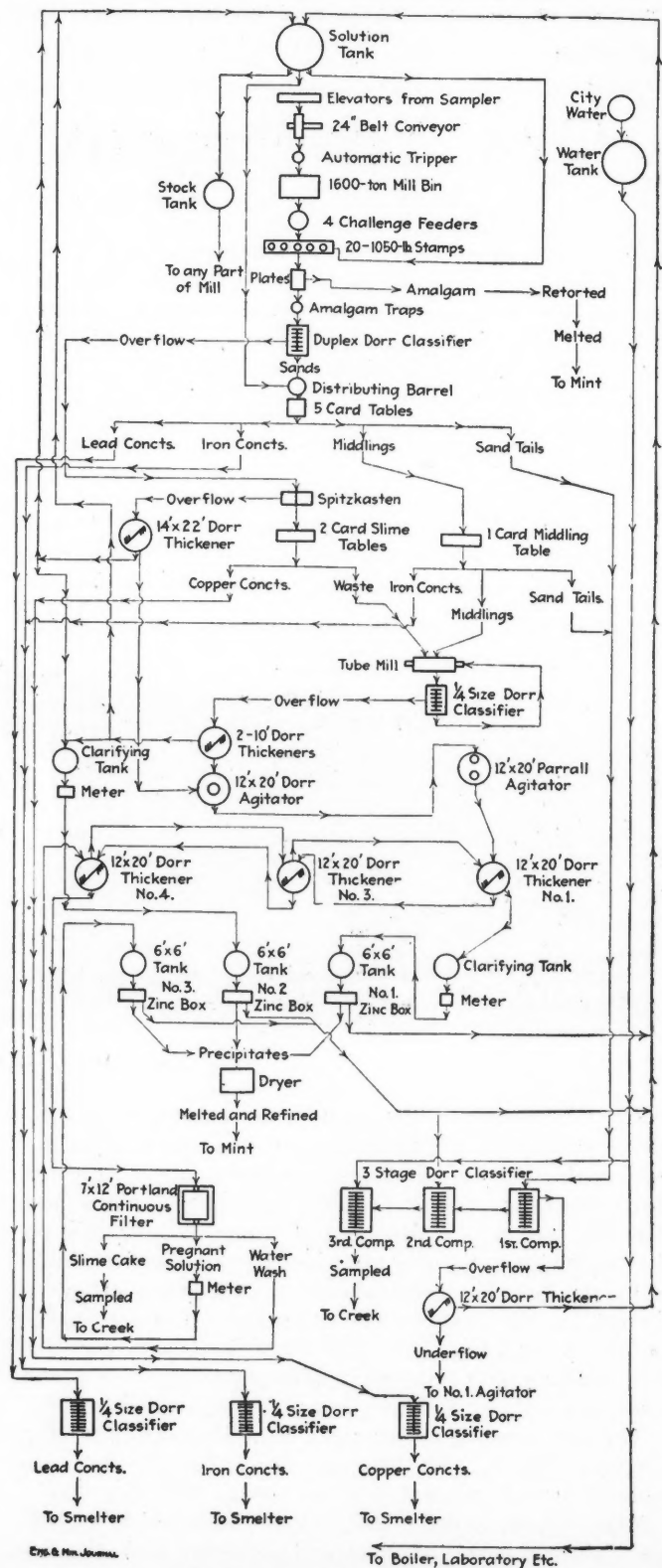
TREATMENT OF SLIMES

A 3/4-in. spigot underflow from the spitzkasten is concentrated on two Card slime tables, placed on the same floor as the middling table. A clean concentrate is here cut out and shipped as a copper product, thus eliminating a large percentage of the copper before agitation and contact with the stronger solutions. This spigot underflow also removes 90% of the +200-mesh product

from the slimes entering the spitzkasten. The whole remaining product from the above two tables gravitates to the tube-mill circuit, together with the middlings from the middling table. The slimes from this classifier have a screen analysis as follows:

	Per Cent.
+150.....	1.0
+200.....	5.0
-200.....	94.0
Total.....	100.0

They flow to two 10-ft. Dorr thickeners operated in tan-



FLOW DIAGRAM OF ARGO MILL

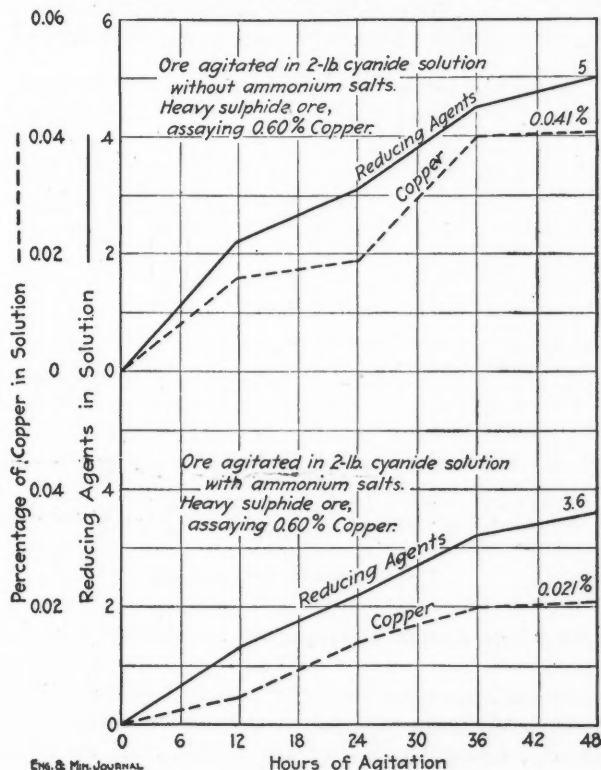


dem. The thickened overflow from these tanks flows to the Dorr agitator. The clear overflow can either be sent to precipitation via the clarifying filter, a simplex excelsior filter, or may be pumped directly to the head of the mill.

The overflow from the 14x22-ft. Dorr thickener is handled through the same channels as the overflow from the 10-ft. thickeners. The underflow, which is thickened to about 34% solids, and has the screen analysis given in the following table, goes to the Dorr agitator.

	Per Cent.
+ 80 .....	Trace
+ 100 .....	0.5
+ 150 .....	1.75
+ 200 .....	4.75
- 200 .....	92.5
Total .....	99.50

The combined pulp entering for agitation comprises about 26% of the mill tonnage. The underflow from the 10-ft. Dorr thickeners is considerably more dilute than the



EFFECT OF AMMONIUM SALTS

underflow from the other thickener, and will thin the total pulp agitated to 2½ of solution to 1 of dry slimes. This is made up to 1½ lb. cyanide and 0.6 lb. lime per ton of solution in the No. 1 or Dorr agitator, which is connected in continuous agitation with a 12x20-ft. Parral agitator. The cyanide consumption passing these two agitators is about ½ lb. per ton of slimes.

The overflow from the Parral tank passes to Dorr No. 1, the first of a series of three 12x20-ft. thickeners, arranged for continuous decantation, the underflow pulp being passed on by Goulds diaphragm pumps, while the returning clear overflows run by gravity.

The water used for washing the sands on the third deck of the triple Dorr classifier is raised 2 ft. by an air lift, and used as a wash for the last thickener. The barren solution used to wash the sands on the second deck, flows by gravity to the second thickener, and is here used as a wash. The clear overflow from the first thickener is sent

to zinc-box precipitation by way of an excelsior clarifying filter.

Under first arrangements, the underflow from the last Dorr thickener was concentrated on two Card slime tables, making a clean mineral, and the balance sent to the slime filter for final treatment. But this arrangement proved useless, as the amount and value of the mineral made was not worth considering. Therefore, the thickened underflow, 35 to 40% solids, is pumped by a diaphragm pump direct to a 7½x12-ft. Portland continuous-type drum filter, which is given a barren solution and a water wash, and from which the pregnant solution is combined with the barren solution wash by both being pulled through a 12x10-in. Gould vacuum pump, and then returned to the head of the mill, or passed first through an available zinc box if desired. The wash water is passed through the filter by a 4x6-in. triplex pump and used as a wash for the last Dorr thickener. The discharged slime cake, containing 0.20 lb. KCN and 10c. in dissolved values, falls into a launder and is sluiced into the creek.

SOLUTIONS AND PUMPS

There are generally two different strengths of solutions going to precipitation. The strong heads, being the overflow from the first Dorr thickener following the agitators, titrates above 1 lb. KCN, and carry 60c. to \$1 in gold and silver. The weak heads, being either the overflow from the two 10-ft. thickeners behind the tube mill, or the 14x22-ft. thickener below the batteries, titrate about ½ lb. KCN and carry 30c. to 60c. in gold and silver. The zinc-box tails assay from 4c. to 8c. A portion of the weak tails is used as wash in the sand-tails classifier and slime thickeners, the balance joining the strong tails and being sent to the head of the mill.

The feed tank at the head of the mill is divided into three compartments simply as a device to keep the table washes clear in case of temporary muddying of solutions below. They are connected and any overflow is automatically taken care of, running back to a 12x20-ft. stock tank set on the table floor, where it can be discharged to nearly any part of the mill.

A general mill sump is located on the lowest floor, so as to receive by gravity the spills from any part of the mill, and a 2-in. centrifugal pump returns any such solution to the stock tank.

All other pumps are Goulds triplex power machines. The three return pumps located on the lower floor are so connected that in case one is overloaded, the excess solution is automatically taken care of by the others and the system kept in balance. The Goulds diaphragm pumps transferring slimes give excellent service, the only real expense being a new diaphragm on an average of once a month, taking only 20 minutes to change.

Precipitation is by zinc shavings, both weak and strong solutions being precipitated in the usual way. The boxes are cleaned up every two weeks. Anything not passing a 30-mesh screen is put back. After drying, the precipitate is smelted direct without acid treatment. A No. 60 crucible in a Case oil tilting furnace is used.

HEATING THE SOLUTIONS

The solutions throughout the mill are warmed by a 70-hp. boiler, under 40 lb. pressure, from which lead two lines, the first going through radiators on the battery

floor, thence through coils in the 14x22-ft. Dorr thickener and discharging the condensed water into the last compartment of the sand-tailings classifier, and the second a line going through coils in the three thickeners following agitation, discharging into the last. No other heat is used in the mill, except one line of steam going to radiators in the superintendent's office, a radiator at the solution man's titrating desk and radiators in the bucking room of the sampling department. An appreciable increase in extractions is shown by keeping the solutions above 60° F.

Lime is added at three places in the mill; the amount is varied and is regulated according to the ore treated. A small amount of slacked lime is first added at the batteries with the feed solution. Over the 14x22-ft. thickener a continuous lime feed is made from a common whiskey barrel, mounted on a shaft, and belt-driven, filled with crushed lime. The barrel makes 6 r.p.m. and the feed is regulated by adjusting a slide over a small rectangular opening. A few small tube-mill pebbles are placed in the barrel, keeping the discharge opening free. The balance of the lime is fed by slacking it in the water used to wash the last thickener.

As already mentioned, enough cyanide is added at the Dorr agitator to bring the solution up to the desired strength. Just enough cyanide is added at the tube mill to keep the weak solution at 1/2 lb. per ton at zinc-box head.

The ammonium salts are added at the Dorr agitator, as experience has shown the zinc boxes will be kept free from precipitated copper by so doing, and the salts have the effect of increasing the extraction. The accompanying curves, Fig. 2, show the experimental results of the use of ammonium salts on the copper and reducing agents.

#### ELECTROLYSIS OF SOLUTION

An interesting feature of the treatment is the use of electrolytic oxygen to overcome the effect of reducing agents. It is according to a modification of the method advocated by T. H. Aldrich, Jr., of Birmingham, Ala. The accompanying curve, Fig. 3, gives the reducing power of the solutions with and without the cell installed. A hard-rubber cell, containing fifty 4x5-in. lead plates 1/8 in. in thickness and 1/2-in. centers, is placed in the head compartment of each zinc box. A 110-volt alternating current is used, and the cost if this current is less than 1c. per ton of crude ore milled.

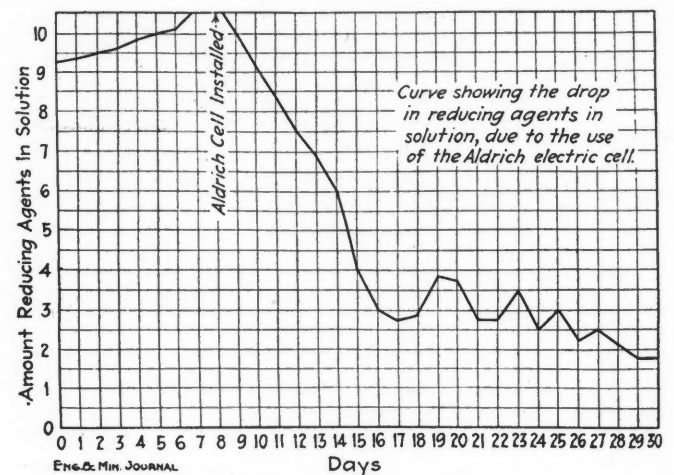
Lead salts in varying quantities have been used to offset the reducing agents, and while they had the desired effect, it was at a cost far greater than the Aldrich electric cell. Litharge was also tried in the tube mill and agitators as a possible aid to silver extraction, but showed absolutely no assistance. Precipitation, however, is materially assisted by dipping the zinc in a weak solution of lead acetate.

#### HANDLING CONCENTRATES

The three concentrate bins, one for each product, are placed on the lower floor so located that the concentrates can be weighed and wheeled into railway cars for shipment. Each class of concentrates from the upper floors gravitate to a one-fourth-size simplex Dorr classifier, placed over the bins and used as a dewaterer. The concentrates are discharged from the classifiers, averaging 12% moisture, on a sloping cement floor, allowing fur-

ther solution to drain off to the general mill sump. The concentrates are sold under contract to the Globe plant of the American Smelting & Refining Co., at Denver.

The total milling process requires about 110 actual hp. outside the sampling department. The mill is electrically driven throughout. Each 10-stamp unit is belted directly to a 25-hp. back-gear motor. A 25-hp. motor drives the balance of the upper part of the mill, which includes eight Card tables, one duplex Dorr classifier, one one-fourth-size classifier, one distributing tub for table feeds, one 4x10 tube mill, three Dorr thickeners, one set 6x6-in. rolls for lime crushing, and the lime-feed barrel. A 20-hp. motor is directly belted to a 14x8-in. Blaisdell compressor, carrying 20 lb. pressure, which furnishes all the air needed in the mill, although air connections are made with the Newhouse tunnel compressor for emergency. Another 20-hp. motor situated on the lower floor drives the balance of the mill machinery, with the exception of one direct-connected pump, which has a 5-hp. motor. The mill employs 12 men in all, superintendent.



EFFECT OF ELECTROLYSIS

ther solution to drain off to the general mill sump. The concentrates are sold under contract to the Globe plant of the American Smelting & Refining Co., at Denver.

The mill costs per ton of ore treated during 1913 operations, when the mill never exceeded two-thirds of its capacity, owing to lack of ore receipts, are as follows:

	Per Ton Ore Milled
Office and overhead expense.....	\$0.138
Milling .....	1.092
Marketing products.....	0.802
Sampling .....	0.225
<b>Total .....</b>	<b>\$2.257</b>

These figures cover all repairs and up-keep, but do not cover depreciation.

Operations during 1913 have shown mill extractions of 83% of the gold, 63% of the silver, 80% of the lead and 40% of the copper. The consumption of cyanide was 1.52 lb. per ton of ore treated, and lime, 5.09 lb. per ton.

With the "breaking-in" period of the mill passed, and the usual mechanical troubles adjusted, there is no reason to doubt that the mill will reach an extraction of 90% of the gold and 75 to 80% of the silver on the ores of the district.

The matter of amalgamation will probably receive further consideration. Plating in cyanide solution shows only a small recovery and does not pay for the time and



trouble. The main difficulties are due primarily to a comparatively small amount of metal amenable to amalgamation (about 15%), and second to the rapid formation on the plates of a black scum which stops all amalgamation.

Experimental work and local operations before this mill was constructed show that by stamping in water, about 15% of the value can be amalgamated with the average sulphide ore of the district. This point was kept in mind in designing and constructing the Argo mill and it is therefore only a matter of a few days' shut down, for rearrangement of pipes and minor details, to enable one to stamp and plate in water, and complete the milling process in cyanide solution.

This stamping in water means, besides the 15% extraction on the plates, a saving of nearly  $\frac{1}{2}$  lb. cyanide consumption. Offsetting these two advantages, is the prompt extraction of certain values in the batteries when stamping in cyanide solution. So at present it is still an open question as to which is the best procedure at this point.

The mill is a necessary adjunct to the Newhouse tunnel, and is proving itself a great benefit to the mine operators along its line. It is now under the management of Otto F. Heizer, of California, with Richard A. Parker, of Denver, as consulting engineer.

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### The Independent Engineer of To-Day

The following letter lately received from a correspondent in the West, contains so much of interest that it is worth printing:

After retiring from the management of the S—— mine, I conceived the idea that I might grow suddenly rich out of irrigated lands and farming. But alas! our good friend Bobby Burns certainly was right in his remark about the plans o' mice and men, and that other chap—the one that said something about the shoemaker and his last—he, also, made a bull's eye; for soon I found that the rules of the game play as conspicuous part in all business as in bridge.

So I returned to more familiar fields of endeavor and offered my services in a consulting capacity, reckoning that 15 years in management and half as many more in practical day labor entitled me and my opinion to a certain respect.

Nor have I done badly, either, considering that the great business slump struck us about two years ago and, also, that when one gets up to the box-office window and then steps out to see a friend, he generally finds the line ahead of him extended a mile or so by the time he gets back.

So I have been doing examinations and reports and making tests, in fact performing the functions of the office whenever so commanded, but the good old days that you read about have departed, or nearly so, as far as concerns the business of consulting-engineers-at-large; the principal reasons are three in number as, doubtless, you know. Pardon me, then, if I enumerate as follows:

(1) The consolidation of mining operations. This results in the formation of complete staffs of engineers, picked from the surplus stock on hand, the members of which perform the offices of consulting engineers to individual members of the controlling syndicate or com-

pany. In mining as in meats, there has been an elimination of the individual. Where there used to be 500 buyers at the Chicago stock yards, now there is one. And the same in mining. No new districts have been discovered for years and almost all the old ones have become "one-man camps." The prospector is disappearing and with him goes the small operator. The big fellows have their cruisers everywhere all of the time and the regularly organized staff is assigned to the work of examination. True, there is yet work for those that reached the top-notch shelf before we entered this transitional epoch, but most of the work offered the profession in general is of the "chicken-feed" type, i.e., it is small, intermittent and unprofitable.

(2) Mexico has turned loose a small army of capable men who are willing to work for less than their due; in fact, in this region there are many competent engineers that are earning less per day than laborers are getting from the city of D—— for managing the bald-headed ends of shovels, at \$3 per eight hours and at half-efficiency.

(3) The technical schools continue to pour out a stream of bright young men, cubs that will work for nothing except "experience." This last is not a new condition, of course, but when added to the first and second it very often proves the last straw in the utter demoralization of fees hitherto commanded by the really experienced. The general public seldom discriminates, or not until too late.

I do not say, please remember, that mining has gone all to pot, but I do say that the long business depression and present disinclination of capital to venture outside of the line of sure things, added to the conditions above described, have made the business of engineering a very precarious one for the independent, at least in mining in the West. Many have been driven out of it and into other lines. Irrigation is under a cloud and railroad work is uncertain; the rest of the tale you know as well as I and if I have told you nothing new about our own line of work, believe me when I say that I did not expect to do so when I started to express my opinions. Nor is this a jeremiad for it is merely the fact.

For the very young and very capable, a change from one line to another is not as serious as it is to those that have spent half a lifetime in learning that experience is but the dregs of failure.

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### Effect of Foreign Metals on the Corrosion of Zinc

This was studied by E. Prost (*Bull. Soc. Chim. Belge*, p. 94, 1914), who states that the presence in zinc of lead, cadmium or iron in larger proportion than usually found in refined zinc leads to increased corrosion by acids. Minute quantities of arsenic, antimony, copper or tin, especially the two former, accelerate very pronouncedly the rate of corrosion, more or less independently of the actual percentage of impurity present.

For the effect of impurities on the rolling of zinc, see the *JOURNAL* of Nov. 1, 1913, p. 819.

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South American Gold Production in 1912 is given in a recent report of the Mining Department of Peru as follows: Colombia, 160,750 oz.; Venezuela, 17,682; Ecuador, 12,860; French Guiana, 144,675; British Guiana, 42,566; Dutch Guiana, 13,953; Brazil, 102,365; Peru, 46,135; Chile, 19,290; Bolivia, 1125; Uruguay, 3215; Argentina, 14,467; total, 579,083 oz., or \$11,969,645 in value.



# Sectional Buildings for Drilling Camps

BY GEORGE S. ROLLIN\*

*SYNOPSIS*—Drilling on the Michigan iron ranges remote from settlements requires the establishment of a camp to take care of the men. Great advantages attend the use of buildings made up of portable sections which are largely interchangeable. Method of constructing and erecting the sections described. Four types of building provided for.

Exploration work on the Lake Superior iron ranges consists for the most part of drilling. Such work when conducted in the more remote regions involves the establishment of a temporary camp for the accommodation of the drilling crew or crews. The design and erection of the buildings for such a camp are frequently left to the discretion of the foreman and in most cases when a drilling job is completed, the buildings are a total loss, not being of a type which can be moved. In order to be able to use such buildings over again, the plans for portable sectional buildings here illustrated were drawn. By the use of such standard sections, buildings of any necessary dimensions and proportions can be had; they can be readily assembled and torn down; they become, in fact, part of the regular drilling equipment, shipped with the machinery and returned therewith to the central warehouse. The net result is a considerable saving in time and material.



FIG. 1. CAMP BUILDINGS SET UP

The principal buildings to be provided for are the bunkhouse, and the eating house, shown in Fig. 1, the drilling shed, Fig. 2, and the diamond-setting shed. The walls, roofs and floors are divided into panels or made of 2x4-in. framing with 1-in. sheathing. The height and width are thus determined, the length can be varied to suit conditions. Special sections provide for doors, windows, corners, ends, etc. The whole building is covered with a tar felt when erected.

The principal building is made 20 ft. wide with an 8-ft. wall. Into this there enter eight different sections. In case new sections have to be made, the man in charge of the establishment of the camp is given an erecting sheet shown in Fig. 11, of which one is prepared for each of the four types of buildings mentioned. This shows the layout of the building and by its aid the necessary sections can be ordered and all supplies and materials specified exactly.

\*Formerly district superintendent, E. J. Longyear Co., Crystal Falls, Mich.

## ERECTING SHEET FOR PRINCIPAL BUILDING

The instructions which accompany the erecting sheet are as follows:

Determine first the number and position of doors and windows desired. Mark their sections on the erecting sheet by the proper number, thus indicating where the sections will appear in the assembled building. The sheet will then show the number of plain wall sections, the window sections, the door sections and the corner end

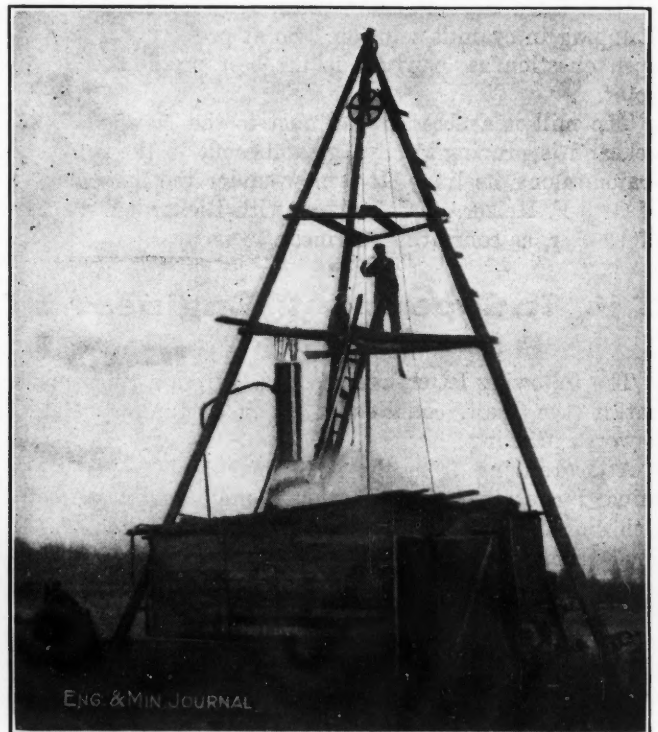
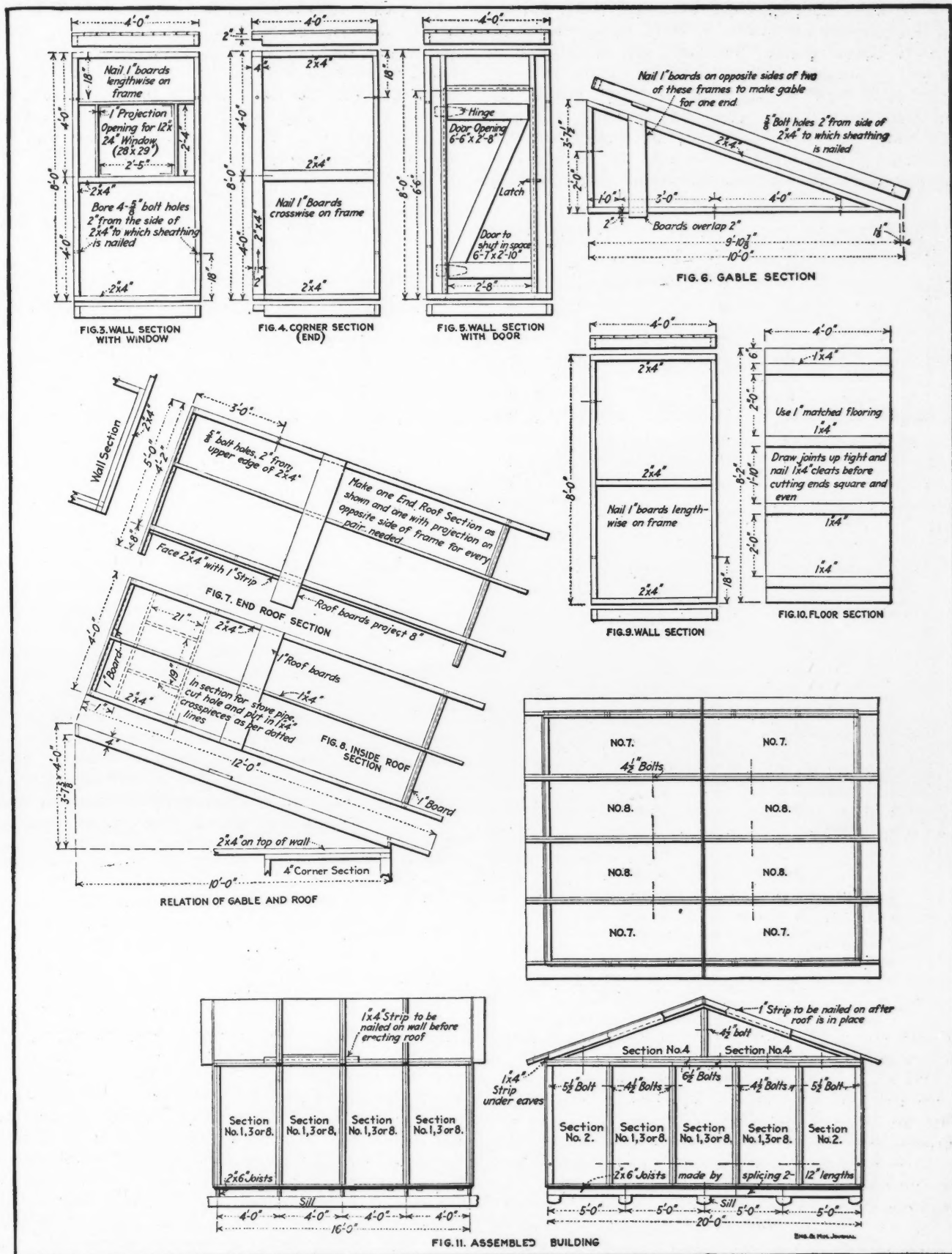


FIG. 2. DRILLING RIG AND SHANTY

sections entering into the building. In the same way determine and mark on the sheet the end roof sections and inside roof sections, designating those to be provided with stovepipe holes, and the floor and gable sections. You can now turn over to the carpenter the construction sheets, Figs. 3 to 10, and specify how many of each section are required. The erecting sheet should accompany these detail sheets as an aid to the carpenter.

To erect the building: Cut first the five sills from neighboring trees and flatten them on one side at least; lay them lengthwise of the building and level the flat sides with a spirit level. Splice 2x6-in. by 12-ft. pieces for the floor beams and lay them across the sills as shown, leveling both ways. Lay the floor sections, Fig. 10, lengthwise of the camp and nail them with a few short nails, preferably finishing nails, at each end. This completes the floor.

Set up the wall sections, Figs. 3, 4, 5 and 9, in their proper positions as outlined on the erecting sheet. Bolt them together in all cases; if bolts are not at hand, wait



ONE OF THE LARGER BUILDINGS. SECTIONS IN DETAIL AND ASSEMBLED

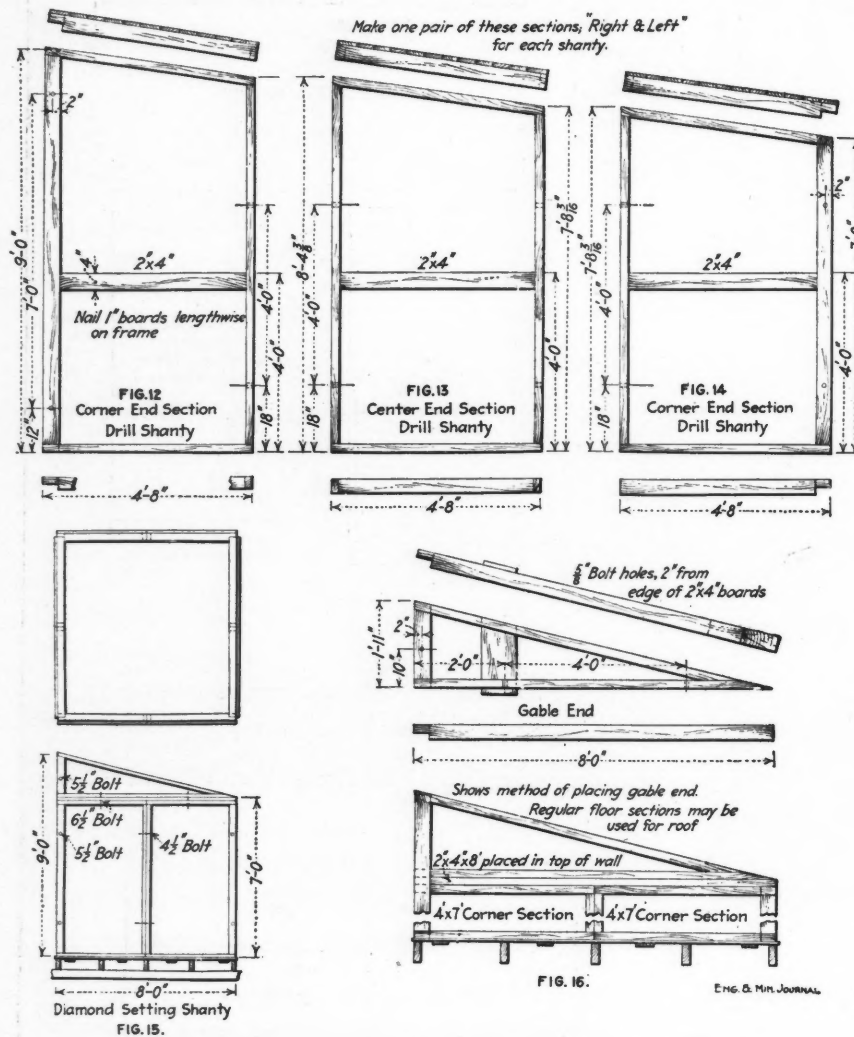


for them, and never nail. Square up the walls. Put stays across between the walls at every second section to keep the walls from spreading when the roof is put on. For this purpose, use 2x4-in. by 20-ft. pieces, or 2x6-in. by 12-ft. pieces spliced. The stays may be fastened to the wall sections just below the top by spiking with 40-penny nails, three to each end. Bind the tops of the four sides with 2x4-in. pieces. If necessary to break these along the side walls, see that the break comes over the center of a wall panel. See that the binding 2x4-in. pieces come exactly over the 2x4-in. pieces forming

walls and not be held up by the projecting portions which form the eaves, resting on the 1x4-in. strip.

The roof is next to be put on. Begin at one end, raising two opposite end sections, Fig. 7. The 1-in. board used to face the outside 2x4-in. piece of the roof section should be set flush with the outside boards of the gable section and then the inside edge of the roof section will be flush with the edge of the side wall section on which the lower end rests. In this way the roof and wall sections will correspond for the length of the building. The inside roof sections, Fig. 8, are next raised in pairs and

are bolted together on the sides with the one bolt, as shown. Care must be taken to get the stovepipe section in the right position. The lower crosspieces of these sections, as stated, butt against the 1x4-in. strip along the top of the side walls. Add the inside sections until the end of the building is reached, when a pair of end sections must be put on. The completed roof may have four cracks between the 2x4-in. pieces of its end sections and the top 2x4-in. pieces of the gable sections. These may be covered with a board 5 to 8 in. wide, fitted as shown. The whole building is then to be covered with tar felt held on with lath. With the dimensions shown, the floor sections will not fit for a building over four sections long. For a longer building it is advisable to cut off enough on one row of floor sections to prevent their projecting beyond the walls, as a projection tends to allow moisture to run in on the floor. The cut sections can be put next the door which is ordinarily in the end of the building. They receive there the most wear and being cheap can be discarded as worn out when the building is moved.



SECTIONS FOR DRILLING AND DIAMOND-SETTING SHEDS

the tops of the wall panels. Fasten with two 40-penny nails spiked to each panel. The ends must measure 20 ft. over all, in order that the roof section may fit easily.

The gable end sections, Fig. 6, should be next erected. They are to be bolted on with 6 1/2-in. bolts; for this purpose, bolt-holes will have to be bored through the 2x4-in. pieces forming the wall top, so as to correspond with the bolt-holes already in the gable-bottom piece. Next nail along the top of the side wall the 1x4-in. strip, shown in Fig. 11 under the eaves and so marked; it should be of good material and should project about 2 in. above the 2x4-in. pieces so as to serve for the lower crosspieces of the roof sections to butt against. It may be necessary to plane off a little of the top of this strip so that the lower crosspieces of the roof sections will rest on the side

and a shed roof. For the front wall panels similar to those of Figs. 3, 5 and 9 are used, but with the vertical dimensions increased to 9 ft. For the end walls, the panels shown in Figs. 12, 13 and 14 are used. It will be noted that these are wider than the wall panels heretofore described. The back walls are made of sections similar to those of Figs. 3, 5 and 9, but with the vertical dimensions only 7 ft., as in the case of those used for the walls of the second building. The floors and roof are usually made of loose planks with tar paper on the roof. Two 16-ft. plank stays are used to support the roof planks, and hold the ends together. The style of the building conforms so closely to that used all over the Michigan ranges that no erecting instructions are necessary.

The fourth building provided for is a shanty for the

THE OTHER BUILDINGS

The second building is similar to the one described except that it is 16 ft. wide and the walls 7 ft. high. The manner of erection is identical. The drill shanty is 14x16 ft., with a 9-ft. front wall and a 7-ft. back wall,



diamond setter. This is 8 ft. wide with the 9-ft. front and 7-ft. back walls of the drilling shanty; the length may be as desired. The ends are made of two panels each similar to those of Fig. 4, but 7 ft. high. The floor sections are made 8 ft. 2 in. long, as shown in Fig. 10 and are laid according to the method illustrated in Fig. 15. More floor beams may be used if it is desired to make the shanty firmer for setting purposes, or for the same reason, heavy sills may be cut and used lengthwise of the shanty directly under the floor, instead of the 2x6-in. floor beams shown. The triangular areas over the end walls are filled with the gable sections made as shown in Fig. 16. The tops of the side and back walls are bound with 2x4-in. pieces as described for the first building. The front of the shanty should be well supplied with windows, and the doors placed at the back. One end of the shanty may be used for a storehouse and for the stove. For the roof, floor sections may be used and covered with tar paper, but it is best to have them a little longer, say 9 ft., which can be shortened to 8 ft. 2 in. if they are used for a floor later.

On each erecting sheet is given a list of supplies and equipment as shown in the table, with blank spaces where the number or quantity can be filled in. When the size of building has been decided upon, the bill of materials is made out exactly and the possibility of a shortage of material is thus minimized.

TABLE OF SPECIFICATIONS

Windows—12x24-in. (2 lights)	No.
Stove pipe saddles (22x24-in. rise 4 in 8)	No.
Bolts, 1x4-in.	No.
1x5-in. (usually 8)	No.
1x6-in. (usually 8)	No.
Hinges	No. pr.
Door latches	No.
Nails, 40-penny	Lb.
10-penny	Lb.
shingle	Lb.
Tar felt	Rolls
Lath	Bundles
Boards—1x4 in.	Lin.ft.
Boards, extra	Lin.ft.
2x6-in. by 10-ft.	No.
2x4-in.	Lin.ft.

### New South Wales Mineral Production in 1913!

The report of the New South Wales Department of Mines for 1913 has just been issued, and gives the figures of production shown in the accompanying table.

NEW SOUTH WALES MINERAL PRODUCTION, 1912 AND 1913

Substance	Unit	1912	1913
Alunite	tons	3,425	2,235
Antimony (metal and ore)	tons	63	18
Blismuth (metal and ore)	tons	6	9
Coal	tons	9,885,815	10,414,165
Coke	tons	241,159	298,612
Copper (Ingots, matte and ore)	tons	11,034	9,461
Diamonds	carats	2,239	5,573
Gold	oz.	165,295	149,657
Iron	tons	32,677	46,563
Iron, "oxide"	tons	3,757	3,204
Ironstone flux	tons	1,093	.....
Lead (plg. etc.)	tons	17,251	23,554
Lime	tons	35,657	33,272
Limestone flux	tons	33,186	42,663
Molybdenite	tons	57	79
Platinum	oz.	610	442
Silver (Ingots and matte)	oz.	2,389,195	2,194,871
Silver-lead, ore, concentrates, etc.	tons	345,307	391,262
Shale (oil)	tons	86,018	16,985
Scheelite	tons	56	44
Tln (Ingots and ore)	tons	2,073	3,021
Wolfram	tons	172	126
Zinc (spelter and concentrates)	tons	520,519	506,661

The output of minerals and metals during last year is valued at £12,095,084, which sum exceeds that of the previous year (itself a record) by £453,649.

Freedom from serious industrial troubles and the consequent, almost continuous working of the mines, have

contributed to this very satisfactory state of affairs. The only products showing a decrease in value of production were gold, zinc and kerosene shale. The number of men employed during the year is estimated at 38,880, an increase of 1022 over the previous year.

In addition to the above, marble valued at £991, opal (£29,493), portland cement (£402,249) and sundry minerals and ores valued at £11,689 were produced in 1913.

### The Fuel Oil Engine in Mining

By JOHN W. KNIFFIN\*

My first experience with oil engines was at the Deadwood mill, at Mogollon, N. M., from 1910 to 1911. At this time all of the power developed in the camp was by steam plants burning wood, the cost of which was \$8 per cord. This made the cost for fuel under the best conditions 3.7c. per brake horsepower-hour, making the total cost when labor and upkeep are added about 4.7c. per brake horsepower-hour.

After carefully investigating the power question, the



DEADWOOD MILL, MOGOLLON, N. M., OF CLEVELAND & WEATHERHEAD

owners of the Deadwood mill decided to install a 140-hp. De La Vergne "FH" engine. I gave the details of the operation of this engine in an article on the Deadwood mill in the ENGINEERING AND MINING JOURNAL of Oct. 14, 1911.

The engine is now developing 120 hp. with an oil consumption of 140 gal. of 27° Bé. fuel oil per day. The cost of this oil is 14½c. per gallon at Mogollon, 9c. of which is the wagon freight charge on the 90-mile haul from Silver City. This makes the cost of fuel 0.7c. per brake horsepower-hour, or about one-fifth the cost of wood as fuel.

The following table shows the cost of power at the Deadwood mill:

POWER COSTS AT DEADWOOD MILL, MOGOLLON, N. M.				
	Gal.	Cost per Gal.	Cost per Day	Cost per B.hp.-Hr.
Fuel oil	140	\$0.1432	\$20.06	\$0.0070
Lubricating oil	6	0.5350	3.21	0.0011
Labor (2 men @ \$4, 1 man @ \$5)	.....	.....	13.00	0.0041
Totals	.....	.....	\$36.27	\$0.0122

This cost is high, compared with oil engines operating on or nearer to the railroad or oil fields. However, the

\*Metallurgical engineer, Presidio Mining Co., Shafter, Tex.

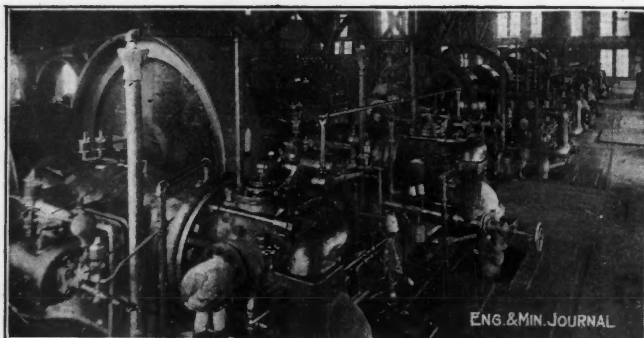
saving of an oil engine over a steam plant is great, being 3½c. per brake horsepower-hour. This engine now runs 35 days without a shutdown.

The Socorro Mines Co., after carefully observing the work of this engine for several months, installed one twin 200-hp. and two twin 280-hp. engines, and has recently added another twin 280-hp., making a total of 1040 hp. in De La Vergne engines. The Ernestine Mining Co., at about the same time, installed one single 90-hp. engine and one twin 200-hp. engine, and recently added a 280-hp. single engine, making a total of 570 hp. in their plant. The total horsepower in De La Vergne engines at Mogollon is 1750 hp.

I am at present operating a 140-hp. De La Vergne engine of the same type for the Presidio Mining Co., of Shafter, Texas, and I am also installing a second unit of 100 hp. for this company. The 140-hp. engine now in operation replaced a Reynolds 16x36-in. corliss engine and boiler plant, oil having been used as fuel. The saving effected by this engine is shown by the following table:

	De la Vergne	Corliss
Oil, gal. per day.....	171.78	1029.42
Gal. per b.hp.-hr.....	0.055	0.373
Cost per day.....	\$10.43	\$62.50
Cost per b.hp.-hr.....	\$0.0033	\$0.0226

The oil engine shows a saving in fuel of 1.93c. per b.hp.-hr. The cost of fuel oil is, therefore, one-fifth of the cost



OIL ENGINES AT SOCORRO MINING CO.'S PLANT

of oil with the steam plant. This engine makes a saving of \$52.07 per day, or \$15,355 per year. The oil used in the engine is the Texas crude oil, the gravity of which is 21° Bé., and which costs \$1.71 per bbl. of 42 gal., f.o.b. Marfa, Texas. The mine is located at Shafter, 45 miles distant. The engine is shut down once each month for general overhauling and for the past year has been operating at full-load for about 97% of the total time.

All of the engines to which I have referred are of the "FH" type and operate on the four-stroke constant-volume cycle. To complete this cycle, four strokes of the piston or two revolutions of the crankshaft are necessary. On the first outward stroke, air is drawn into the cylinder. The next inward stroke compresses the air into the space between the air and exhaust valve and into the vaporizer. At the end of this stroke, the highly atomized charge of fuel is injected into the same chamber, being propelled by compressed air, forming an explosive mixture. The heat generated by the compression of the air in the cylinder, together with the heat furnished by the hot walls of the vaporizer, causes ignition, and the expansion of the gases forces the piston on its second outward or working stroke. The cycle is completed by the second return stroke, called the scavenging stroke, which

expels the burned gases from the cylinder. The air for spraying the oil is supplied by a two-stage air compressor driven off the crankshaft by an eccentric. The air is compressed by the first stage, to 150 lb. per sq.in., and by the second stage to about 600 lb. per sq.in. The quantity of air, however, is very small. The regulation of speed of the engine is effected by a Hartung governor operating by gears from the camshaft. The governor is sensitive and actuates the oil-supply pump, lengthening or shortening the stroke in accordance with the load.

The combustion obtained with this engine is remarkably complete even when operating under wide variations of load and on the heaviest grades of fuel oil. The exhaust is colorless and there is no carbon deposited in the cylinder or the vaporizer. The advantages of this type of engine over any other type are: Low fuel expense; simplicity; flexibility; no stand-by losses; minimum attendance charge.

### Rubberglass

An experienced constructing engineer has communicated the following about a useful new building material:

I have been using rubberglass in mill construction and other industrial buildings during the last seven or eight years. The skylights at the Miami Copper Co.'s concentrator were equipped with rubberglass and in the Inspiration plant it was decided to place rubberglass in the side-lights as well as in the skylights. The Miami rubberglass has now been in use for four years, and to date has given complete satisfaction.

The particular advantages of rubberglass are that it is pliable, and owing to the peculiar construction of the frames to which it is attached, it can easily be made water-tight without the use of putty or other materials of similar nature. It cannot be broken and while it is not transparent, it is very translucent, and the light admitted by it is of a pleasing nature, making a splendid light for mechanics to work by, etc.

I have used a large quantity of this material during the last seven or eight years in Arizona, and for that region, at least, I have no doubt that it will continue to prove very satisfactory indeed.

### Westphalian Platinum

A correspondent, writing to the *Mining Journal*, London, from Düsseldorf, says: Preparations for the exploration of the platinum mines of the Schlägelsberg company, near Meuden, in Westphalia (belonging to the German platinum works at Düsseldorf) are so far advanced that they have commenced to construct the building for the working of the metal. Sixty miners have been occupied for some months in driving a main gallery 200 m. long and four cross galleries to develop the mine. (Cf. also *ENG. & MIN. JOURN.*, June 20, 1914, p. 1252.)

### Nevada Mining Lien Law

Under the Nevada statutes a claim to a lien against mining property for services performed under a contract of employment by the day may be validly joined with one under a contract to perform a specified amount of work at a fixed price; the work being continuous and of the same character under both contracts. (*Nevada Supreme Court, Ferro vs. Bargo Mining & Milling Co.*, 140 *Pacific Reporter*, 527.)



# New Smelting Works of Arizona Copper Co.--II

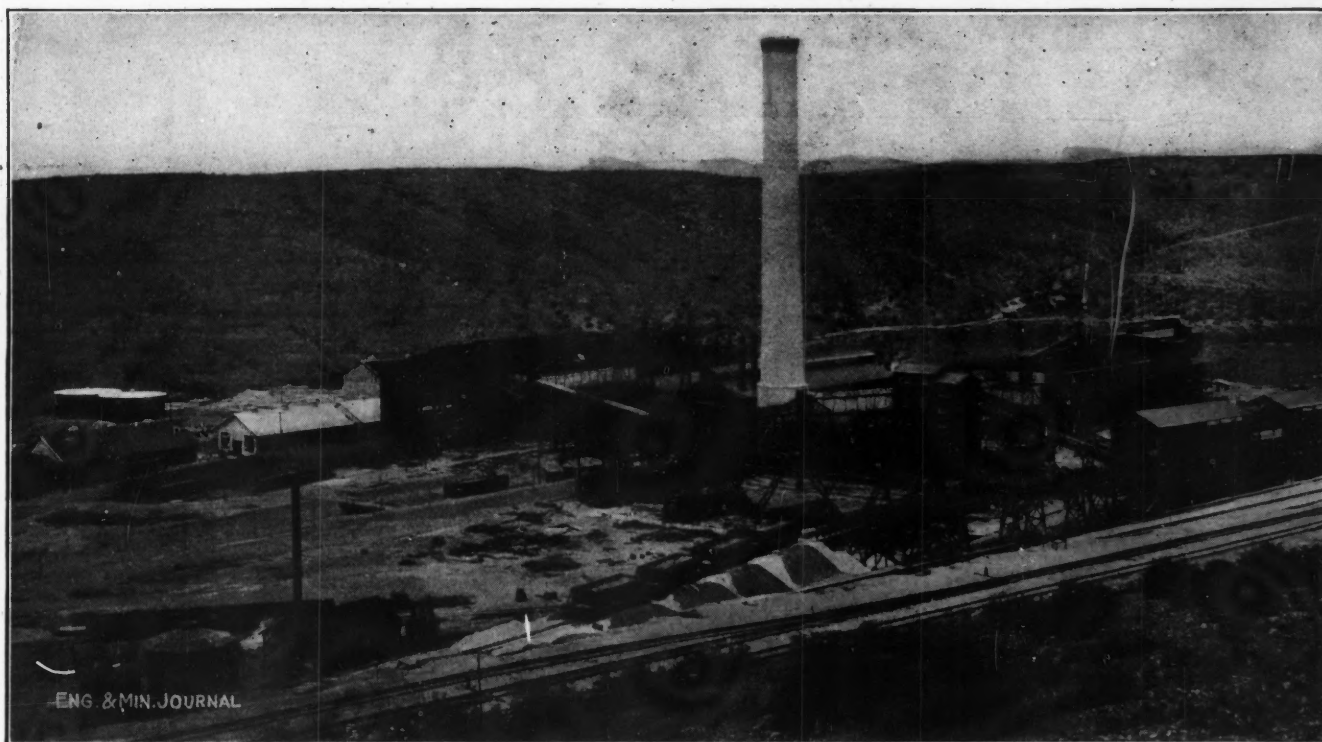
BY RICHARD H. VAIL

*SYNOPSIS*—The reverberatory furnaces at this works are of unusual width, being 22 ft. wide by 100 ft. long; separate oil tanks are provided so that the amount of oil used by each furnaceman may be noted; the waste-heat boilers supply power for the company's mines and concentrators as well as for the smelting works. Agglomerating cones installed to mix hot converter slag and fine siliceous ore for reverberatory charging. The new works cost about two million dollars.

The reverberatory department comprises three furnaces 22x100 ft., the gases from which pass to seven waste-heat boilers of 712 b.hp. each. The reverberatory fur-

The reverberatory furnaces each have two matte tap-holes and the matte is tapped into 20-ton cast-steel ladles. The slag is removed in electrically tilted slag cars, built by the M. H. Treadwell Co. There are four of these cars equipped with bowls of 225 cu.ft. capacity, and two four-wheel trucks. These cars are drawn by two Baldwin-Westinghouse 18-ton electric locomotives, having a speed of six miles per hour and a drawbar pull of 8000 pounds.

Oil is supplied to the reverberatory furnaces and to the separate oil-fired boilers through six Wilgus No. 16 oil systems, each comprising a 5¼x3½x5-in. duplex oil pump and heater. A feature of the oil service in the re-



GENERAL VIEW DURING CONSTRUCTION—LOOKING WEST TOWARD SAN FRANCISCO RIVER

naces are of interest by reason of their being wider than the standard 19-ft. furnace. The No. 3 furnace bottom was built with an inverted arch of 15-in. silica brick, but this was found unsatisfactory and all the furnaces now have the customary silica bottom. Only two of the reverberatory furnaces are operated under normal conditions, the third furnace being held as a spare. Fettingling is done through holes in the roof; the converter byproducts and siliceous ore used for fettingling are brought over the fettingling holes in a small hopper car, running on a track over each side of the furnace; fettingling at the bridge is done in the same manner. Siliceous ore, which is to be smelted in the reverberatory furnaces, may be sent directly to the sampling mill and thence to the mixing beds, or it may go to the bunker bins and thence to the clinking plant and be mixed with converter slag in the agglomerating cones.

reverberatory building is that a sufficient number of tanks has been installed to permit the measuring of the amount of oil used on each shift in the furnaces or boilers. There are eight of these service tanks, each 10 ft. in diameter by 11 ft. 8 in. high. The furnacemen on each shift will thus have a definite reminder of the amount of oil which their predecessors used.

## CONVERTING DEPARTMENT

The converting department comprises three stands, for which the Allis-Chalmers Mfg. Co. supplied four 12-ft. upright shells with eccentric mouth. The converters are lined with magnesite brick, the vertical distance from the tuyeres to the bottom of the dished portion being 15 in. Normally, only two stands are used and the matte is brought to the converters in 20-ton ladles by one of two Morgan cranes. These are of 40 tons capacity and each



has a 15-ton auxiliary hoist. The crane rails are 50 ft. above the floor and the span is 55 ft. There is a storage capacity of 100 tons in the siliceous-ore bins above the converters and this material may be measured out in a small hopper and fed by gravity through pipe chutes, thus saving much time both for the cranes and for the converters; the latter do not have to be turned entirely over to receive the flux and the operation of feeding is greatly expedited, as there is no waiting for crane service. Doubtless some of the older smelting works will find it advantageous to consider remodeling their converting departments to permit feeding the silica in this manner, especially where the converting capacity is

Calumet & Arizona plant, in Douglas. The converter bars are handled by a small compressed-air hoist suspended from a monorail radial crane, extending over the storage platform.

#### NOVEL DISPOSAL OF CONVERTER SLAG

The converter slag at this plant is to be handled in an interesting equipment, by which it is expected that the fluxing value of the converter slag will be more completely utilized than when the molten slag is poured into reverberatory furnaces. It is generally accepted that pouring converter slag through blast-furnace settlers in many cases effects only a partial cleaning; on the other hand,



CONVERTER AISLE DURING CONSTRUCTION—AGGLOMERATING PLANT IN BACKGROUND

crowded and the conditions are such as to permit overhead bins.

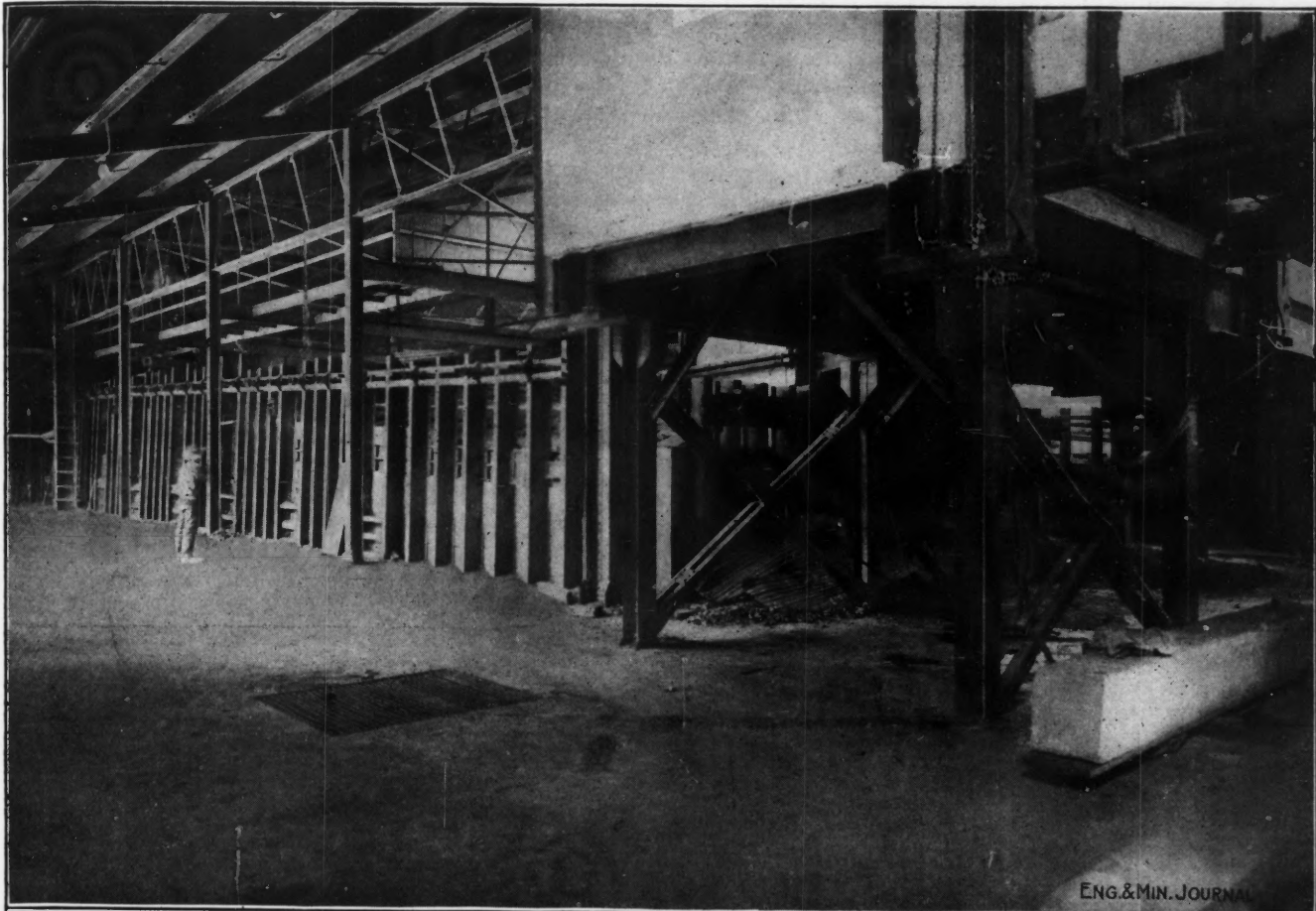
The converter-dust chamber is 130 ft. long by 25 ft. wide and has a cross-sectional area of 500 sq.ft. above the hoppers; it is constructed of steel and hollow tile with a roof of No. 11 sheet iron. This dust chamber is provided with wires as in the roaster dust chamber, but contains only about 56 miles of No. 10 steel wire and one mile of  $\frac{3}{8}$ -in. steel chain; the wires are hung from the chain at 4-in. intervals and extend midway into the hoppers.

The converter copper is cast in one of two straight-line casting machines<sup>3</sup>, similar to those in use at the new

when poured into reverberatory furnaces in the usual manner, only a small percentage of the fluxing value is realized, the general assumption being that the heavy converter slag forms a more or less inert layer between the matte and the reverberatory charge or slag.

At this plant there have been installed agglomerating cones, of a type similar to the cone developed at the Copper Queen smelting works at Douglas, where flue dust and converter slag were agglomerated. At the Arizona Copper Co.'s plant, siliceous ore, crushed to pass  $\frac{1}{4}$ -in. ring, will be substituted for flue dust, and the aim will be not to agglomerate into large lumps, but merely to make an intimate mixture and obtain a hot product that will be charged into the reverberatories as a self-fluxing mix-

<sup>3</sup>"Eng. and Min. Journ.," Apr. 25, 1914.



VIEWS FROM SKIMMING AND FIRING ENDS OF ARIZONA COPPER CO.'S 22x100-FT. REVERBERATORY FURNACES







poses; direct current is supplied at 250 volts for the cranes, trolleys, converters and Messiter reclaiming machines. There are two 75-kw. Ridgway exciter units and three 56-hp. Ridgway single-expansion engines are used to drive three Connersville rotary pumps, supplying circulating water for the turbines.

The converter blowing engines are Nordberg cross-compound duplex condensing engines, with steam cylinders, 22 and 42 in. in diameter, air cylinders 44 in., and 42-in. stroke. They are designed for steam at 160-lb. pressure and 75° of superheat and at a normal speed of 71 r.p.m., each engine has a capacity of 10,000 cu.ft. per min. compressing to 12 lb. at an altitude of 3500 ft. A steam consumption of 1.1 lb. per 100 cu.ft. is guaran-

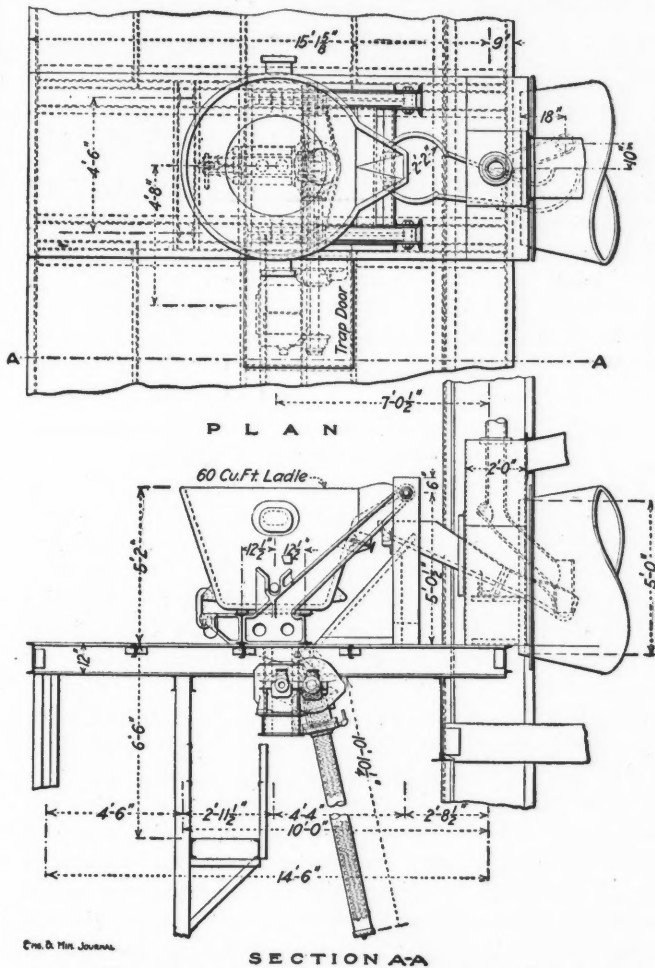
basin. The power-house site is such as to permit the turbine condensates to drain from the surface condensers under barometric head; the condensates are then pumped up to a Wainwright heater by two Goulds, 2½-in., single-stage centrifugal pumps, direct-connected to Westinghouse motors; each of these pumps has a rated capacity of 200 gal. per min. against an 80-ft. head, one unit being maintained as a spare. There is also a Cochrane No. 760 feed-water heater, the discharge from which goes to a settling tank and thence to the tank receiving condensates from the Wainwright heater. Before going to the boilers, the water is measured through a Lea recorder, which may also be checked by a tilting-box meter of the Cananea type. From the storage tank the boiler-feed water is pumped to the reverberatory boilers by equipment already described.

The general water-service tank holds 250,000 gal., being 40 ft. in diameter and 26 ft. high. Oil storage for the works is provided by two 486,000-gal. steel tanks and a 48,000-gal. concrete sump, into which six tank cars may be unloaded; beside this, there are the eight 160-bbl. tanks for the individual service in the reverberatory building. An oil pump house contains two 5x8-in. Aldrich triplex pumps that deliver the oil from the unloading sump, either to the general storage tanks or to the tanks in the reverberatory building. These pumps are guaranteed to deliver 80 gal. per min. against 150-lb. pressure, when operating at 37 revolutions per minute.

NEW WORKS COST \$2,100,000

The new plant, which cost about \$2,100,000, was designed by Dr. L. D. Ricketts, and was started and operated under his direction until Mar. 1, 1914. It was turned over to the company management after two months' operation at figures below the estimated operating cost. While construction cost of the new works was over two million dollars, the cost of the smelting plant proper was only \$1,700,000; about \$400,000 have been spent on the power house. About \$300,000 additional money was spent for transmission lines, transformer houses, etc. Most of the electric power generated is conveyed to the company's mines and concentrators.

The plans for the new smelting plant were drawn by Repath & McGregor, of Douglas, Ariz., and the work of erection was in charge of E. Horton Jones. Construction was begun in January, 1912, and the first copper was poured on Oct. 8, 1913. While the new reduction works was not built in the record time made in constructing the new reverberatory plant at Hayden, yet a creditable rate of construction was maintained; no night work was done, and there were some delays in the delivery of structural steel; also, considerable fabrication of steel work, including all the steel chutes in the sampling mills, etc., was done at the site. The prompt completion of the smelting plant was expedited by the application, in a limited way, of "efficiency engineering," two men having been detailed to assist foremen in planning their work; one of these men took charge of blueprints, listing all materials required and expediting their delivery; the other man was detailed to "take up lost motion" for the construction gangs, by seeing that all material required for a certain job was on hand before the final order was given to the foreman to begin the job. In the erection of the works, the mechanical shops were among the first buildings completed, so that their facilities could



SECTION AA  
LADLE-TILTING APPARATUS FOR POURING CONVERTER SLAG INTO AGGLOMERATING CONE

teed when operating at full speed and 1.2 lb. per 100 cu.ft. at half speed.

The condensing apparatus for the power plant was supplied by the Alberger Condenser Co., and comprised three surface condensers for turbine exhausts, each having a capacity of 40,000 lb. of steam per hr. and requiring 5000 gal. per min. of water; one barometric condenser for the reciprocating-engine exhaust, requiring 2000 gal. per min. of water; there are three 8x20x12-in. dry-vacuum pumps for the former and for the barometric condenser, two 16x12-in. horizontal, single-stage, rotative, dry-vacuum pumps driven by electric motor; three 18x20-in. and two 14x12-in. Connersville pumps supply water to the above condensers. North of the power house there is an extensive wooden cooling tower with concrete

be utilized in the general construction of the plant. The shops and warehouse are built of hollow tile and steel, and each building is equipped with Kinnear rolling doors.

The new smelting plant is operated under the general direction of Norman Carmichael, general manager of the Arizona Copper Co., and is in direct charge of F. N. Flynn, smelter superintendent.

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### Methods of Treating Tungsten Ores

A process, for which F. M. Becket, of Niagara Falls, N. Y., has taken out U. S. pat. 1,081,571, aims to prepare low-phosphorus tungsten or ferrotungsten from certain phosphorus-bearing tungsten ores, which may or may not contain manganese, or from high-manganese, low-phosphorous tungsten ores.

The method may be carried into effect as follows: The low-phosphorus tungsten ore or concentrate is first subjected to a reducing operation, carbon, hydrogen, carbon monoxide, producer gas or furnace gases having a reducing character. The reduction is effected at a temperature below the melting-point of the reduced product, and the reduction may be either partial, approximately complete, or complete. The product of this reducing operation, or "reduced product," is next subjected to an appropriate treatment for the removal of part or all of the manganese. This may be accomplished by treatment with an acid under the following conditions: To the reduced product is added an excess of sulphuric acid, say of 1.20 sp.gr., and the mass is allowed to stand for 24 hours with frequent stirring. Moderate heating accelerates the reaction, but involves some loss of tungsten by solution. The solution is then drained off, and is preferably applied to the purification of successive batches of reduced product, with such reinforcement as may be required. By this treatment, 70% or upward of the manganese may be removed, and also a large percentage of the iron, the result of the removal of the iron being, of course, a corresponding concentration of the tungsten of the reduced product.

The purified product is now melted in an electric furnace, with or without carbon, according to whether the initial reduction was complete or incomplete, yielding directly a commercially available metal or ferro-alloy, the composition of which depends upon the amount of residual iron.

Certain ores of tungsten, including ferberite from Boulder County, Colorado, contain considerable proportions of phosphorus, which in special cases may attain 0.6 to 0.7%. Such ores consist largely of iron tungstate with a gangue of siliceous character, the phosphorus being usually associated both with the mineral and the gangue in extremely variable proportions. Becket has discovered that it is possible to remove a material proportion, and in some cases all, or nearly all, of the phosphorus from these ores by a treatment involving the solution of the phosphorus in acid reagents, without substantial solution or loss of tungsten, thus converting high-phosphorus ores into low-phosphorus material available for direct smelting for the preparation of low-phosphorus ferro-tungsten.

In the case of certain ores, a simple acid treatment of the finely ground ore may suffice. For example, the ore, ground to suitable fineness, say 100 mesh, may be mixed with concentrated sulphuric acid (specific gravity 1.84)

in the approximate proportions of 200 cu.cm. of acid per kilogram of ore. The solution proceeds at ordinary room temperatures, dissolving from 30 to 90% of the phosphorus in the course of a few hours without substantial loss of tungsten, the loss of tungsten under these conditions being usually less than 1%. At somewhat higher temperatures, say 80 to 100° C., the solution of phosphorus is more rapid but the loss of tungsten is materially greater. At the same time, considerable quantities of iron are dissolved, thus effecting a concentration of the tungsten in the ore. Following the acid-treatment, the ore is thoroughly washed with water to remove the dissolved substances.

#### METHOD FOR HIGH-PHOSPHORUS ORE

There are, however, some ores which do not respond well to the treatment as above described, such ores being usually comparatively high in phosphorus. Those ores which are suitable for treatment by the simple acid-solution process and those which are not suitable, may be rendered responsive to such process by suitable heat treatment, preferably by roasting under oxidizing conditions, a roast of this character being most easily and economically accomplished. For example, the ore is crushed to 10 to 12 mesh and subjected to an oxidizing roast, with stirring, at a red heat or somewhat lower. The acid treatment may be applied to the roasted ores without further crushing. The efficiency of the process may, however, be further increased in certain cases by a finer subdivision of the ores, either before or after the roasting.

The conditions of the acid treatment as applied to the roasted ores may be substantially as above described with reference to the raw ores. Such treatment of roasted ores has been found effective to remove up to 90% or even more of the contained phosphorus, without material loss of tungsten. In the acid treatment of roasted ores much less iron is dissolved than in the treatment of the raw ores.

Results of a similar character may be obtained with other acids, as diluted sulphuric acid, hydrochloric acid or the like. Mixed reagents may also be used, good results having been obtained with sulphuric acid containing a small proportion of nitric acid, potassium chlorate, and other oxidizing agents. In the use of these acid baths it may be desirable to dispose the ore in proximity to an insoluble anode connected in a direct electric circuit, for example in proximity to an anode of lead in the case of sulphuric acid, whereby the solvent effect of the acid is somewhat accentuated.

Preferably the purified ores are smelted in presence of a metallic reducing agent, usually silicon, the reduction being accomplished in an electric furnace. By this procedure it is possible to obtain a ferrotungsten which is low both in phosphorus and carbon, and which is, therefore available for general use in the preparation of high-grade or alloy steels or for other purposes.

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### Duty to Guard Shafts

A miner or prospector is not required by law to fence or otherwise inclose holes, pits, shafts, or tunnels to protect live stock running at large from falling into them, according to a decision reached by the Idaho Supreme Court in the recent case of *Fix vs. Gray*, 140 *Pacific Reporter*, 773.

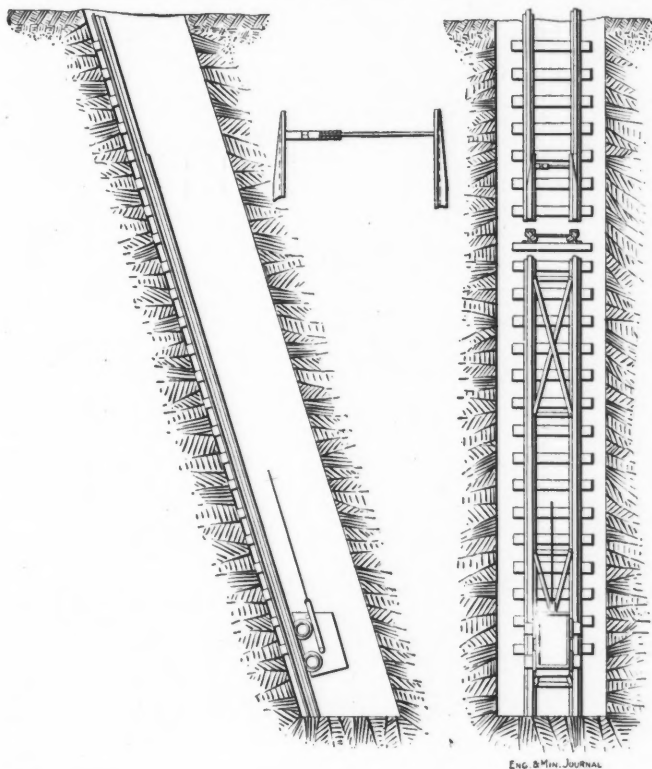


# Details of Practical Mining

## Extensible Skip Track for Sinking

A movable track designed to permit the skip to be lowered to the bottom of an inclined shaft in process of sinking, has been invented by Otto Lieber and Chester A. Gibbs, of Hancock and Houghton, Mich. (U. S. pat. 1,093,708.)

At blasting time the movable bottom section is merely pulled up along the fixed track. It consists of two rails set inside the fixed rails in an inverted position, so that the heads work below the heads of the fixed rails; one side of the base is cut away. The two rails are held together by cross and diagonal braces as shown. The tops of both are tapered so as to allow the skip wheels to pass from



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MOVABLE SECTION OF TRACK TO REACH SHAFT BOTTOM

the fixed rails without difficulty. To get a good fit of these tapered points, a telescope screw bar is inserted, by which the points are spread and held snug to the fixed rails.

Whereas the gage of a section, such as this, is slightly less than the gage of the permanent skip tracks, there is usually enough clearance between the wheel gage of the skip and the permanent track gage to allow the skip wheels to run without any great trouble over the movable section.

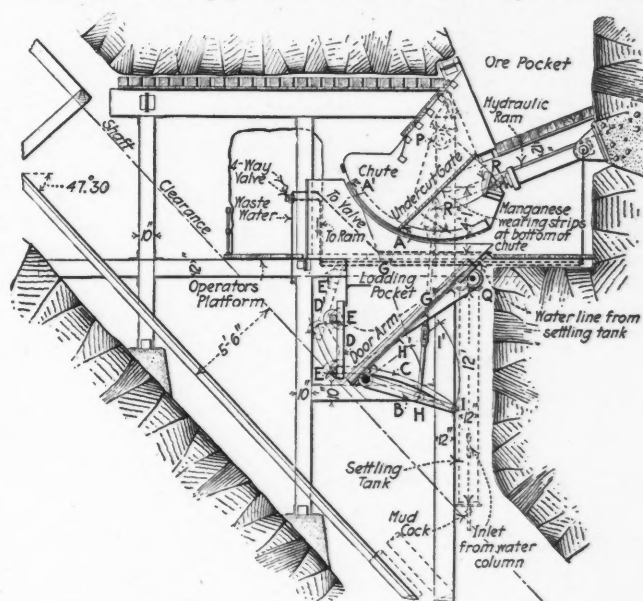
It is stated that the device has been installed in two shafts, dipping 72° and 56°, and has been found to work satisfactorily.

## Hydraulically Operated Skip-Loading Pockets

BY CLARENCE M. HAIGHT\*

The accompanying drawing shows the general arrangement of the steel ore-loading pockets in use in the Palmer shaft of the New Jersey Zinc Co.'s mine at Franklin Furnace, N. J. The pockets are the design of R. M. Catlin, superintendent.

The arrangement includes a loading pocket, and between this and the rock ore-bin, a chute and gate. The loading pocket holds one skip load of ore only; the upper chute feeds the loading pocket and its gate cuts off the ore supply therefrom when the skip is filling. Water from the column pipe in the shaft furnishes power to the



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SIDE ELEVATION OF THE POCKET

hydraulic ram which operates the gate levers. The direction of the movement of the ram is controlled from the loading platform by an easily operated four-way valve. Water, after use, flows out through a waste pipe from the valve.

When closed, the apparatus stands as shown in the drawing. The lower door is closed and the lip A of the upper chute-gate is drawn back beyond the bottom of the chute. This allows the ore to run into the bottom or loading pocket until that is filled, and, as the angle of repose of the ore is then reached, the movement of the ore stops with both the lower pocket and the chute full.

When the empty skip is spotted at the door of the loading pocket, the controlling valve is reversed. The hydraulic ram moves out along the arc shown, its connection point B moving toward the position B'; this moves the lip A around its pivots P toward A', closing off the

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

chute so that no more ore can go into the loading pocket. Meanwhile, the rod *G* is pulled forward and up toward the position indicated by the line *G'*. This motion moves the lever arms *B* and *C*, which link the rod *G* to the lower pocket door so that the pins *H* and *I* advance toward the positions *H'* and *I'*. The door *D* of the loading pocket is held against the mouth of the pocket by two arms, pivoted at *Q* and *E*. The movement of the arms *B* and *C* forces the door toward the open position *D'*. This position is reached at the end of the stroke of the hydraulic ram. As this door opens, the ore runs from the pocket into the skip.

In this operation, the advance of the lip *A* is more

One man only is needed to operate a pair of pockets, as the valves work easily. A second man is stationed in the shaft, below the loading platform, to trim the skip in case a large chunk lies on the top of the load and projects over the back or the sides of the skip. The operation of these pockets is easy and rapid. With skips averaging about six tons to the load, over 2000 short tons have been hoisted in 8½ hours.

### Diagonal End Plates, Inclined Shaft

By G. A. DENNY\*

For a Mexican shaft, inclined at 65°, we used in the first stages the conventional timbering shown in Fig. 1.

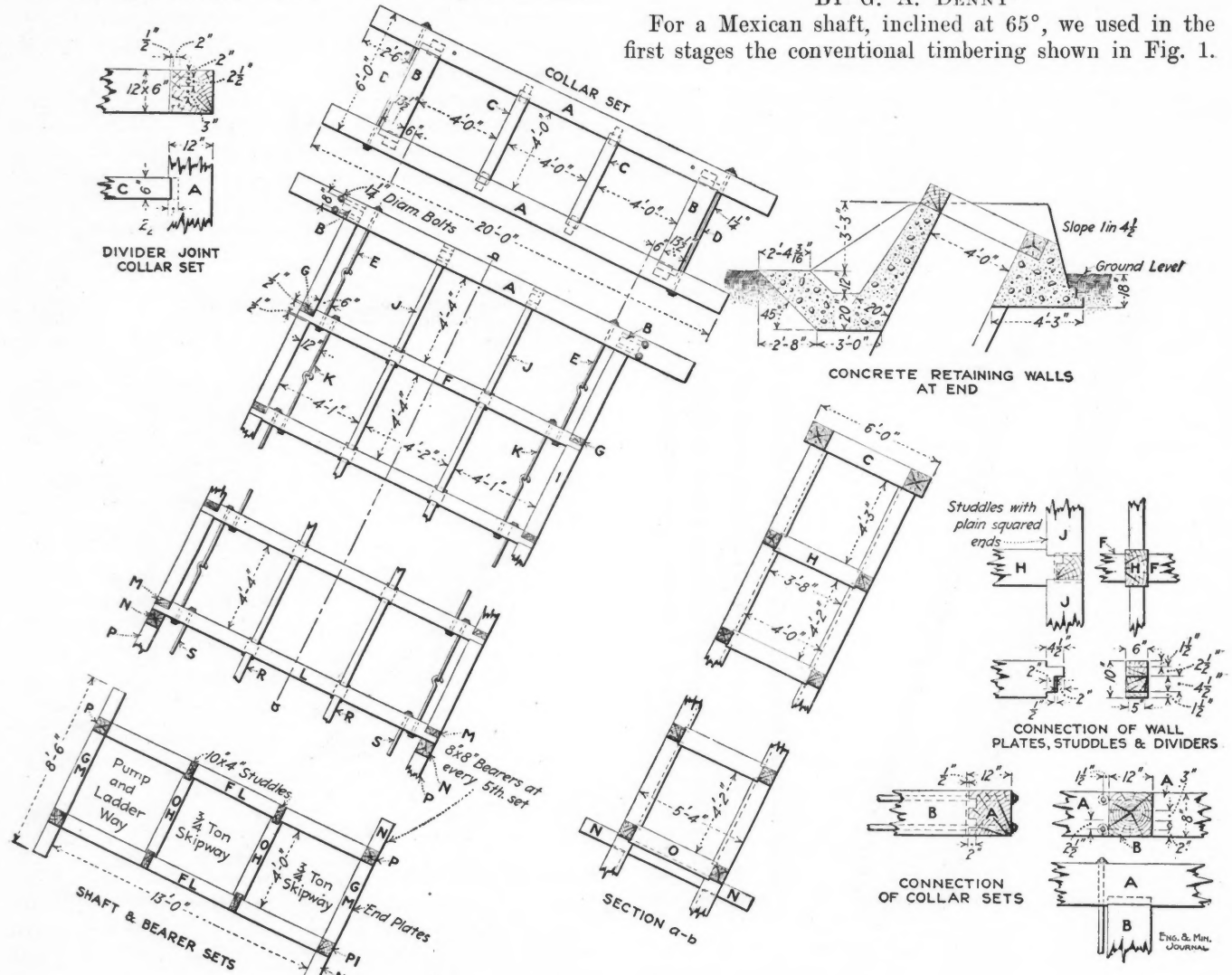


FIG. 1. THE STANDARD SHAFT TIMBERING FIRST USED

rapid at first than the movement of the door *D*, so that it has cut off the ore lying in the chute before the loading pocket begins to discharge to the skip. In like manner, on reversing the ram, the door *D* moves the more rapidly at first, so that it is closed tight before the lip *A* has retreated far enough to allow any ore to run into the pocket. Hence, all danger of an excess of ore running over the skip and down the shaft is avoided. The lip *A* cannot jam, because it cuts in from under the chute when closing and so cannot catch on a chunk of ore; while, as the door *D* does not close until the pocket is empty, there is nothing for that to catch on.

The hanging in the shaft was exceedingly heavy and hard to support and to overcome this difficulty we designed the system of timbering shown in Fig. 2. This has proved to be altogether superior to the first set and easily sustains the pressure put upon it by the heavy ground. So far as we are aware, this is the first time that this system has been used and we offer it as a subject of discussion.

The principal difference between the two systems is, of course, the substitution of the diagonal end plates for

\*Of Denny Bros., managers and consulting engineers, Apt. 829, Mexico, D. F.



the right-angled. The bearers, however, are put in parallel to the wall plates in the new system and parallel to the end plates in the old. Fig. 1 shows also the method

### Erroneous Results from Angle-Hole Drilling

By F. A. GLASS\*

TABLE I. TIMBER LIST OF COLLAR, ORDINARY AND BEARER SETS OF OLD SYSTEM

No. per Set	Mark	Size	Length	Material	Description
2	A	12x12"	20' 0"	Pine	Wall plates, collar set
2	B	12x12"	4' 6"	Pine	End plates, collar set
2	C	6x12"	4' 6"	Pine	Dividers, collar set
4	D	1 1/2" diam.	6' 2 1/2"	Wrt. iron	Tie bolts, collar set
8	E	1" diam.	3' 2"	Wrt. iron	Hanging bolts, collar set
2	F	8x8"	14' 6"	Pine	Wall plates, shaft set
2	G	8x8"	5' 6"	Pine	End plates, shaft set
2	H	6x10"	4' 6"	Pine	Dividers, shaft set
4	I	8x8"	4' 6"	Pine	Corner studdles, shaft set
4	J	4x10"	4' 6"	Pine	Intermediate studdles, shaft set
8	K	1" diam.	2' 10"	Wrt. iron	Hanging bolts, shaft set
2	L	8x8"	14' 6"	Pine	Wall plates, bearer set
2	M	8x8"	5' 6"	Pine	End plates, bearer set
2	N	8x8"	3' 6"	Pine	Bearers, bearer set
2	O	6x10"	4' 6"	Pine	Dividers, bearer set
4	P	8x8"	4' 0"	Pine	Corner studdles, bearer set
4	R	4x10"	4' 6"	Pine	Intermediate studdles, bearer set
8	S	1" diam.	2' 10"	Wrt. iron	Hanging bolts, bearer set

On the Cuyuna iron range in central Minnesota there are no outcrops of ore or of the associated rocks. A mantle of glacial drift covers the entire district for a depth of from 20 to 250 ft., or more, with an average of over 100 ft. There is no relation between the topographic features of the present surface and those of the underlying rocks. There are large undrained areas in many parts of the productive district which, for the most part, lies in or adjacent to marshes and lakes. Test-pitting is impracticable on account of the volume of water encountered, and explorations can be carried on only by means of churn and diamond drills.

The orebodies occur in lenses of variable length and

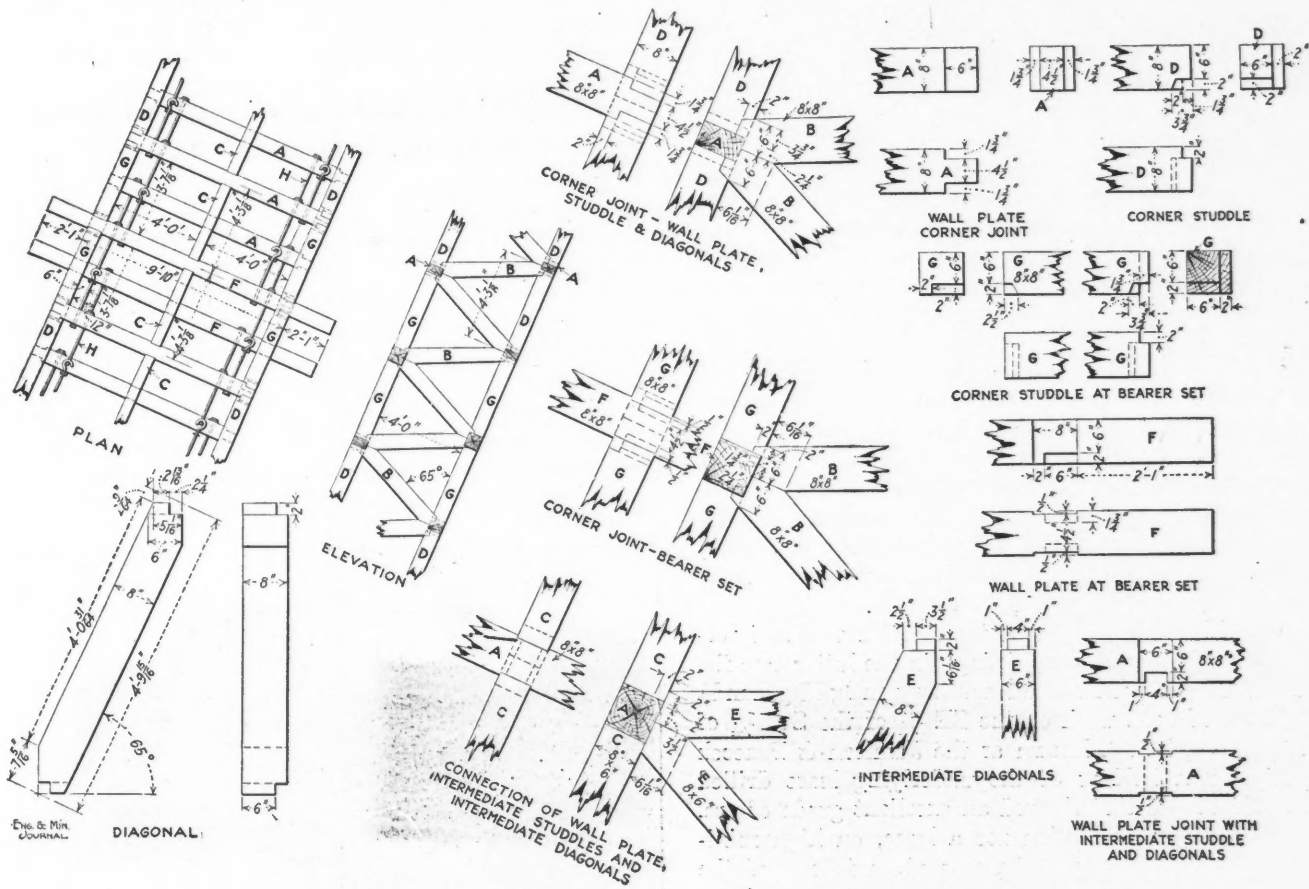


FIG. 2. THE NEW TIMBERING WITH DIAGONAL MEMBERS

TABLE II. TIMBER LIST OF ORDINARY AND BEARER SETS IN NEW SYSTEM

No. per Set	Mark	Size	Length	Material	Description
2	A	8x8"	9' 10"	Pine	Wall plates, shaft set
4	B	8x8"	4' 10 1/2"	Pine	End diagonals, shaft set
2	E	6x8"	4' 10 1/2"	Pine	Intermediate diagonals, shaft set
4	D	8x8"	3' 10 1/2"	Pine	Corner studdles, shaft set
2	C	6x8"	3' 8 1/2"	Pine	Intermediate studdles, shaft set
8	H	1" diam.	2' 5 1/2"	Wrt. iron	Hanging bolts, shaft set
2	F	8x8"	14' 0"	Pine	Wall plates, bearer set
4	B	8x8"	4' 10 1/2"	Pine	End diagonals, bearer set
2	E	6x8"	4' 10 1/2"	Pine	Intermediate diagonals, bearer set
8	G	8x8"	3' 9 1/2"	Pine	Corner studdles, bearer set
2	C	6x8"	3' 8 1/2"	Pine	Intermediate studdles, bearer set
8	H	1" diam.	2' 5 1/2"	Wrt. iron	Hanging bolts, bearer set

of reinforcing the collar with concrete. Table 1 gives the bill of materials for sets of the first system and Table II gives it for the new system.

run from a few feet to 300 ft. or more in width. Merchantable ore has been found at depths of a thousand feet, but in general the vertical depth of the orebodies is not explored for over two or three hundred feet. It is considered poor policy, when the orebodies dip so steeply as they do in this district, to carry explorations in depth beyond a point where sufficient ore is blocked out to assure a 15- or 20-yr. output from one shaft.

The orebodies are generally brecciated and frequently contain vugs and seams of pulverulent, disintegrated quartz. Minor but intricate folding within the orebodies is also frequent. The dip is steep, say, from 50°

\*Mining engineer, Brainerd, Minn.

to 80°, prevailing between 60° and 70°. With such high dips, it is only natural that at first "angle" or inclined holes should be drilled against the dip of the formations, to obtain as nearly as possible representative cross-sections. These angle holes are limited by physical conditions to an inclination of from 60° to 70° from the horizontal. At present, for reasons to be explained, the angle hole has been practically abandoned in favor of vertical drilling.

Most of the ore can be churn-drilled with vertical holes, and much of it can be churned with angle holes. With angle holes, however, the diamond drill must often be used to cut through the harder seams.

In diamond drilling, where no core or only a small amount of it can be obtained, samples of the cuttings are taken. It is at this point that difficulties arise. The recovery of the cuttings is dependent on the velocity of the water as it rises between the hollow drill rods and the casing, and as the area of this space is greater than the opening in the drill rods, the velocity of the water pumped through the rods is relatively high. The clearance between the bit and the diamonds is extremely small, and the scouring effect of the water passing through this clearance, is sufficient to cut out relatively large amounts of any disintegrated quartz through which the drill may penetrate, and to mix this with the sample. The iron content is lowered by the addition of quartz and also by the loss of the heavy ore particles that settle out in the space from which the quartz is removed.

In churn drilling, the scouring action of the water is much less in seams of fine quartz, and by keeping the casing well advanced, caving can be reduced greatly. In vertical holes, a few raps on the casing is usually enough to ream the drill holes and to drive the casing to the bottom of the hole; however, with angle holes, it is usually necessary to blast enough clearance about the drill hole to make room for the casing, as the larger part of a driving blow on the casing is lost in friction. This blasting aggravates the troubles with caving ground, more especially in seams of pulverulent quartz.

An excellent illustration of the relative value of vertical and angle-hole churn drilling (in the latter case the diamond drill was used as an auxiliary in hard ground) is to be seen in the work on the SE  $\frac{1}{4}$  of the SW  $\frac{1}{4}$  of Sec. 1, T. 46, R. 29, known as the Jamison & Peacock property. The holders of the underlying lease drilled two vertical holes that showed an excellent grade of ore. On this showing, an option for a lease, on high minimums, and at a high royalty, was given to one of the large independent operating companies, who drilled the property with angle holes. The drilling was disappointing, and the property was turned down in disgust. After about four years, a second option was given, the holders of the underlying lease having made concessions on the royalty and on the minimum-tonnage requirements. This time, vertical, churn-drill holes were used exclusively, and one of the largest high-grade orebodies in the district was proved up. The drilling under both options was done by the same firm of drilling contractors, one of the most skillful and reputable in the Lake Superior district, so that there is no question about their work, which, moreover, was performed under the direction of engineers representing the holders of the options.

In a recent vertical hole cutting through one of the angle holes, over 100 ft. of ore assaying about 55% in

iron was encountered, where the angle hole showed about 40% in iron. In fact, each sample in the angle hole was lower than the corresponding one in the vertical hole. Since the large number of vertical holes show uniformly high-grade ore, as against the poor to indifferent results of the angle holes, it is highly improbable that the areas pierced by the two holes mentioned are really different in composition.

The inherent inaccuracy of one of these drilling methods caused the holder of the first option to lose a valuable lease and about \$12,000 in drilling expenses. The loss to the holders of the underlying lease through loss of interest on deferred royalty payments and in the concessions made in the royalty rate, is nearly \$100,000.

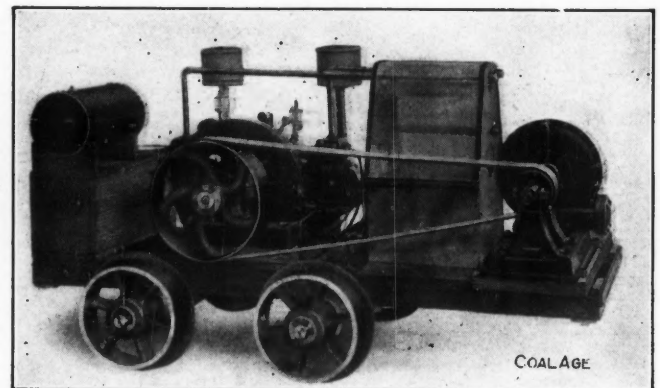
I do not wish to be understood as condemning all diamond drilling, or even all churn-drill angle holes. In their place, that is, in a compact, homogeneous formation, these methods cannot be excelled, but over a large part of the Cuyuna district, vertical-hole churn drilling is to be preferred.

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### Portable Gasoline-Engine Centrifugal-Pump Set

By A. W. DICKINSON\*

In a mine of large area working a flat deposit near the surface, great trouble is often had with surface water entering at such points that it cannot be easily handled. Operating under such conditions I conceived the idea of establishing a number of pumping stations near the working face with a sump at each, and employing a portable pumping set consisting of a centrifugal pump and a gasoline engine to drive it, mounted on a car bed. Five such stations were established and at each, two holes were drilled from the surface, one to take a 2-in. pipe through



CENTRIFUGAL PUMP, BELT-DRIVEN BY A GASOLINE ENGINE, AND MOUNTED ON A TRUCK

which the gasoline engine exhausted, the other to take a 1½-in. water-discharge pipe. The gasoline engine was of 8 hp., the pump had a 2-in. suction and a 1½-in. discharge.

The pump was in continuous operation for eight months in charge of one man and proved successful. Following my suggestions, the Hayton Pump Co., of Quincy, Ill., furnished another unit, similar but embodying some improvements, shown in the illustration.

\*Superintendent, Central Coal & Coke Co., Bevier, Mo.



# Details of Milling and Smelting

## Circular Concrete Ore Bins\*

A set of four reinforced-concrete ore bins has recently been completed for the Croton Magnetic Iron Mines, Brewster, N. Y. They are intended to provide storage capacity between the proposed one-shift operations of the steam-shovel mine and the two-shift operations of the new concentrator. The bins are each 22 ft. 6 in. inside diameter and 34 ft. 3 in. above foundations, giving an effective capacity of 390 cu.yd. or about 500 tons apiece.

The ore is fed by an inclined belt-conveyor from the coarse-crushing plant to a point at the center of the first bin, whence it is fed directly to the first bin and to the

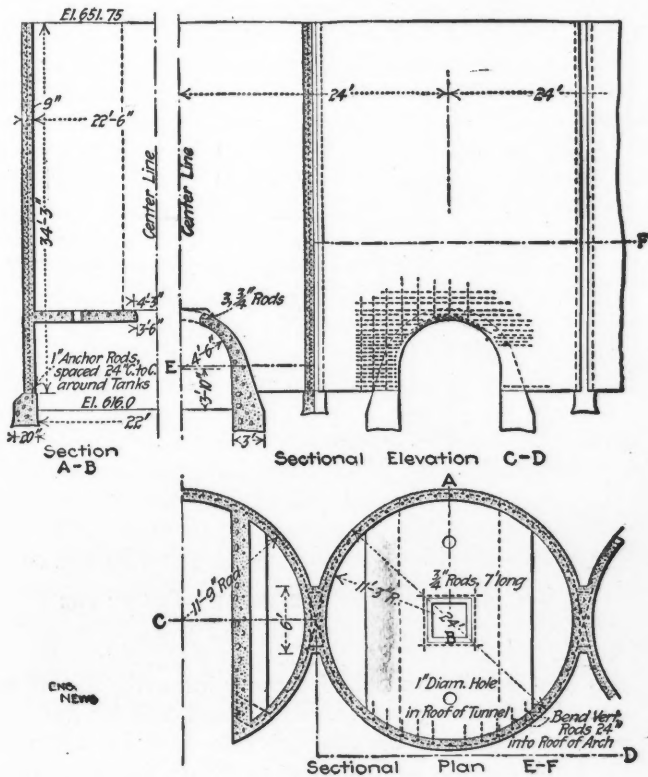


FIG. 1. DETAILS OF CONSTRUCTION OF BINS, SHOWING REINFORCEMENT

other bins by another belt-conveyor with tripper, running along the center line of the bins. The ore is withdrawn through hoppers, automatically feeding to belt-conveyors running in the arched tunnels under each bin, which carry it to the fine-crushing plant, located 40 ft. farther down the hill.

The bedrock, a mica schist decomposing somewhat readily on exposure to the air, lay close to the surface, and the ore bins were founded on this. No reinforcement was used in the foundations, but 1-in. round vertical rods, 2 ft. long, were placed 2 ft. apart to bond the footing to the 9-in. exterior wall forming the upper part of

\*An abstract of an article by M. F. Sayre in "Engineering News," June 4, 1914.

the ore bins. This 9-in. wall was reinforced vertically by 1/2-in. round rods, 18 in. apart, and horizontally by cables placed 4 1/4 in. apart for the first 5 ft., then 6 in. apart for 10 ft., and 9 in. apart for the remainder of the height of the bins.

The original design called for 3/4-in. and 1/2-in. round rods; but the second-hand 3/4-in. wire cable could be obtained locally for much less and was substituted. The strength below elastic limit was as high for the cable as for the rods, even allowing liberally for wear, and the cable could be handled more readily than the rods and used in longer lengths, giving fewer laps. Any badly worn sections of the cable were used in the upper sections of the bins, where only 1/2-in. round rods were called for. The cables alternately circled each bin separately, and made figure eights including all four bins to bond them together. The vertical rods could not be handled full length and were lapped 2 ft. at joints. The cables were cut long enough to encircle one bin, lapped 3 ft. or more at joints, the ends raveled out to give better hold in the concrete, and then the two wires clamped together by a wire clip. The wire cables used cost actually \$75 delivered, as against an estimated \$520 for the round rods.

Fig. 3 shows the forms. They were made of rough 2-

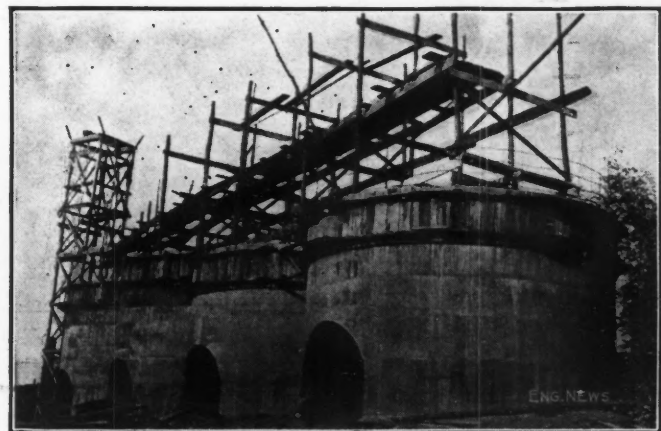


FIG. 2. VIEW OF ORE BINS DURING CONSTRUCTION, SHOWING DISTRIBUTING TOWER FOR CONCRETE ON LEFT

in. unseasoned chestnut lumber, except the lagging on the arches, which was 1 1/4-in. chestnut.

The ring forms, 4 ft. high, were composed of face boards not over 12 in. wide nailed to two ribs, and were made in four types: Type A—inside ring forms 8 ft. 3 in. long; type B—outside ring forms 8 ft. long; type C—outside closure forms 2 ft. 6 in. long, needed to keep the corresponding outside and inside forms opposite each other; and type D—the V-forms at the junction between the bins on the outside ring. Two rows of 1/2-in. bolts held the forms together—six bolts in all for each 8-ft. section, long enough to pass through vertical bolting pieces, 2x4 in. by 3 ft. 6 in. long, placed outside the ribs.

The ribs were wide enough to stand on and the reinforcement and these two-by-fours gave sufficient hand-holds so that no outside scaffolding other than ladders proved necessary.

CONSTRUCTION

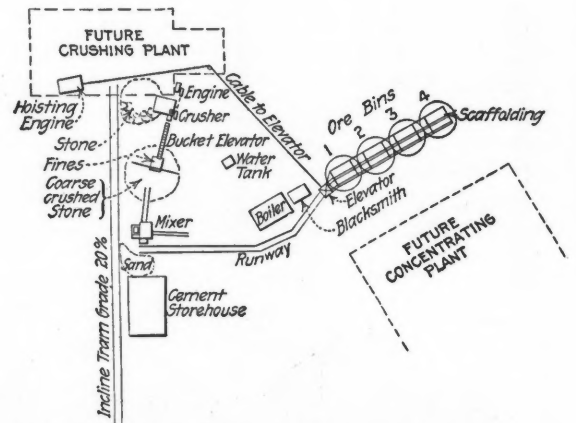
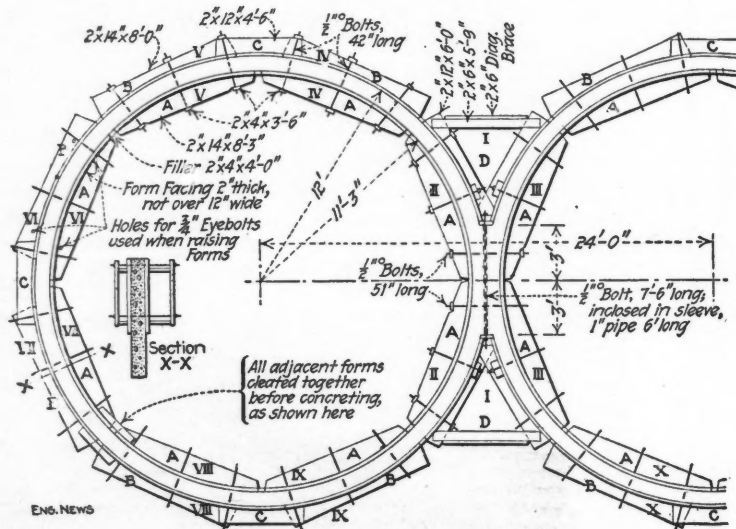
After the foundation concrete had set, the ring and arch forms for the first 4-ft. rise for bins 1 and 2 were placed and concreted. The arch forms were then built up to the full height of the arch, the ring forms raised, the gap between them and the forms for the back of the arch filled in, and this lift concreted. As soon as this had set, the arch forms were removed to be reused for the other bins. Above the arches, the four bins were carried up simultaneously. In raising the form a block and tackle hung from a long pole running across the scaffolding was used. The forms were raised in the order indicated by the Roman numerals on the sketch, two forms at a time being raised by each gang, and two gangs being used. The cable reinforcing was placed for one lift at a time before raising the forms. For the first two lifts the forms were raised 2 ft. 9 1/2 in. each time so that the lower bolts came

which all supplies were brought, the derrick which handled the excavating and concreting at the site of the main crushing plant, and the small incline tram which brought the concrete from the mixer to within reach of this derrick. Thanks to a good engineer, there were no delays on this score.

Two 6-cu.ft. carts were used to carry the concrete from mixer to forms. These were loaded only half full, but at that were all that one man could handle, and smaller, lighter carts would have been advisable.

Mixing was done in a 1/10-yd. batch mixer, run by gasoline. Each batch was a cart load. The concrete gang comprised one man handling rock, one man handling sand, one man handling cement and water, and dumping the mixer, two men on carts, two or three men tamping, one foreman, one engineer, one fireman. Each man was working very nearly to full capacity all the time and a larger mixer would have given no better economy. Each rise of the forms after the arch had been passed, held 25.5 yd. and took 10 to 11 1/2 hours to fill.

The mixture used was 1 : 3 : 6 for the foundations and 1 : 2 : 4 above. At the start, only 1-in. stone and smaller



in the holes just vacated by the upper bolts. Driving the bolts wasted a good deal of time and the other lifts were made 3 ft. 1 in. each, placing the lower bolts on top of the concrete each time, occasionally checking up the elevation of the concrete to keep the top from getting too far off level.

The bolts were greased each time before placing; but no sleeves were used as the time wasted placing the sleeves would have been more than the time gained when drawing the bolts. Straightening and greasing the bolts and re-running the threads kept a boy busy one day to a day and a half for each rise of the forms.

The scaffolding and elevator are well shown in Fig. 2. The elevator was built first and the separate bents of the scaffolding nailed together on the ground and hoisted to place. The first bent was made the full height to begin with. The others would have been, but that the sticks available were not long enough.

EQUIPMENT—The elevator was run by a long-suffering double-drum hoisting engine located at the crest of the hill (Fig. 4), which also handled the incline tram, up

was used in the concrete for the 9-in. walls, but it was later found that after forming a soft bed by dumping several barrows of the fine concrete into the bottom of the form, a coarse aggregate up to 2 1/2-in. size stone could be used, careful tamping, of course, being necessary. Under local conditions this reduced the cost considerably.

COST—These bins cost, after crediting for the future value of the form lumber used,

For foundations—221 cu.yd. at \$3.81.....	\$842.61
Above foundations—380 cu.yd. at \$9.76.....	3710.28
Total .....	\$4552.89

This includes labor and material used (lumber and reinforcement included), but does not include cost of excavating or charges for superintendence or depreciation of plant.

The bins were designed by Hamilton and Hansel, Consulting Engineers, of New York, and erected under the supervision of the writer and Mr. Theodore Earle, General Manager.



# The Assayer and Chemist

## Effect of Acidity of Assay Slags on Silver Losses

By D. C. LIVINGSTONE\*

The following set of experiments, on the formation of slags of varying silicate degree, and the effect of these slags in the assaying of silver in three different types of ores, were recently made by the students of the class in assaying at the University of Idaho.

### SILICEOUS ORES

Five slags of the following silicate degree were formed; subsilicate, monosilicate, sesquisilicate, bisilicate and trisilicate. As no siliceous silver ore of a sufficiently high grade for an experiment of this nature was available, approximately 100 mg. of silver are carefully weighed in duplicate for each of the five silicate degrees, and put in the crucible with the charge. The charge consisted in each case of sand, litharge and sodium carbonate, with sufficient flour to reduce a lead button of from 20 to 25 grams, and a light cover of borax glass. In each case 1/2 assay ton of sand was taken, except for the subsilicate, where 1/4 assay ton was used. The silicate degree was varied by varying the amounts of litharge and soda in the charge, Fulton's table for the calculation of slags being the easiest method of doing this, and assuming that half of the silica combined with the soda and half with the litharge.

Curve sheet No. 3 shows the average percentage of silver lost in fusing and cupelling these different charges as obtained by four of the students.

This curve shows a gradually increasing loss of silver as the silicate degree increases, and from this the inference would be that even for a siliceous ore the highest silver assay would be obtained by using a charge approaching a subsilicate of Na<sub>2</sub>O and PbO. This set of experiments would have been of greater value if an ore had been used instead of the artificial mixture given above, but results obtained from a set of experiments that were made last year on a high-grade siliceous ore, showed the same results; that the subsilicate charge gave the highest assay.

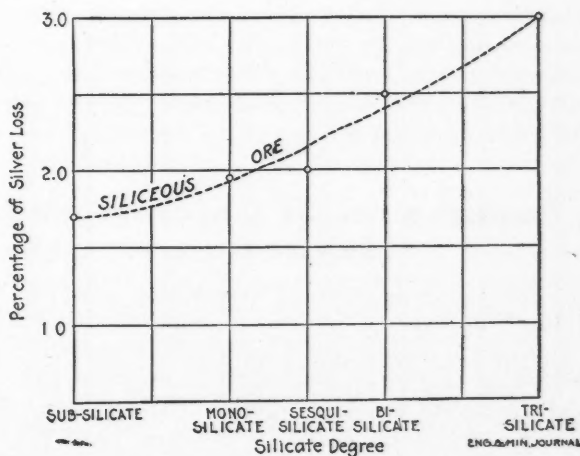
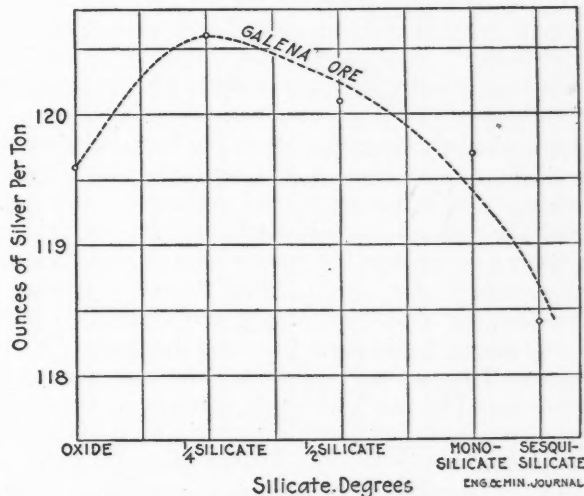
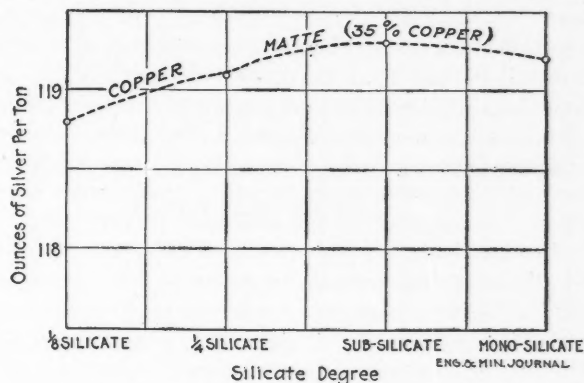
### GALENA ORES

A practically pure galena ore was used, carrying about 120 oz. silver to the ton, and about 80% lead.

In assaying this ore the following slags were calculated and the following charges used: A half assay ton of ore was used in each case, and the slags were an oxide, a sesquisilicate, a mono- or singulosilicate, a subsilicate or 1/2 silicate and a half sub- or 1/4 silicate.

For the sesquisilicate, the charge was 10 grams silica, 12 grams sodium carbonate and 43 grams of litharge. For the monosilicate, 10 grams silica, 17 grams sodium carbonate and 55 grams of litharge. For the subsilicate, 10 grams silica, 34 grams sodium carbonate and 92 grams litharge. For the 1/2 sub- or 1/4 silicate, 5 grams of silica

and the rest of the charge like the subsilicate. For the oxide, the same charge as the subsilicate, leaving out the silica altogether. Curve sheet No. 2, which gives the average curve obtained by four students from plotting



### INFLUENCE OF ACIDITY OF SLAG ON SILVER ABSORPTION

the number of ounces per ton of silver obtained as one coördinate and the silicate degree as the other coördinate, shows the following facts: The maximum results were obtained in each case with the 1/2 sub- or 1/4 silicate, the

\*University of Idaho, Moscow, Idaho.

curve showing an increase from the oxide to this point and then a decrease with the increase of silica in the charge. The apparent reason for the low results from the oxide slag was the brittleness of the lead button, due to the presence of litharge. This gives rise to mechanical loss of some of the lead, with a consequent loss in silver, when cleaning the slag from the button.

The inference from these experiments is, that with a galena ore the highest assay will be obtained where the slag approaches a  $\frac{1}{2}$  subsilicate.

#### LOSSES WITH COPPER MATTE

A copper matte carrying 35% of copper and about 120 oz. in silver was next tried, using four different slags. These slags were a  $\frac{1}{4}$  sub- or  $\frac{1}{8}$  silicate, a  $\frac{1}{2}$  subsilicate, a subsilicate and a monosilicate. The matte, of course, contained iron, the percentage of which was known, and when allowance was made for this, the charges were as follows,  $\frac{1}{4}$  assay ton of ore was used in each case. For the  $\frac{1}{4}$  subsilicate 3 grams of silica, 95 grams of litharge and 30 grams of sodium carbonate. For the  $\frac{1}{2}$  subsilicate, 5 grams of silica, 95 grams of litharge and 30 grams of sodium carbonate. For the subsilicate, 10 grams of silica, 90 grams of litharge and 30 grams of sodium carbonate. For the monosilicate, 10 grams of silica, 60 grams of litharge and 15 grams of sodium carbonate.

Curve sheet No. 1 shows also the average result obtained from the work of four students on this matte with above charges.

These curves are remarkable in the fact that they show practically no difference in the result through this range of slags. The following special charge was also run by one of the students on this matte and gave a result several ounces lower than the results obtained by these more simple charges. Ore  $\frac{1}{4}$  a.t., silica 3 grams, litharge 100 grams, sodium bicarbonate  $7\frac{1}{2}$  grams, potassium carbonate  $7\frac{1}{2}$  grams, borax glass 10 grams and also light cover of same. The results from which the curves were plotted were obtained by carefully checked assays, as the students were required to re-run each slag until the results checked is duplicate within 0.3 oz. In the above work the subsilicate is assumed as containing  $\frac{1}{2}$  the silica that the monosilicate contains, or twice the number of oxygen atoms in the base as are in the acid. This makes the subsilicate a definite silicate degree, and not any silicate degree below a monosilicate, as given in some metallurgical works.

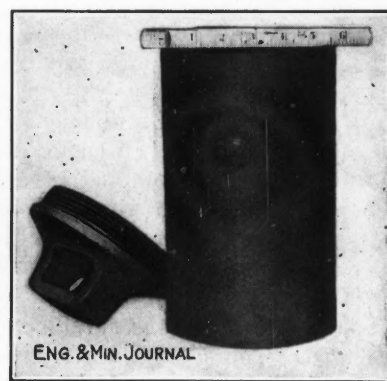
### Separation of Calcium and Magnesium

In presence of an excess of magnesium, in ammoniacal solution, the calcium is only incompletely precipitated by ammonium oxalate, but a quantitative precipitation is obtained in neutral solution when an excess of solid ammonium oxalate is added, says F. Halla (*Chem. Zeit.*, 1914, p. 100, abstr. *Journ. Soc. Chem. Ind.*, Feb. 14, 1914). When the proportion of magnesium chloride to calcium chloride is less than 12:1, the calcium oxalate is contaminated with some magnesium, but with larger proportions of magnesium the results come within the limits of experimental error. The neutral solution is treated at boiling point with an excess of solid ammonium oxalate until the precipitate of magnesium oxalate, at first

produced, is redissolved and the residue of calcium oxalate remains unaltered. The solution is allowed to stand for some hours, filtered and the crystallized ammonium oxalate dissolved by warming with a little water. The precipitate is washed at first with hot water, then with cold and the calcium precipitate after incineration is covered with a little alcohol and a few drops of sulphuric acid, ignited and weighed as sulphate. The magnesium oxalate dissolved in the form of a double salt is precipitated according to Classen's method by neutralizing the filtrate with acetic acid.

### Flask for Moisture Sample

Taking a moisture sample and preserving it in its original state until analyzed, is always an annoying job.



IRON FLASK FOR SAMPLING AT DRYING PLANT

Where reduction of moisture is the main function of a treatment plant, the sampling becomes of great importance. This is true at the iron-ore drying plants on the Mesabi. At the Whiteside drier, a flask has been devised which is both light and practically indestructible. As shown in the illustration, it consists of a short length of 5-in. wrought pipe, the bottom closed by a plate set in with the edge beaded down tightly on it. For the other end a screw plug with a handle is provided.

### Asbestos Shapes

BY DONALD M. LIDDELL

The plasticity of thin asbestos paper, when wet, does not seem to be sufficiently appreciated by most chemists. This material can be worked and molded like clay. In a recent laboratory visit some small rings were seen, which had been molded over a funnel, just where it begins to flare. These fitted inside iron crucibles, and just neatly took a platinum crucible inside, thus leaving an air space below this asbestos ring, between the iron and platinum crucibles. The arrangement permits of very rapid evaporations.

Another piece of this molded asbestos work was a cover which fitted the neck and upper half of the bulb of a Florence flask. After baking, the cover had been slit down one side, and removed. It could then be fitted over any flask, to prevent chilling the upper portion during distillations, etc.

The chemists in this laboratory said the sheet asbestos was invaluable for such work as this, for repairing muffles, etc.

**Rapid Evaporation in Platinum Crucibles** can be performed by setting a platinum triangle on the top of an iron crucible, then allowing the platinum crucible to come down in it so that  $\frac{1}{4}$ - to  $\frac{1}{2}$ -in. air space is left between the crucibles.



## Michigan State Tax Reduction

MARQUETTE CORRESPONDENCE

The Michigan state tax commission has reduced the valuation of the mines at Negaunee, Mich., \$2,500,000, without lowering the general property assessments accordingly, so the business men of that Marquette range city are protesting. The business interests have united in an effort to have the taxes reduced and have engaged counsel to appear before the commission. The taxpayers protest on the ground that they are assessed dollar on the dollar and, since the depression in the mining industry has set in, their property values have decreased in like proportion to the value of the mines. The businessmen are aware that the mining companies have sold little ore this season and assert that the reduction given the companies is just, but they hold that the city goes up and down with the mining industry and that the property owners in general are entitled to proportionate reductions. As a matter of fact, the cut in mining assessments is not because of trade depression, but because errors were made in the process of figuring valuations a year ago. These errors are now corrected.

In the Iron River district, Menominee range, the tax commission has cut off \$2,000,000 from the valuation of the mines. The figures for 1913 and those for this year are shown in the accompanying table.

	1913	1914
Caspian .....	\$3,670,000	\$2,772,879
Dober .....	1,160,000	1,030,792
Baker & Tully .....	1,010,500	396,950
Sherwood .....	1,103,292	1,037,101
Zimmerman .....	805,200	952,134
James .....	794,452	750,000
Bengal .....	782,000	913,147
Baltic .....	646,040	587,055
Forbes .....	608,678	745,355
Davidson .....	437,346	545,101
Homer .....	427,856	440,500
Minckler .....	361,000	347,450
Berkshire .....	251,150	246,416
Youngs .....	215,000	230,400
Fogarty .....	200,000	362,237
Chatham .....	176,000	129,940
Wauseca .....	141,620	140,429
Virgil .....	95,000	30,000
Hawatha .....	80,000	48,734
Wickwire .....	56,000	26,625
Purcell .....	25,000	30,000

Mining properties not assessed in 1913, but which are on the roll this year, are, together with the valuations given them, as follows: Aronson, \$72,200; Spies, \$32,000; McGillis, \$20,000; Cory, \$6870; Cortland, \$3000; Lenox, \$3000. The assessed valuations fixed include the value of the buildings and machinery, but not that of the stockpiles.

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## Salvaging Pumps in the Baraboo Mines

The iron mines of the Baraboo district in Wisconsin have been abandoned by the Steel Corporation. A particularly difficult feat, but one successfully performed, was that of salvaging the pumps. The Baraboo district is so wet that while the Steel Corporation shaft, sunk on an incline, is only 350 ft. deep, it produced 6,500,000 gal. of water per day. Thirteen pumps were used to raise this big inflow. As with the machinery stopped the mine was sure to become inundated within a few hours, great care and expedition were required to recover the equipment, too valuable to abandon. A bulkhead was constructed, bolts were loosened and other preparations were made to get the pumps out of the mine in

quick order, one at a time, once the hoisting was started.

So well did the plans work out that only two small pumps were left in the workings. The last pump taken out was in operation until within a few minutes of the time when, slung in its chains, it was taken to surface. The bulkhead, 7 ft. high, was submerged so quickly the men barely had time to escape. In less than six hours the shaft wall filled to within 50 ft. of the collar and water gushed forth from every drill hole on the surface.

The Steel Corporation controls in fee or lease 2000 acres in the Baraboo field. It is unlikely, however, that further efforts will be made to develop a mine for years to come. No ore was taken from the property now abandoned. No mining operations whatever are in progress in the field. Pumping costs are prohibitive.

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## Radium Output of Standard Chemical Co.

BY CHARLES H. VIOL\*

It has been customary in the past to speak of "radium" and to signify thereby the pure crystalline bromide salt (RaBr<sub>2</sub>·2H<sub>2</sub>O) which contains 63.6% of radium, element (or metal). Our sales are based on a guaranteed content of radium element in our preparations, and it is to be hoped that the practice of describing any radium preparation in terms of its radium-element content will soon become general. When the radium-element content is stated it makes little difference as to the purity of the salt, or whether it is a sulphate, bromide or chloride, since the exact purity of the salt and the chemical combination of the radium are of less importance than the actual amount of radium element in a preparation. Our radium is refined until it contains about 50 to 60% of pure radium salt and it is supplied in the form of bromide, chloride or sulphate. In order to avoid any possible misconceptions I give figures in terms of the equivalent of pure crystalline radium bromide and also in terms of radium element.

In October, 1913, following extensive alterations in our mill looking toward increased facilities in handling ore, etc., the Standard Chemical Co. entered upon the production of radium on a large scale. The first finished product was obtained in January, 1914, and contained the equivalent of 560 milligrams of pure radium bromide or about 300 milligrams of radium element. Since then each month has seen an increase in the production and at present the production (in the form of radium salts of 50 to 60% purity) is at the rate of 2050 mg. of pure radium bromide per month. That is the month's output contains 1100 mg. of radium element. This is not the maximum output for the year and each succeeding month will see an increase, such that by October, 1914, the monthly output will be equivalent to 2800 mg. of the pure radium bromide, or 1500 mg. of radium element. This is the estimated capacity of our mill.

In 1913, when it was foreseen that the Standard Chemical Co. was to produce radium on a larger scale than had ever been realized in Europe, it was of course important to assure a market for the radium as fast as it was produced. Just about that time Europe was in a fever of excitement over the application of radium in

\*Director, Radium Research Laboratory, Pittsburgh, Penn. Note—This article was written to reply to certain specific questions asked by the "Journal."

the treatment of malignant growths, and the small visible supply of radium was wholly inadequate to meet the great demands. Governments, municipalities and philanthropic persons were vying with each other in the purchase of radium.

The president of our company decided to sell one-half of our 1914 production abroad, which was then estimated would on the average amount to about 1870 mg. of pure bromide, or 1000 mg. of radium element per month. So contracts were made in 1913 to deliver the equivalent of 11,200 mg. of pure radium bromide (6000 mg. of radium element) to foreign purchasers during the year 1914. In spite of the fact that American physicians showed practically no interest in radium in 1913, half of the radium output for 1914 was reserved for this rather dubious market in the hope that the American people and physicians, particularly, would soon become aware of the importance of radium. This hope has been more or less realized and at present contracts are signed for the delivery, in America, during 1914, of radium preparations containing the equivalent of 7500 mg. of pure bromide (4000 mg. of radium-element). The balance amounting to the equivalent of 3750 mg. of pure radium bromide (2000 mg. of radium-element) is still available for delivery in 1914 at the current market price.

Up to May 1, the Standard Chemical Co. had produced a total of 8530 mg. of pure radium bromide (4563 mg. of radium element) and of this 5950 mg. of pure radium bromide (3183 mg. of radium-element) was contained in the material prepared between Jan. 1 and May 1. The Standard Chemical Co. is proud of the fact that so far all the contracts for the delivery of radium preparations have been promptly fulfilled, and as the contracts were based on the estimated outputs, which increase from month to month, this is further evidence that there has been no exaggeration in the statements regarding our present and future output. The greater amount of the radium preparations now sold are sulphate, with bromide and chloride next in the order named.

The producers of radium in America are the Standard Chemical Co., of Pittsburgh, Penn., and the Radium Co. of America, of Sellersville, Penn., although I have no definite advice as to the output of the latter company. There are, I understand, a number of companies in Colorado and Utah which at present are engaged in the preliminary work looking toward the future production of radium.

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### Chronology of Mining for June 1914

*June 1*—Timber Butte mill, at Butte, Mont., began regular operations treating Elm Orlu ore.

*June 2*—Canada Refining & Smelting Co. closed its plant at Orillia, Ontario.

*June 10*—East Tennessee mine surface plant of Ducktown Sulphur, Copper & Iron Co., at Isabella, Tenn., destroyed by fire.

*June 12*—Butte miners started rioting in protest against unions levying assessments to support strikers in other districts, charging union officials with irregularity in disposing of union funds.

*June 17*—Two mills of Witherbee-Sherman & Co. at Mineville, N. Y., destroyed by fire.—Workmen at the Abangarez mine in Costa Rica seized and operated mine and mills when company attempted to shut them down pending introduction of a system for preventing theft of gold.

*June 19*—Fire in the Vieille Marihaye colliery, near Liège, Belgium, resulted in entombing 200 coal miners.—An explosion in the Hillcrest colliery, Hillcrest, Alberta, resulted in the death of 199 miners.

*June 22*—The Supreme Court decided the Intermountain rate case in favor of the Interstate Commerce Commission, and against the railroads.

*June 24*—Supreme Court handed down decision in favor of Southern Pacific R.R. in oil lands in California case.

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### New Mine and Metallurgical Construction

*Arizona Consolidated Gold Mines Co.*, Kingman, Ariz., broke ground June 1, 1914, for a Nissen stamp mill of 6 to 12 tons daily capacity, which will be completed Aug. 1; cost of installation, \$7500.

*Pasquale Copper Co.*, Bellevue, Ariz., broke ground May 1, for a 100-ton flotation plant, which will cost \$35,000 and be completed in six months.

*R. F. Schaefer*, Vulture, Ariz., will build a mill with three to five stamps.

*Argonaut Mining Co.*, Jackson, Calif., plans building a 50-stamp mill of 200 tons' daily capacity, to replace the old 40-stamp mill.

*Arnold Concentrating Machinery Co.*, Lawson, Clear Creek County, Colo., broke ground Mar. 25, 1914, for a concentrator for treating low-grade ores, which cost \$10,000 and was completed May 25.

*Tomboy Gold Mines Co., Ltd.*, Telluride, Colo., broke ground May 7, 1914, for a cyanide plant of 400 tons' daily capacity for the treatment of tailings, which will cost \$130,000 and probably be completed by December.

*Tecumseh Mining Co.*, Thoms Station, Mo., operated by Homer Seals, Joplin, Mo., is building a mill of 150 tons' daily capacity, which will cost \$10,000 and be ready for putting in commission after July 10.

*Butte Duluth Mining Co.*, Butte, Mont., broke ground Nov. 1, 1913, for a leaching plant with electrolytic precipitation of 1000 tons' capacity, which will cost \$250,000 and be completed in July.

*Elko Mining Co.*, Jarbidge, Nev., is considering building a cyanide plant, possibly this summer.

*Irwin Bros.*, Currant, Nye County, Nev., completed a small stamp mill of 10 to 15 tons' daily capacity, May 1, 1914; it cost \$2000.

*Metals Recovery Co.*, Dayton, Nev., broke ground Aug. 1, 1913, for a cyanide plant of 200 tons' daily capacity, which cost \$50,000 and was completed May 1, 1914.

*Nevada Packard Mines Co.*, Rochester, Nev., will probably begin grading Oct. 1, for the first 50-ton unit of a cyanide plant.

*Ben Harrison Mine*, Whitney, Ore., expects to break ground in July for a cyanide plant of 120 tons' daily capacity to cost \$40,000 and be completed by October.

*Park City Milling Co.*, Park City, Utah, began remodeling the Graselli mill Mar. 17, 1914, for treating



50 tons of ore daily, by chlorination, the cost being \$21,000; the work was completed early in July.

Lawrence Mines Co., Hazel Green, Wis., will complete by Sept. 1, entire mining equipment and mill of 150 tons' capacity per 9-hr. shift.

Mineral Point Zinc Co., New Diggings, Wis., will complete, by the end of the year, a Joplin-type mill of 250 tons' daily capacity at a cost of \$12,000.

Wisconsin Zinc Co., New Diggings, Wis., broke ground May 1, 1914, for a hoisting plant and mill of 300 tons capacity per 24 hr. at a cost of \$50,000, which will be completed in September.



### Mining Dividends for June

Thirty-one mining companies making public reports paid \$7,410,317 in dividends in June, as against \$7,331,706 paid by 34 companies a year ago. Steel, smelting and holding companies paid \$12,945,007, an increase of \$220,291 over June, 1913; and Mexican and Canadian companies paid \$1,018,580 as compared with \$1,287,645 last year.

United States Mining Companies	Situation	Per Share	Total
Alaska-Treadwell, g.	Alas.	\$0.75	\$150,000
Bunker Hill & Sullivan, l. s.	Ida.	0.25	81,750
Bunker Hill Con., g.	Calif.	0.02	10,000
Butte & Superior, z.	Mont.	0.75	406,703
Calumet & Arizona, c.	Ariz.	1.25	748,741
Calumet & Hecla, c.	Mich.	5.00	500,000
Chino, c.	N. M.	0.75	648,615
Federal M. & S. Co., l. s.	Ida.	1.50	179,791
Fremont, g.	Calif.	0.02	4,000
Gemini-Keystone, l. g. s.	Utah	10.00	50,000
Golden Cycle, g.	Colo.	0.03	45,000
Hecla, l. s.	Ida.	0.02	20,000
Homestake, g.	S. D.	0.65	163,254
Mexican, g. s.	Nev.	0.75	141,750
Nevada Con., c.	Nev.	0.37½	749,796
North Star, g.	Calif.	0.40	100,000
Ray Con., c.	Ariz.	0.37½	543,964
Superior & Pittsburgh, c.	Ariz.	0.38	569,922
Stewart, s. l.	Ida.	0.10	123,826
St. Joseph, l.	Mo.	0.05	73,632
Tennessee, c.	Tenn.	0.75	150,000
Tomboy, g.	Colo.	0.48	150,660
Tom Reed, g.	Ariz.	0.06	54,573
United Verde, c.	Ariz.	0.75	225,000
Utah, c.	Utah	0.75	1,189,440
Vindicator, g.	Colo.	0.03	45,000
Wasp No. 2, g.	S. D.	0.01	5,000
Yellow Aster, g.	Calif.	0.00½	5,000
Yellow Pine, l. c. z. s.	Nev.	0.01	10,000
Yosemite, g.	Calif.	0.01	2,400
Yukon, g.	Alas.	0.07½	262,500

#### Iron, Industrial and Holding Companies

Iron, Industrial and Holding Companies	Situation	Per Share	Total
Am. Sm. & Ref., com.	U. S., Mex.	1.00	500,000
Am. Sm. & Ref., ref.	U. S., Mex.	1.75	875,000
Crucible Steel, pfd.	U. S.	1.75	427,638
Greene Cananea, c.	Mex.	1.00	486,209
International Nickel, com.	N. Y.	2.50	948,133
Lackawanna Steel, pfd.	N. Y.	1.75	612,115
National Lead, com.	U. S.	0.75	154,916
National Lead, pfd.	U. S.	1.75	426,436
Phelps Dodge, c.	U. S., Mex.	4.00	1,800,000
Pittsburgh Steel.	Penn.	1.75	112,500
U. S. Steel, com.	U. S.	1.25	6,353,781
Warwick I & S.	Penn.	1.67	248,279

#### Canadian, Mexican and Central American Companies

Canadian, Mexican and Central American Companies	Situation	Per Share	Total
Caribou Cobalt, s.	Ont.	0.02½	25,000
Crown Reserve, s.	Ont.	0.02	35,376
Granby Con., c. g. s.	B. C.	1.50	222,721
Hedley, g.	B. C.	0.50	60,000
Hollinger, g.	Ont.	0.15	90,000
Kerr Lake, s.	Ont.	0.25	150,000
Lucky Tiger, g.	Mex.	0.09	64,330
Mexico Mines of El Oro, g. s.	Mex.	0.96	174,960
Peterson Lake, s.	Ont.	0.01¾	63,000
Seneca-Superior, s.	Ont.	0.12½	59,860
Standard Silver Lead, s. l.	B. C.	0.02½	50,000
Temiskaming & Hud. Bay, s.	Ont.	3.00	23,283

The features of the month's payments are an extra dividend by Alaska Treadwell; a long expected disbursement by Mexican, which shows what can still be done on the Comstock by real miners; an initial payment by Butte & Superior; and resumption of payments by Wasp No. 2.

Dividends for the half-year are: Mining companies, \$32,925,883 in 1914, \$38,216,193 in 1913; metallurgical

and holding companies, \$41,714,103 in 1914, \$41,129,521 in 1913; Canadian, Central American and Mexican companies, \$9,894,912 in 1914; \$10,781,767 in 1913.



### Lake Superior Mining Institute

#### ISHPEMING CORRESPONDENCE

It has been definitely decided to hold the 1914 meeting of the Lake Superior Mining Institute during the week of Aug. 31. The members will assemble at Ishpeming, Mich., on the Marquette range, the first day, where a first-aid meet will be held and a visit made to some of the newer mining properties. After the completion of the contest, the members will be taken in automobiles to the Negaunee mine, at Negaunee, where everything in and about the mine is operated electrically. From here the party will go to the Cleveland-Cliffs company's hydro-electric plant on the Carp River, where the power is generated for the Negaunee and other mines owned and operated by the Cleveland-Cliffs company. After this the Lake Superior & Ishpeming Ry.'s steel dock at Marquette will be visited. It is expected that visiting these points of interest will consume a whole day. If the plans of those in charge carry, the members of the Institute and guests will then take the night train on the Duluth, South Shore & Atlantic Ry. for Mackinaw City, arriving there the following morning. At this point a chartered steamer, "City of Detroit, II," of the Detroit & Cleveland Navigation Co., will be boarded for Detroit. The members will have the exclusive use of the boat and all business sessions will be held on board. Two days will be spent in Detroit, and the return trip will be made either on a special steamer or on the regular boats, as some have expressed a desire to remain away for a week or more. It is believed that 300 will make the trip.

The first-aid and mine-rescue exhibition at Ishpeming will be in charge of Charles E. Lawrence, of Palatka, Mich.; D. E. Sutherland, Ironwood, Mich.; William Conibear, Ishpeming, Mich.; W. H. Schacht, Painesdale, Mich.; and M. H. Godfrey, Virginia, Minn. Elimination contests will be held on all of the iron ranges to select the teams that are to represent the several districts in the meet. Cash prizes and trophies will be presented to the teams exhibiting the most skill. The judges will be selected from surgeons and first-aid men who are not identified with any mining company.

#### ENTRANCE RULES

- 1—All entries will close July 20, and must be filed with William Conibear, Ishpeming, Mich.
- 2—A team is composed of five men, including captain.
- 3—Each team will select its own patient in addition to the five operating members thereof, or will have a miner present selected for them.
- 4—All members of a team shall be bona fide workers.
- 5—The teams will bring their own first-aid material, including bandages, splints, blankets, stretchers, etc., and will not be allowed to leave the patient to secure material.

#### CONTEST RULES

- 1—The captain will select the patient and designate the member or members of the team to perform the work.
- 2—The captain will control his team in the field by giving audible commands.
- 3—The captain may select himself as one of the members who will perform.
- 4—The captain or other members will not prompt the person performing unless he is one of the performers. This will not apply to full-team events.
- 5—At the conclusion of any event, the captain will raise

his right hand and announce his team number. The team will remain at post until relieved by the judges.

6—The triangular bandage will be the standard used in the contests, but roller bandages may be used and equal credit will be given for their proper use as with the triangular bandages.

7—All splints must be prepared on the field for each event requiring their use. Specially designed splints may be used, but they must be assembled during the time of each event requiring their use.

8—No practicing will be allowed on the field before the beginning of the contest.

9—The teams will be numbered consecutively, beginning at No. 1, and they will occupy their consecutive positions on the field.

10—Each judge will mark the team number, event and discount for each team judged, sign his name and deliver record to recorder.

11—The recorder will foot up the discounts and mark points made by each team in each event. The total points will be divided by the number of events and the quotient will be the average for each team for the entire contest.

12—Time will not be an element unless the team or men performing run over the allotted time or fail to give treatment properly.

13—All exceptions to these rules must be made to the Committee on the Practice for the Prevention of Accidents of the Lake Superior Mining Institute, of which Charles E. Lawrence, general manager for Pickands, Mather & Co., Palatka, Mich., is the chairman.

## Alfred E. Barlow--An Appreciation

BY H. MORTIMER LAMB

The majority of men born into the world pass out of it leaving little to mark the passage of that progress. A small minority in each generation more richly endowed with gifts, and chosen of destiny, stand out as conspicuous figures from among the multitude, and achieve by their works and service to humanity some nearer approach to immortality. The name of Alfred E. Barlow, whose death was briefly announced in the JOURNAL a week or so ago, will be indelibly associated with Canadian geology, and particularly with that branch of it dealing with economic problems, whereof he was in this country a pioneer exponent. Two, at least, of his papers for the Geological Survey of Canada are classics. His voluminous and comprehensive report on the Sudbury nickel area has been of immense service to industry. His report on corundum, written in collaboration with Dr. F. D. Adams, and of which just before his death he completed the preparation of a revised edition, is no less monumental. Other important work he did, as all geologists know.

But the recollection of him as a personality, as a man, can linger only for a short while, limited to the duration of the lives of his friends and intimates. Hence my acceptance of the invitation to write this appreciation in testimony of the charm of his nature and the uprightness and manliness of his character. Were he alive, such a task would have been a welcome one; with the somber shadow of his tragic death so near it becomes a mournful duty.

The successful geologist, I conceive, must possess a temperament akin to that of the great painter or poet. He must have an intense love and a reverence for nature, whose secrets he would fathom and interpret. He must be gifted with imagination, and be large of soul, in order that the greater truths that lie beneath the surface of things may be revealed to him. And because geologists of distinction have these attributes, which make them essentially human, they are usually lovable. Barlow was one of the most lovable of men, but it was necessary to

know him well to realize fully and appreciate the finer and bigger side of his nature. A superficial acquaintance might easily create misleading impressions, for he, like his great prototype, Sir William Logan, was inclined to be careless of his personal appearance, while a certain almost boyishness of manner gave no indication of his powers of mind and character. Nevertheless, there have been few men who commanded to so universal a degree the respect and esteem of their associates. And the foundation for the sentiment he inspired may be attributed to certain fundamental and admirable qualities that were the basis of his character. He was unfalteringly honorable in all his dealings; he was the spirit of sincerity; he was entirely fearless; extraordinarily disinterested; always true to his principles and ever loyal to his friends.

You never had any doubt where he stood and if he fought you it was in the open. Perhaps he loved fighting rather overmuch, but his fight was always for a cause or a principle, not for his personal gain, unless he believed there had been an attempt to impose on him. As a worker, he was indefatigable. His delight in work, and in geological investigation in particular, was unbounded. But since he left the Canadian Geological Survey in 1907, certainly more than half his time has been ungrudgingly devoted to the performance of gratuitous service. McGill University, where he served as honorary lecturer in economic geology, owes much to him. He contributed in no small measure to the success of the International Geological Congress. But his chief debtor is the Canadian Mining Institute, of which he was successively a councillor, vice-president and president. His profession was first, but the interests of the Institute were next in his affections. He devoted himself to the promotion of those interests with unflagging zeal, sparing neither his time nor his money, which latter he was none too well able to afford. During his term of office he must have traveled several thousand miles at his personal expense on behalf of the Institute, while day after day he would put his own affairs aside for those of the Society.

Doctor Barlow retired from the presidency of the Institute last March, and but for the fact that he held office and considered it a point of duty to be present at the annual meeting of the society, he would have sailed for Europe last December or January, and in all probability would have been alive today. It is difficult yet to realize the loss his death represents. To his friends, it seems irreparable. To the mining industry of Canada, and to the Canadian Mining Institute, it is a heavy blow. But measured by effectiveness, Barlow's life, although so prematurely shortened, was far fuller than that of most men whose years extend to beyond the scriptural span. It is no less solacing to believe that he himself could have chosen no more fitting or more noble end, for there can be no doubt that he gave his own life in the effort to save that of his wife, to whom he was devotedly attached.

It may not be out of place to add here that it has been proposed to establish a memorial of Doctor Barlow, for which purpose an endeavor is now being made to raise funds. Already the invitations to contribute have met with a ready response both in this country and in the United States. The form the memorial will take will depend largely, of course, on the amount of money subscribed, but the present suggestion is to place a gold medal, at the disposal of the Council of the Canadian Mining Institute, to be awarded annually.



## Correspondence and Discussion

### Automatic Samplers

My attention has just been directed to L. U. W. Judell's description of "A Simple Sampling Device," printed on page 1052 of your issue of May 23, 1914. The machine illustrated is not, as Mr. Judell suggests, "altogether original," as the same mechanical movement has been applied to automatic samplers before. All such movements of the sampling trough suffer from the same absolutely fatal defect.

On reference to the illustration, it will be seen that the sampling trough is moved by a falling weight, in this instance a slowly filled tipping tank; therefore, at the beginning of its traverse it must move at a slower rate than at the end of its traverse. It follows, therefore, that if there be a greater proportion of water or sand or slime at one side of the launder than there is at the other, the sample drawn must be inaccurate.

Furthermore, in the sampler illustrated the area of the crifice through which the sample is collected changes in accordance with its position in relation to the bottom of the launder, being a maximum at the middle of the stroke and a minimum at the beginning and end of the stroke. It follows from this that a larger proportion of the middle of the stream is secured than of either side, and therefore again the sample must be inaccurate.

This question of automatic sampling is an extremely important and interesting one. During the last few years much work has been done on the subject and many trials with various forms of samplers have been made. The sampler illustrated and described on p. 1017 of the JOURNAL of May 16, shows a machine free from the defects pointed out above, because it cuts an absolutely true sample, the cut being made at a perfectly uniform speed with a collecting orifice of fixed area.

W. H. C. JEROME.

Stoke Newington, N., England, June 5, 1914.

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### Oil on Eastern Slope of the Andes

I have noticed in the JOURNAL of June 13, an article upon the "discovery of oil on eastern slope of Andes," marked "Washington Correspondence." This article would give the impression that petroleum in paying quantities is about to be found along the entire eastern slope of the Andes.

As I looked into this question, and these Santa Cruz deposits in particular, during a trip through these countries in 1911, I am surprised at this statement, and should advise all stampedeers to the new diggings to get much more proof of the conditions before they stampede. The information sounds too much like that contained in Colonel Roosevelt's recent speech before the Geographical Society to the effect that a great mining region is lying dormant along the Paraguay River. I do not believe it, and think these off-hand predictions should

not be taken too seriously. There are numerous oil seeps along the eastern slope of the Andes and considerable drilling has been done, especially in Argentina; but no one, so far as I know, has ever struck oil in commercial quantities there.

A. P. ROGERS.

New York, June 20, 1914.

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### Development System, Lyon Mountain Mine

Appended to an abstract published in the JOURNAL of May 16, describing the development work now under way at the Lyon Mountain mine of the Chateaugay Ore & Iron Co., I note the editorial comments on the advisability of developing by inclined shaft rather than by vertical shaft, and also on the proposed methods for ventilating the workings.

The question of vertical or inclined shaft was considered in all its bearings. The country rock in the district is an extremely hard syenitic gneiss and with a vertical shaft the cost of crosscuts to the vein would be large, as well as the cost of excavating ore pockets adjacent to the shaft. A vertical shaft, to develop the territory below the old mine, which has been proved by diamond drilling, would necessarily be on ground over 100 ft. lower than the present concentrating mill and 1200 to 1500 ft. distant. By sinking an inclined shaft, we are able to land the ore practically at the mill, the headframe and shaft-house being only about 100 ft. away.

Again, by sinking parallel to the average dip of the ore in the foot wall, at a distance of 20 to 50 ft. from the vein, the shaft will be kept entirely independent of the mine workings so that disturbances caused by the removal of the ore will not affect it. This foot-wall material is really a portion of the mineralized ore zone, and contains more or less lean ore, being thus better material to sink in than is the syenitic country rock. The shaft can be sunk more cheaply and rapidly than could a vertical shaft through the country rock. Other reasons governing our choice are of more purely local interest.

It will be understood, of course, that the "vein" is a mineralized zone or orebody from 100 to 200 ft. thick, containing a concentration of magnetite near or along the upper border of the zone, and this concentration of mineral constitutes the ore which is usually spoken of as the vein or orebody.

As consulting engineer to the Chateaugay company, I am personally responsible for the plans under which these improvements are being made, but the details, both as to general layout and power plant, hoisting and machinery equipment, have been worked out by my son, T. M. Chance.

Regarding the comments upon the proposed method of ventilation and the statement that the ventilation at Lyon Mountain is good, it is true that the ventilation

of the mine is most excellent, and if the new mine were to be worked by the methods which have been used heretofore, no special provision for ventilation would be necessary. However, the new mine is to use a shrinkage-stope method of mining, and a well planned system for insuring efficient ventilation of the stopes, and a quick driving out of the powder smoke is therefore essential. The method adopted is practically that in common use for ventilating steeply pitching anthracite mine workings where the breasts are kept full of broken coal. Such system if planned from the outset will be much cheaper and more efficient than the usual methods of supplying stopes with air by forced ventilation through pipes or conduits, and was chosen as being much more satisfactory than any other known method. It further provides, as your comment points out, protected traveling ways for the men, and will thus reduce the risk of men being run over by cars or motors. The old workings of the Lyon Mountain mine are connected to the surface by 12 or 15 shafts; all of these were opened and sunk and the ore was stoped by the open-stope method. Under such conditions and with an orebody as large as the Lyon Mountain deposit, there would, of course, be no trouble with the ventilation.

In opening up the shrinkage stopes, raises will be driven from each level and pushed through rapidly by double-shift work, until they are holed into the level above. These raises will be at points corresponding to the end of each stope, and are planned to be 300 ft. apart, giving a length to each stope of 300 ft. The levels will be 300 ft. apart so that each stope will be 300x300 ft., by the working width, which is an average of 35 to 40 ft. These raises will be used for ventilation and for access to the stope. The stope will be opened from the level below by raises spaced 50 ft., which will be used as loading chutes. These raises will be driven up wide enough to be used as chutes and will gradually be widened out until they meet, thus providing substantial pillars at the bottom of each stope. At the start, access will be had to the stopes from the raises and chutes, but after the end raises are holed through, access to each stope will be had from above through these raises. Tools, drill steel and materials will also be raised and lowered from the upper level through these raises, using small air hoists. If it be found that the distance of 300 ft. between levels is too great, a counter level will be driven midway between the levels, and ore from this level will be passed through a chute, or chutes, directly to the loading pocket on the level below.

All of the work has been planned to secure continuous and intensive operation and large output, by methods that will insure safety to the men and proper working conditions. The shrinkage-stope system could not properly be used in a large development such as is planned, without provision for adequate ventilation. Many of the mines in the Lake Superior districts are today seriously handicapped as to cost and output because of the impossibility of securing adequate ventilation, operations being carried on under conditions that seriously decrease the efficiency of the average employee; these conditions developed because provision was not made at the outset for efficient ventilation. The depth of the mines has increased, the output and number of men employed has increased, but it seems impracticable to ventilate in a way that will carry out the powder smoke and keep the

humidity and temperature conditions such as will enable a man to perform a full shift's work.

H. M. CHANCE.

Philadelphia, Penn., May 18, 1914.

### What Becomes of All the Mining Engineers?

The query, "What Becomes of All the Mining Engineers?" propounded by J. I. Blair in the JOURNAL of May 30, 1914, is evidently meant to be serious, although on first reading I mistook it for attempted humor or the brain-child of one suffering with a grouch. On second thought I have attributed the author's trouble to "liveritis," and would there let the matter rest were it not that the author has left the mining engineer and the mining and smelting business in such a helpless condition. Hence to the rescue.

If there ever was a business that needed and is asking for the technical man to guide its affairs it is the mining and smelting business, and its successful engineers are amply rewarded. The man with an engineering diploma from some college is simply a possibility and nothing more. That more college mining engineers are not following their supposed calling is due to several reasons:

The physical requirements for young mining engineers are severe and many young engineers find, after a few months in the field, that they are not equal to the task, physically, or else do not care to submit to the hardships. To be a successful mining engineer requires a high order of executive ability combined with good engineering brains in the one head, and this is a rare combination. Many young potential mining engineers find that they are better fitted for other lines of engineering and they enter these other fields, to their benefit.

Then there is the man with simply a superficial engineering education and nothing more. This type is found in every profession or occupation and because of some mental deficiency will be found among the tail-enders. That only a small percentage of college graduated mining engineers remain and succeed in the profession I readily admit, but it is not because of lack of opportunity. A large number desert the profession for reasons given above, some few are natural failures; those that remain and have brains succeed and succeed in a substantial way.

In following Mr. Blair across the continent I did not find only a few technical men at work, and all in minor positions. Such is not the case. Mr. Blair was seeing things with jaundiced eyes. The recent advances in mining and metallurgy were made by the brains of the technical man—the mining engineer—and not by the ex-drygoods clerk, who thinks only as per directions from the boss. That some fail as cited in the last paragraph of Mr. Blair's article I do not doubt, but these are the rare exception and not the general rule as is rather suggested.

But not to carry this too far, it is my opinion, based on some years of active work in the profession that mining engineering offers an equal opportunity for the young man properly equipped with any other profession or occupation; that the wealth and success gained is the cleanest in the world; that the rewards are certain and come much sooner than in most other professions; that the field is the greatest and the opportunities larger than anywhere else.

Park City, Utah, June 6, 1914. GEO. H. SHORT.



## Editorials

### What Is the Prospect for Copper?

Everybody has had to reverse the optimistic views of the prospects for copper that he held six months ago. At that time the statistics were good and the sentiment also was good. Since then sentiment has become bad. This is because of the pall of depression that has overtaken American industries. The forecasts of production and of European consumption have proved to be correct; but the forecast of revival in American business and increasing domestic consumption was as erroneous as anything could be.

The brilliant statistical position, which has all along been the bulwark of hope, is not yet materially impaired. But if things continue for another three months as they are now the statistical position will begin to be looking dubious. In that event we might as well be prepared to see copper at less than 13c. Indeed, it is not very far from that now. On the other hand, a sudden revival in domestic demand might cause the price to bound up to 15c. within a few weeks.

Which will it be? The answer depends on what is going to happen in general business in this country. He who can solve that riddle can prophesy the movement of copper.

### Iron-Ore Supplies

Independent producers—that is, producers who mine ore to sell—are not having a very good time this season on the Lake Superior iron ranges. The season prices are lower than for several years, sales so far are light, and the prospects for business not very good. The large quantity of ore brought down last season on a falling market and decreasing demand has filled the furnace yards to an unusual extent, and they are not disposed to buy, even at the lower prices, until the old stocks are worked off. The last stroke has been found in the reported sales by two or three large furnace and steel companies of some round lots of ore to outside furnaces. These companies have, perhaps, found that it is worth while to make such sales to keep down expenses and fill up the minimum quotas on their leases. It is good for them, but not so good for the merchant ore miners.

That there has been some change in views concerning iron ore has been observed by more than one commentator. A few years ago there was a rush to secure iron-ore properties, especially in the Lake Superior country. The iron or steel company which was behindhand in the race was pitied, a concern doomed to early failure. The culmination of the rush was the lease of the Hill ore properties by the United States Steel Corporation, which most people now take as an economic and financial mistake, imposing a heavy burden on the Corporation with no corresponding benefits. This lease was abandoned mainly for political reasons, or for effect on the Government suit against the Corporation; but it would probably have been

given up in any event, when its full effects were realized.

The surrender of this lease, though it will not terminate until next year, marked the turn of opinion. The steel men have learned what some engineers could have told them before, that an iron-ore famine was a very remote contingency. It will be a long time before supplies begin to be exhausted, and some of them, at least, realize that they have burdened themselves with heavy continuing charges to provide against an emergency which is not likely to arise until long after our time. Reserves of iron ore in the United States are so large and the quantities that South American and other neighbors are ready to supply are so great that scarcity is not to be considered as a factor.

It is not simply a dull year that has brought about this change of views; it would have come, perhaps a little later, in any event. A pinch is a good thing sometimes, if it will teach us that future prosperity is dependent not upon hoarding up natural resources, but in extending their wise and economical use.

### Analysis of Mine Accident Figures

We recently commented on the general excellence of the Bureau of Mines' 1912 metal-mine accident report, but suggested lines of improvement in the collection and formulating of statistics that seemed to us desirable. A large part of the value of such reports is the stimulation of rivalry along safety lines. This end, the comparison of results in the various states is well calculated to serve. We look forward to the day when a low death rate and accident rate shall be as much a source of commonwealth pride as a great production of metals. For purposes of analysis, however, a division by districts would be more serviceable than by state boundaries. The mining regions of this country are susceptible of grouping into a few large divisions, within any one of which mining conditions are similar, while they differ from those existing in other divisions. This is particularly true of labor conditions and nothing more forcibly influences the accident and death rate than the character of the labor available or employed. Such a division might be as follows: (1) The Rocky Mountain, Pacific Coast and southwestern states, including Alaska and the Black Hills; (2) the Mississippi Valley lead and zinc districts; (3) the Lake Superior iron and copper region; (4) the southern states iron region; (5) the Atlantic states.

The report in question also presents its figures classified according to the metal mined; i.e., into copper, gold and miscellaneous metal, iron, lead and zinc in the Mississippi Valley, miscellaneous mineral. There is not much information to be gained by this analysis. The mining of any one metal does not constitute a homogeneous industry, and conditions affecting the mining of any such metal are highly variable. The Ray copper mine is more fairly comparable with the Alaska-Gastineau gold mine than

with the Anaconda copper mine. Utah Copper has more in common with the Mahoning than with the Calumet & Hecla. A division by the mining method followed would be more logical and more profitable. Some such tentative division would be: (1) Work in narrow veins or deposits of similar form; (2) caving and slicing; (3) other methods in large orebodies; (4) steam-shovel work; (5) glory holes and milling; (6) dredging; (7) hydraulicking. Such a division has regard to the essential hazard of the various systems.

No adverse criticism of the work of this nature, which the Bureau is carrying on, is here intended. We believe it to be extremely well done and of the greatest importance, but in the process of development, certain changes are likely to be found desirable. The changes here suggested we put forward as objects toward which to work.

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### International Gold Reserves

At the recent Congress of Chambers of Commerce in Paris, one of the leading questions brought up was the question of gold reserves as a means of preventing panics, on which a committee had been appointed the year before. The report of this committee was presented by Mr. Faithfull-Begg, of London, suggesting an international organization by which the circulation of gold supplies can be regulated quickly and effectively and the reserves placed where they are especially needed in times of trouble. In effect the plan strongly resembled the International Monetary Clearing House suggested by Richard P. Rothwell over 20 years ago.

The chief addition to that plan was that this clearing house should control a large reserve of gold held in readiness for quick and effective use. The report suggested that this reserve should amount to \$90,000,000, to be contributed by the six leading commercial nations, and to be held permanently at six financial centers, except when specially needed.

The clearing-house part of the committee's scheme met with few objections, but the reserve section was sharply criticized by such eminent financial authorities as M. Raffalovitch and Herr Kaempff. They both pointed out that the questions involved would stir up matters of an international and political character, and that it might be very difficult to secure agreement as to the use of the reserve, or the special need for it at any one center. Moreover, Herr Kaempff suggested that the hoarding of so great a sum might in itself at times cause financial trouble.

Another point, which does not seem to have been brought up at the meeting, was that some of the great commercial nations might very strongly object to the use of the reserve to meet an emergency caused by an outbreak of militarism and excessive expenditure for armaments on the part of other nations. Such a condition has been partly the cause of the demand for gold which has been so strong in Europe for the past half year. That demand has taken from the United States some \$60,000,000 in gold in the last three months; but it has taken it in the ordinary course of trade, because we owed money, and because our supply of gold was abundant at the time. There would have been sharp resistance to the taking of the gold by any international committee.

The Congress referred the whole matter back to the committee for further study and a report two years

hence. During that time the plan may be materially modified. Its adoption in the present form seems hopeless, even as a recommendation.

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### Some Questions

If Congress enacts legislation exempting labor unions from ordinary processes of law, what is to be done when members of a union shoot and dynamite each other, as recently in Butte?

What is to be done when 80,000 members of the bricklayers' union are blacklisted by the superior labor organization and excluded from chances of earning their living in so far as that body can control things?

If farmers are to be permitted to organize and hold their wheat for an agreed price, why may not the bakers agree upon a price for bread made out of that same wheat? And why then should not the copper producers agree about the price for their product?

If thrifty workmen have invested their savings in the shares of the Steel Corporation, or the other companies for which they are working, are they to be punished for being capitalists?

Is the new legislation that is directed against the big corporations and very wealthy men in reality going to bear hardest upon the middle classes, who are workers even if not organized?

Do the big banks, railways, and insurance companies really own the bulk of the wealth of the country or do they merely concentrate the savings of hundreds of thousands of small investors who by their thrift have saved from their labor?

Is the "new freedom" to be simply a freedom for farmers and members of labor unions and is the new legislation to be especially in the interest of the incapable and unthrifty?

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### Ingenious Skip-Loading Arrangement

There is described in this issue by Clarence Haight a mechanically operated skip-loading chute, the most complicated to design and the simplest to operate that has ever come to our attention. The device is in use in the main hoisting shaft of the New Jersey Zinc Co., at Franklin Furnace, the design having been worked out by the manager, Mr. Catlin.

The arrangement embodies the familiar double-pocket principle; the lower loading pocket, which holds just a skip load, is filled while the skips are traveling, so that it is ready for instant discharge when the descending skip is spotted below it. There is nothing new in this, but the fact that the upper gate is left open until time to load the skip and then closed by the same operation that discharges the loading pocket, is a novelty. It is difficult to imagine anything simpler than this—one twist of the control valve after the skip is loaded, another when it is time to load it again. Three points in the design make this possible. In the first place, the relative positions of the pocket and the feeding chute are such that the ore at the angle of repose, itself prevents any overflow; in the second place, the upper gate is swung up through the ore pile by the powerful action of the hydraulic ram; in the third place, the two gates are mechanically connected by a system of levers and arms



so that not only does one stroke of the ram move both gates, but it closes the upper one before it opens the lower and opens the upper after it closes the lower.

The speed of this loading chute is evidenced by the hoisting rate given in the article. Where high capacity is required from a shaft, especially if it is relatively shallow and the loading time is an important element in the hoisting cycle, it would be hard to devise a more economical installation than this.

**BY THE WAY**

What a wretched life Brother Moyer has to lead! He visits Hancock, Mich., to run a strike, is deported with some personal damage incidental thereto, and thereafter had to direct the strike from a distance. Lately he went to Butte to adjust some internal affairs of the union and had to make a precipitous departure to avoid being dynamited, since when he has been spouting from Helena. In the meanwhile the courts of Michigan are awaiting his attendance. Truly the career of a patriot has its trials and tribulations. Brother Moyer is quoted as saying in Helena: "I almost lost my life in Butte." In Hancock it was the enraged citizens who were the aggressors, although Moyer averred that they were thugs led by the doughty McNaughton in person. In Butte it was his own whilom subjects.

During an attack made by Constitutionalists upon the Federal forces in Matamoras, Mexico, the defending Federal troops entrenched themselves behind a barricade of barbed wire, and then, as an afterthought, their commander hit upon the pleasant scheme of connecting this barbed wire to the line of the Matamoras electric plant, says *Engineering*. During an assault on the Federal works six or seven Constitutionalist soldiers were electrocuted by the wire before the deadly nature of the barricade became known. Withdrawing his infantry, the rebel general directed his field guns upon the electric plant, quickly shutting it down. Returning to the assault the now innocuous barbed wire entanglement proved only a slight obstacle to the final capture of the city by the Constitutionalist forces.

This is a tale from Russia, although its geographical situation is of small account, except as explaining some peculiarities of its English. It runs somewhat as follows: "In the Namanganska Mountains, in the district of Fergiana, a new metal has been discovered whose properties are surprising and remarkable. A prospector found, besides rich deposits of asbestos and rare ores of different kinds, a dough-like metallic substance of a dirty brown color, which was not known to either chemists or metallurgists before. He sent a sample of the stuff to the chemical laboratory in Moskva, where it was analyzed and experimented on with most surprising results. When the ore was treated with acids an intensive cold was developed. The glass that held the acid was disintegrated into powder. Vessels of stone and porcelain were reduced in the same manner. Iron vessels to hold the acid were then tried, but they exploded instantly and were reduced to atoms. The chemists then tried it on a large piece of granite. This was instantly disintegrated and reduced to

gravel without explosion or generation of gas of any kind. When alkalines were brought into contact with this new substance the vessel containing the alkaline lost 20% in weight. So far as the chemists have yet been able to ascertain, this new substance is in no way related to radium. One of the most curious phenomena concerning it is that substances coming in contact with it lose much of their weight." By which we are reminded again of the traveler-farmer dialog. "There's a great scientist lives up there." "You don't say, what does he do." "He's looking for an acid that will dissolve everything." Head scratching by Reuben—"Huh, what's he going to put it in."

**What is a Prospector?**

We beg to report that analysis of the specimen labelled *Prospector* shows the following:

	Per Cent.
Optimism .....	45
Alcoholism .....	22.5
Superstition .....	11
Perseverance .....	9
Education .....	5
Business sense .....	2
Insolubles .....	2
	96.5

SNICKERS & PRANKS—  
Psychological Chemists.

The foregoing being merely the result of a test on a grab-sample, it is manifestly unjust to generalize. But if asked to describe the typical prospector one must plagiarize the remark of the old farmer who, upon first seeing a giraffe, indignantly exclaimed: "there ain't no sich animal." For, like the typical farmer of the vaudeville stage, the common conception of the typical prospector is but the exaggerated personification of a rare and almost extinct variety. We are all prospectors, or we should be. *Pro* signifies "forward," and *spector* a "looker." The prospector looks forward, the inspector looks in, the promoter moves forward, and the expecter generally has to look out. The investor may be all of these; taking a look in, moving forward with his cash, expecting dividends, and looking forward for a rise in the value of the stock he buys. Sometimes, in a retrospective mood, he realizes not merely that his vest is in, but that he has lost his shirt. And thereby hangs a tale. Dirty Dick was a prospector. Such faith had he in his mineral prospect that when he struck ore he made a vow not to change his shirt until the mine (have you noticed how a prospector insists upon calling his prospect a mine; probably because it is his?) was sold to an Eastern capitalist, the ideal prospect of the prospector. In "them days" an Eastern capitalist almost invariably could be spotted by his spotless white b'iled shirt, so Dirty Dick acquired the habit of looking forward along the trail for Mr. E. C. and soon became an authority on shirts. His general powers of observation improved coincidentally, and eventually the mine was sold to a prospect for a sum sufficient to enable Dirty Dick to put on a clean shirt every day, regardless of contingent dirt. The moral of my tale is this. Cultivate a harmless eccentricity and you may attract notice to such an extent that you will profit financially and also become an authority on some particular subject. When prospecting, keep your shirt on, figuratively, and do not look through colored glasses lest you fail to recognize the white shirts of rational scientific deduction.

## PERSONALS

F. C. Alsdorf, of Prescott, Ariz., is in the state of Washington examining mines.

C. M. Means, of Pittsburgh, has been appointed consulting engineer with the U. S. Bureau of Mines.

C. R. Willfey had moved from Denver to Ouray, Colo., to look after the leasing of the Barstow mine.

Edwin J. Collins has returned to Duluth, Minn., from an examination trip in Inyo County, California.

Campbell M. Hunter, of Thompson & Hunter, an English firm of petroleum mining experts, has gone to inspect the Calgary oilfield.

Alvin R. Kenner, superintendent Rio Plata Mining Co., attended a directors' meeting in New York last week, and has returned to El Paso, Texas.

F. F. Wilson has gone to the Calgary oilfields in the interests of a group of Toronto and Northern Ontario capitalists, who has extensive holdings in the district.

General Manager Graves, of the Granby Consolidated Mining Co., has resigned his position. F. M. Sylvester, who has been assistant manager for some time, succeeds him.

H. C. Meek has resigned his position as manager of the Dome mine, Porcupine. He is succeeded by C. D. Keading, who has been made vice-president and managing director of the company.

R. W. Deacon has been appointed superintendent of the Chrome, N. J., works of the United States Metals Refining Co. Mr. Deacon was assistant superintendent at this plant for over six years.

Dr. F. L. Nason, of the Mineral Point Zinc Co., has been in Silver City, N. M., and vicinity, examining operations of the Empire Zinc Co., where a power plant and two ore-treatment plants are under consideration.

Robert H. Richards will spend July and early August visiting mills at Lake Superior, Butte, Anaconda and in Idaho, California, Nevada and Utah, with the idea of bringing the data in his "Ore Dressing" up to date.

Thomas Turnbull has been appointed superintendent of the new underground mine, to be opened at Crosby, Minn., by the Merrimac Mining Co. He was formerly superintendent of the Shenango Furnace Co.'s Webb mine, at Hibbing.

J. W. Whitehurst has been visiting Denver and various cyaniding districts of the United States in the interests of the Estaca Mining Co., of Contra Estaca, Sinaloa, Mexico. His permanent address is 422 Kohl Building, San Francisco.

Walter Harvey Weed will be in Butte, Mont., until July 11, engaged as expert witness in the Anaconda-Pilot Butte Mining Co. case, now being tried. He was also engaged as expert witness in the Alice-Amalgamated suit tried last week at Helena.

William W. Clark has resigned as chief chemist of the American Vanadium Co., to take effect July 15, and has accepted a position as metallurgist for the Seymour Manufacturing Co., Seymour, Conn. His connection with the last named company starts Aug. 1 next.

Newton W. Emmens, mining engineer, of Vancouver, has been commissioned by the Minister of Mines of British Columbia to investigate and make a special report upon the recent discovery of tin on Fish River, and a general report upon the present mining development in Upper Arrow Lake and Lardeau mining divisions.

W. H. Donner and Geo. V. Massey were elected directors of the Cambria Iron Co., succeeding Geo. F. Baer, deceased, and E. T. Stotesbury, resigned, at a meeting in Philadelphia, June 18. Alexander P. Robinson formally was made treasurer to succeed E. T. Stuart, who resigned some time ago to become treasurer of the Pennsylvania Steel Co., at Steelton.

Thomas F. Higgins, who for the last eight years has been superintendent of the smelting plant of the Central Chile Copper Co., at Panulillo, Chile, left, on June 10, for New York, where he will be for three or four weeks attending to business for the company; afterward he will go to Europe for a well earned vacation, returning to Chile about the beginning of next December.

T. E. Mitchell, assistant superintendent of the Anaconda Copper Mining Co., in charge of the Leonard mine, has accepted the position of assistant general manager of a large copper-zinc and silver-lead mine, in Burma, India,

owned by English capitalists. Mr. Mitchell will sail from New York for London on July 4. The name of his successor at the Butte mine has not yet been announced by the company.

J. A. Singmaster, general superintendent of the Palmerston plant of the New Jersey Zinc Co., is making a tour of Europe, visiting smelting works and other departments of the zinc industry. He left New York on Apr. 25, and will be away at least three months. He will visit plants in Silesia, Belgium and France, probably making detours to Italy, Spain and Sweden, ending with the Swansea district in Wales. He has been especially interested in the manufacture of lithopone, which brought him in contact with all departments of the Palmerston plant, leading to the position of general superintendent, which he has held for three years.

## OBITUARY

Benjamin F. Wheeler died at Santa Monica, Calif., June 20, aged 65 years. He was largely interested in Colorado mines and was a pioneer of the Aspen district in that state.

Newton Wilson died at St. Louis, June 23, aged 56 years. He had been engaged in mining operations in the Southwest and Mexico, and built the smelting plant at Torreon. He was also interested in oil wells and lands in Texas, owning a large property at Beaumont.

Fred J. Bedford, a mining engineer, aged 29 years, who had been in the service of the Canadian Copper Co. for about six years, was accidentally killed on June 25 in a mine near Copper Cliff, Ont., while repairing some machinery that had broken down. The machinery was started by mistake while Mr. Bedford was working about it.

William Plummer, of Winnipeg, died June 16, aged 44 years. He was born in Keswick, England, graduated at the Cornwall School of Mines, and had an extensive professional experience in the mining districts of England, as well as in Spain, India and Northern Nigeria. He went to Manitoba a year ago and was consulting engineer to the Rice Lake Gold Mining Co., besides acting for other syndicates operating in the Rice Lake district. He leaves a widow and three children.

## SOCIETIES

**American Society of Mechanical Engineers**—A party of 30 members, following the annual convention at St. Paul, visited Duluth and vicinity on June 20 and 21, inspecting the new plant of the Minnesota Steel Co. Among others, the party included W. F. McGregor, A. F. Blaisdell, G. H. Hutchinson, R. W. Hutchinson, John Hunter, Arthur Seibert, C. J. Taylor, F. R. Low, E. J. Von Rein, James Powers and Stafford Montgomery. The trip was in charge of Steel Corporation officials.

**Canadian Electrical Association**—The 24th annual convention of this association was held at Montreal, June 24-26, with an attendance of over 300 members. The chair was occupied by the President, Col. D. R. Street, of Ottawa, who, in his opening address, dealt with the growth and progress of the association. A large number of technical papers were read and addresses given. Officers were elected as follows: President, Col. D. R. Street, Ottawa; first vice-president, D. H. McDougall, Toronto; second vice-president, R. M. Wilson, Montreal; third vice-president, W. MacLachlan, Toronto; honorary secretary, T. S. Young, Toronto; secretary-treasurer, Alan Sullivan, Toronto.

**Southern Oregon-Northern California Mining Congress**—This congress will meet in Ashland, Ore., July 9 and 10. The local committee is preparing to entertain a large number of delegates. The program is as follows, besides the usual opening addresses: President's address, L. J. Luce; S. B. Edwards, Grant's Pass, "Placer Mining in Southern Oregon"; H. N. Lawrie, Portland, Ore., "Mining Industries of the State"; R. A. Watson, corporation commissioner, "Blue Sky Law, Relation to Mining Industry"; A. L. Lamb, Ashland, "Mining in Jackson County"; M. Mangum, "Mining in Josephine County"; Professor Parks, "Mineral Resources of Oregon"; address by state mineralogist of California; C. B. Watson, Ashland, "Clay and Kaolin and Their Possibilities"; "Iron and Copper, Their Relation to Commercial Industries"; E. P. Hopson, "Irrigation and Reclamation"; C. L. Probstel, "Mineral Resources of Siskiyou County."



## Editorial Correspondence

### SAN FRANCISCO—June 24

**Western Fuel Co. and Other Suits**, which will be filed by the Government, are announced by U. S. Attorney John W. Preston, at San Francisco. These suits will demand the recovery of sums aggregating \$300,000. This action by the Government is based upon the results of the criminal trials when some officers of the Fuel company were convicted of conspiracy. Various steamship companies, acting with the Western Fuel Co., are included in these civil actions. The suit against the steamship companies is for recovering money paid by the Government on false affidavits made by the Fuel company's officials. The action against the Western Fuel Co. is for the recovery of money which the Government charges was paid for coal that was not delivered. The several amounts sued for are as follows: Western Fuel Co., \$22,417; Pacific Mail Steamship Co., \$225,163; Oceanic Steamship Co., \$20,314; American Hawaiian Steamship Co., \$4778; Pacific Coast Steamship Co., \$172.

**Character of Land Granted to Southern Pacific R.R.** should have been known by the Department of the Interior before issuing final patent, according to the decision of Justice Vandeverter of U. S. Supreme Court. This decision was handed down in the Edmund Burke case. Burke sought to locate as mineral land, certain parcels of land in the Coalinga oil district, which had been patented to the Southern Pacific. Burke claimed that the Southern Pacific had no title, because of the mineral exemption clause, and that the land was open to entry. The case was tried in the U. S. District Court and was taken up to the U. S. Court of Appeals, which asked the supreme court to instruct on seven points. The decision of the supreme court is the reply. Burke is denied the right to locate the land on the ground that collateral suits have no standing and that only the Government has the right to attack the validity of the patent. Justice Vandeverter intimated that in the case at bar the time within which the Government had the right to such attack expired in 1900 or 1901; the patent to the lands in controversy having been issued in 1894. The decision holds that the officials of the Department of the Interior must do their duty in ascertaining whether the land comes within the law, excluding and excepting mineral lands patent to railroads, and that they could not perform their duty by inserting exceptions that the lands should not pass to patent, if found later not to be within the law. Justice Vandeverter cites the Northern Pacific, which secured patent to every alternate section of land in a 40-mile strip from Duluth to the Pacific Coast. Should the exemption be held valid in an attack on the Northern Pacific the question would arise whether those who long ago purchased from the railroad, and created farms, ranches and towns have any rights. The court held, contrary to the contention of the Southern Pacific, that oil land is mineral land. So there need be no more contention on that point. The Southern Pacific, however, has gained by this decision more than the winning of the Burke suit means. The decision may be held to mean that the attacks of the Government upon the validity of patent to the Southern Pacific of oil lands valued at several hundred millions of dollars, cannot be maintained in the courts. This decision of the supreme court is met with general approval throughout the state. Whether or not the Southern Pacific was aware that the lands contained mineral, the burden of proof that they were mineral lands appears to have been laid upon the Department of the Interior. It is not likely that either the Southern Pacific officials or the officials of the Department of the Interior had any knowledge that these lands contained mineral oil at the time the patents were issued.

### DENVER—June 26

**A Virgin Field for Prospectors** has been provided by recent acts of the managers of the Luis Maria Baca Land Grant No 4. This tract is in southeastern Saguache County, along the western flanks of the Sangre de Cristo range, and covers a little more than four modern townships, or 150 square miles. This old Mexican cession having heretofore remained privately owned, prospectors have not been privileged to search for mineral on it, although the area has long been known to possess mineral deposits from remarkable float finds that have been made. The owners now announce

the opening of this large tract to general development under leases that will be granted only to discoverers of mineral. Such leases will run for two to five years and will carry royalties of 10% on net returns from operations. With each lease there will be given guarantee of free timber sufficient for mining needs and abundance of free water. Furthermore, there are no taxes of any kind and the corporation will furnish free assay service to prospectors and miners. Placer ground exists in the area. The chief metals known to prevail are gold and silver, but there are good reasons to presume the existence of base-metal ores. Faithful performance of contracts assures each lessee of extensions on his leases, which are transferable.

### BUTTE—June 24

**A New Union Was Formed by Butte Miners** at a meeting held at the Holland Rink Sunday afternoon, June 21, more than 4000 miners attending. The new organization is to be known as the Butte Mine Workers Union. Muckie McDonald was elected temporary president and with his elected associates was instructed to draft a constitution and bylaws, also to send telegrams and letters to all those unions which have wired promises of support to President Moyer, and to request them to withhold judgment on the Butte situation until investigated by their own representatives which are invited to come to Butte. The report of the executive committee was adopted. The chairman of the committee announced that inside of two days the organization would open temporary quarters to receive dues and application for membership. President Moyer of the Western Federation of Miners contends that the action of the secessionists means an open shop and will result in the destruction of organized labor in Butte. These views are not shared by the members of the new union, who are equally firm in their contentions and are not inclined to favor any compromise with the old Butte union or the Western Federation. The resignation of all officers of the old Butte union, announced by Moyer and the promise to abide by the results of an election of new officers from among the seceding miners, were ignored at the meeting. No attention was paid to any offer of compromise, nor were any suggestions offered in the way of conferring with adherents to the old unions. The whole attitude of the meeting clearly indicated that the great majority of the miners were through for all time with the old union and were confident to stand on their own feet and to further the interests of their members far better and more justly than the officers of the old union were able or willing to do.

**Moyer's Visit to Butte** was made in opposition to the advice of friends. He attempted to bring back into the federation 4000 or 5000 rebellious miners. Of course, he failed and with some of his staff officers had to flee from the city to save his life. Today Butte, the strongest union town in the world, the parent of the Western Federation and for years the support of the organization and its officers, occupies the unique position of being a "wide-open shop," so far as the mines are concerned. The rebels have refused to recognize longer the authority of Moyer and his federation, and for two weeks men have been working in the mines without union affiliation, having divorced themselves from the union of miners. Moyer and 142 of his loyal followers, out of a membership of 8000, attempted to hold a meeting in the wrecked old union hall. Thousands of rebels and others congregated in the street in front of the hall and jeered at the few going into the hall. The men inside became nervous and lost their heads. They were all heavily armed, and when one of their own number started to enter the hall, he was shot down by one of the inside riflemen. Then shooting became general and a man in the street was killed and four others wounded. The mob cried for the blood of Moyer and he beat a hasty retreat through a rear window and over adjoining roofs, followed by the faithful 142. All made their escape, and when the mob procured dynamite and began blowing up the building many thought Moyer was still in the hall, but he got out of town in an automobile, and with several of his followers, turned up in Helena, where he petitioned Governor Stewart to send troops to Butte. The Governor declined to do so in the absence of requests from the local authorities. Moyer was again ad-

vised to stay out of Butte, but he threatened to return, and later did. The mob, led by I. W. W. agitators, who have been attracted to Butte by the direct-action Socialist administration of Butte, made threats against other property, the newspapers and public buildings, but let it go with threats, as it was known that most of the mine and other buildings were under heavy guard of armed men, who were not Socialist policemen. The sad condition of Butte's civic administration may be noticed in the fact that while the I. W. W. dynamiters were stealing dynamite at the mines, a dozen policemen were at headquarters playing cards and refused to respond to a call for assistance, while the mayor was safely guarded in another part of the city hall.

#### SALT LAKE CITY—June 25

**Restoration to Entry of Withdrawn Lands** in Utah, amounting to 262,822 acres, which had been withdrawn as possible coal land, was made by the Secretary of the Interior, June 6; 320 acres reserved by the Government for power sites will be restored to entry July 1, and 40 acres formerly included as a part of the Strawberry Valley project, have been restored, subject to entry Aug. 7.

**A Decree To Silver King Consolidated** has been given by Judge John A. Marshall, of the U. S. District Court, quieting title to all the ores vertically beneath the surface of its Electric Light, Cumberland, Ural and Croesus claims at Park City. The Silver King Consolidated has recently developed a large orebody in the Electric Light claim, and the decree quiets any effort that might be made to apex the orebody from adjoining property. About one year ago it was rumored that the Silver King Coalition would claim an apex. For that reason the Silver King Consolidated Mining Co. started suit against the Silver King Coalition Mines Co. to quiet title to the claims. The complaint alleged that there were veins and lodes of mineral-bearing rock in place vertically beneath the surface of the claims, carrying minerals without which the claims would be of little or no value. It was declared that the minerals within the said claims belonged to the plaintiff, but that the defendant caused it to be said that the ore belonged to the Coalition company, and that it had certain rights in the ground. A number of extensions of time within which to file an answer were given, the last one expiring Oct. 15, 1913. After this an order was entered taking the bill as confessed for want of an answer, and a final decree was given. In this it is adjudged that the veins or lodes and all the mineral therein are the property of the plaintiff, and that at and prior to the time of the filing of the action the plaintiff was the owner of said veins and lodes; and that the defendant had no right to enter under the surface of such claims and mine and remove said minerals as its own. It was held further that the title of the plaintiff in and to the ore in said claims was established, confessed, and quieted against any and all claims of the defendant.

#### HOUGHTON—June 29

**Copper Range Consolidated** is getting out a greater tonnage than ever before in its history. General physical conditions at all of the mines are better or as good as ever before. Expenditures for improvements have been paid for and the company is now about to gain from its investments. It has no extraordinary outlays in view, and earnings for the next six months depend upon the price of copper alone. A total of 2750 men is now employed. A daily total tonnage of 6100 tons is being sent to surface, this being the best rock tonnage in the history of the consolidated companies. At the Champion mine, four shafts are producing, B, C, D and E and the daily tonnage exceeds 3000. Shafts B and E are down approximately 2300 ft. and the two others to a depth of 2100 ft. The lower levels are maintaining the general grade of Champion rock, which is comparable with the best from the Baltic lode at any point. At present no sinking is being done and no advanced openings are under way. Advanced openings had been extended before the strike, and when operations were resumed all energies were directed, properly, to the maintenance of rock tonnage. By July 15, this mine will be extending its openings again and maintaining its maximum tonnage at the same time. At the Trimountain mine three shafts are producing. No. 2 is the deepest, 2800 ft. Nos. 3 and 4 are down to the 22d and 23d levels respectively. The general improvement in the underground showing of this mine that has been commented upon for the past two years, continues with all the newer openings. The Trimountain seems to have permanently passed out of the leaner levels and it is yet a young mine. Before Trimountain openings at these three shafts attain their maximum rock productiveness the tonnage probably will reach 36,000 per month. A high mark of 33,000 tons will be attained in July, from present indications. The Baltic mine is now turning out 1800 tons daily and the trend is upward. The

good showing of rock in the bottom of No. 3 shaft is holding out. No. 2 is particularly good in the north end. The bottom of No. 4 continues to show poor copper rock, and it is believed that it will continue poor for a distance of 200 ft. more when the good run of ground which is showing in No. 3 at a similar depth, will be encountered. This is a reasonable deduction as the 28th-level drifts from No. 3 shaft toward No. 4 are in good rock. No. 4 shaft is a small producer at Baltic, as a limited tonnage only can be taken out now, but the shaft is being retimbered and this work will be completed in the near future. This will permit of increased hoisting capacity and then two regular shifts of miners and trammers can be put on at this shaft. Normal opening work is now being done at the Trimountain, about half of normal at the Baltic, and the Champion is so far ahead that the immediate necessity for extending advanced drifts and sinking is now not great, for this work can be started in the near future. Before the end of the year the Champion will again have maximum advanced openings as well as maximum daily tonnage. Extensive changes and improvements in the stamp mills of the Copper Range Consolidated have been about completed and paid for, a comparatively insignificant outlay having been required. Tube mills have been installed and are working satisfactorily on regrinding. The power is furnished by a recently installed exhaust-steam turbine in the Baltic mill. About the only large construction item that will come this year at these properties is the new change house for the men. This was practically a necessity some time ago and the recent destruction of the old change house made the new one an immediate need. All of the Copper Range Consolidated mines are equipped with one-man drills and the increased efficiency as well as the increased compensation to the miners is remarkable. The saving in drifting alone runs from \$1 to \$2 per foot and in a mine where the drifting work averages 30,000 ft. per year this is a pronounced betterment in operating costs. The drill now is perfected so that it is as easy to operate as any drill and the miners who have become accustomed to them and are able to see substantial increases in their pay checks by reason of the change are delighted with the innovation, now as they were opposed to it when it was first proposed and introduced.

#### TORONTO—June 26

**Another Discovery of Oil at Calgary** has been made. On June 17, crude black petroleum was struck at a depth of 808 ft. in the Monarch well, 30 miles west and six miles south of Olds, and 70 miles to the northwest of the Dingman well. This find is considered as demonstrating the extent of the field, and the fact that the oil is crude instead of light, white oil like the former find is viewed with much satisfaction as more likely to indicate its presence in commercial quantities. This, however, is not yet assured, as drilling was suspended until the well could be provided with a special cap to avoid a rush of oil. The news of the find caused a renewal of speculative excitement at Calgary where the shares of the Monarch of the par value of \$1 speedily rose to \$50. The company is capitalized at \$260,000 and controls claims covering 122,952 acres. The Dingman well remains capped owing to the high pressure and will not be reopened until ample storage capacity is provided. The directors have ordered twelve 12,000-gal. tanks for installation near the well.

#### COBALT—June 26

**In Liquidating the Bailey Mining Co.**, the Standard Stock & Mining Exchange has departed from the ordinary procedure in asking for proxies to contest the action of the directors. At the last meeting of the directors, it was decided to liquidate to satisfy the claims of the creditors, and it was decided to call a shareholders' meeting in Toronto to have this action ratified. The president of the exchange states that he is unable to explain the proceedings to wind up the business and upon inspecting the records, finds that Edwin A. Benson, the president and other promoters issued 4,250,000 shares of \$1 par to themselves, leaving 750,000 in the treasury. In 1909, Benson was the holder of 2,155,165 shares, in 1910, 1,187,916 shares, in 1911, 1,001,655 share, while at present he is the registered holder of only 278,190 shares. Other promoters who held large blocks of stock, have been selling in the same way and they have held in the treasury, the 750,000 unsold shares. The sale of the treasury shares might have come in competition with the shares of the promoters' shares, and the result has been that the public now owns almost all of the outstanding capital stock. If the exchange receives a sufficient number of proxies before the petition for the winding-up order comes on for hearing, a counsel will be engaged to oppose the petition and to challenge and dispute the validity of the judgment.



# The Mining News

## ALASKA

**RECENT REPORTS FROM TWENTYMILE** are not encouraging. Three shafts have been sunk to bedrock near scene of recent discovery of pay without finding even fair prospects. Prospectors have every confidence that more pay will be found, however, and will remain there for some time yet before giving up. Pearson & Anderson, discoverers of pay, are sluicing. Morency and partners are sinking on creek that flows into Twentymile near Pearson & Anderson ground, working day and night. William Volkman and John McLaren have bedrocked one hole a short way up Twentymile from Discovery and are now sinking another. Mac-Gillivray & Henderson are prospecting on Hanson Creek. There are many other prospectors in vicinity, and it is probable that district will be thoroughly prospected this summer. Twentymile Creek is a right-limit tributary of Salchaket River, or Salcha River, as it is known on maps, which flows into Tanana 40 miles above Fairbanks, and receives its name from fact that it is 20 miles from roadhouse, mission, and trading post at mouth of Salchaket.

**CRITES & FELDMAN (Fairbanks)**—A mill will be built at mine to avoid long haul to custom-mill.

**WILLIAMS & RUTHERFORD (Fairbanks)**—These Engineer Creek operators recently added a 60-hp. Oil City boiler of return-tubular type to their equipment. Ground on which they are working is comparatively low-grade, but has produced over \$1,000,000 previous to present season. Some portions of claim ran as high as \$10 per sq.ft., but a recent cleanup by present workers indicates that they will recover between \$1 and \$1.25.

**NO. 3 BELOW, PEDRO CREEK (Fairbanks)**—One-third interest in Mudge-Goodrich lease was recently purchased by Ed. Farrel. Lessees expect to strip 30,000 sq.ft. of bedrock during season. Bagley scraper of 32 cu.ft. capacity, operated by an 8x10 Washington engine, will be used. Gravel will be scraped into a car, and car will be hauled up an incline to dump-box with a small auxiliary hoist. This method of elevating gravel, which has never before been tried in Fairbanks district, although used at Iditarod, will, it is hoped, effect a great saving in power. Ordinarily, loaded scraper is dragged from cut up incline to dump-box, but, although this permits more rapid work, it is otherwise less efficient. On account of shortage of water during greater part of season, it is rarely possible to sluice all the gravel scrapers will handle, so these operators expect to uncover as much bedrock during summer by using a car as they would by dumping scrapers directly into boxes. Ground is wet, and on that account has never been thoroughly prospected, but result of work done by others on adjoining ground leads to belief that an estimate of 50c. per sq.ft. of bedrock is conservative. All conditions being favorable to low costs, it is hoped to mine gravel for 25c. per sq.ft., which is lower than any figure yet reached in district.

**HILTY & LUNDBLAD (Fairbanks)**—Operators are working 40 men on No. 1 Below, Cleary Creek, and this crew will probably be doubled later. Two years were spent in preparing for present season. Ground is wet, which means that it contains sufficient water to make cost of pumping prohibitive with wood at \$15 per cord. It was therefore necessary to drive a drainage adit 1900 ft. long before mining operations could be undertaken with hope of success. Ground is 16 to 18 ft. deep and will be worked by scrapers. Small dump taken out during winter will first be sluiced, then tailings from previous mining operations will be scraped into boxes with a 3½-ft. Bagley scraper operated by a 7x10-in. double-cylinder, double-drum Lidgerwood engine. When piles of old tailing are out of the way, work will be started on virgin ground, and for this purpose largest hoist ever designed for interior of Alaska has been ordered from American Hoist & Derrick Co. Hoist, which is of special construction, will have steel gears and banked levers; it will have twin 10x12-in. cylinders, and will be capable of lifting 25 tons with steam pressure to be used. Like most hoists used in open-cut work with scrapers in Fairbanks district, it is of 3-drum type. Weight of engine is 13½ tons. A similar hoist, with cylinders of same size, but of general lighter construction, has been ordered for James McPike, a Goldstream operator, from Washington Iron Works, of Seattle. There are several other large 3-drum hoists in use in scraping work in district, and following list will show growing importance of this form of mining:

Name of Operators	Location	Size, In.	Make
Hilty & Lundblad	Cleary Creek	10x12	American
James McPike	Goldstream	10x12	Washington
Julius Gius	Pedro	9x10	American
Charles Gius	Pedro	8½x10	American (2)
Harry Atwood	Pedro	8½x10	American
Tom Gilmore	Pedro	8½x10	American
Fred Bleeker	Goldstream	8½x10	American (2)
Dan Koch & Co.	Goldstream	8½x10	American
Henry Wagner	Goldstream	8½x10	American (2)
Mudge & Goodrich	Pedro	8x10	Washington
Lempinen & Co.	Goldstream	8x10	Washington
Fred Parker	Fairbanks	7x10	American

All of these 15 are of 3-drum, twin-cylinder type, and, with four exceptions, all operate, or will operate, Bagley scrapers of various sizes. Four are used with slip scrapers, which require men on the handles. Bagley scraper is much more efficient and is less dangerous to workmen. Number of hoists in district with 7x10 or smaller cylinders is great, probably running into hundreds.

## ARIZONA

### Gila County

**INTERNATIONAL SMELTING CO. (Miami)**—Because of a shortage of steel erection of engine-house unit of power plant at smelter site has been slow, but building is now erected and riveting should be finished in a few days. Exteriors of power-plant buildings are to be of reinforced concrete and erection of forms has already been started on one end of engine house. Multiplex reinforcing plates for boiler-house roof are also in place and concrete filling will be poured promptly. Foundations for turbo-generators were poured this week, as were those for two retaining walls on oil-storage bench. Two auxiliary 24-ft. concrete oil tanks that are to be used for measuring are nearly completed. Each will have a capacity of 3500 gal. Because new 25-ton slag pots, recently received, are not designed for fast haulage around sharp curves, idea of obtaining slag from Globe for reverberatory bases has been abandoned. Instead a 52x276-in. blast furnace obtained from Old Dominion smelting plant is being erected on furnace site so that slag can be made as required. Furnace will probably be ready within a week and foundations will be poured as soon as possible, as this work is already far behind.

**INSPIRATION CONSOLIDATED (Miami)**—For some time past mine department has had inadequate air supply, but now with new compressor and hoist plant erected and one compressor unit installed and in operation it is possible to supply a quantity greatly in excess of requirements. Present installation, however, is only temporary insofar as scheme of distribution is concerned, as it will require several months to complete entire installation with its elaborate distributing system. With 3000 cu.ft. furnished by this unit total available capacity is now 7500 cu.ft. per min., ample for all development work requiring compressed air. If present rate of erection is continued concentrator trestle should be completed in 10 days. About 60 tons per day is being put in place and riveting is being carried along with erection. Painting will start soon. Carpenters have nearly completed work on shop extension. Company carpenters have started laying composition roofing on main concentrator building, and as soon as shop extension is completed entire finishing force of American Bridge Co. will be put to work to complete inclosing of main building. Considerable riveting, however, remains to be done on concentrator bins, but this probably will be left until trestle is completed. A large shipment of steel shelving for concentrator warehouse has arrived and work of assembling same will begin in a few days. Excavation for concentrator transformer station and distributing station has been completed and forming of walls, floors and piers has been started. Latest addition to test mill is five Metals Recovery Co. pneumatic-flotation machines and auxiliary equipment, which are to be given a thorough test to compare their efficiency with Minerals Separation process. Although two processes are based upon same principle, means of acquiring final result are different and purpose of company is to determine which is best adapted to treatment of its ores. As soon as necessary parts are received from the East a series of experiments are to be started with Bradley preliminary crushers to determine best steel for rolls and die use. The rolls and dies, which gave good results on a dry, brittle feed, were found to wear excessively in crushing moist Inspiration ores, but with a change to one or a combination of alloy steels it is believed much better results will be obtained.

### Mohave County

**SWASTIKA (McCracken)**—Preparations are being made to build smelting plant of 60-tons daily capacity.

**WALKOVER (Hackberry)**—Qualey Bros., who have a bond on property, recently started working with a small force.

**LUCKNOW (Hackberry)**—Vein at this mine, operated by Nevada-Arizona Gold Mines Co., has been struck at 420-ft. level, but owing to an inrush of water no examination has been made. In Roosevelt tunnel a drift has been driven 75 ft. on a cross vein, 4 ft. wide.

### Pinal County

**GOLDEN BELL (Kelvin)**—Work has been suspended while ground is being surveyed for patent.

**KELVIN-SULTANA (Kelvin)**—Retaining walls for Hardinge mill and rolls floors are in place, as well as foundations for ore bins. All grading for mill is now completed. In mine station on 500 is half finished. Old No. 2 has been timbered for a depth of 120 ft., where a loading pocket will be put in. Putting this shaft in commission opens up large tonnage of mill ore left in old stopes as filling by lessees some years ago, as well as considerable virgin ground.

### Yavapai County

**BUNKER HILL (Prescott)**—Lessees are driving to connect old and new shafts, a distance of 100 ft.

**GREAT BELCHER (Big Bug)**—Groups known as Great Belcher, Mammoth, Eugene and Red Rock are to be combined and operated under one management.

**SNOOZER (Senator)**—Senator tunnel, which opened up new ore in Cash and Getchell veins, has now opened up Snoozer vein at a depth of nearly 700 ft., exposing high-grade ore.

**HENRIETTA (Chaparral)**—After completing cleaning out of lower tunnel, which is 1000 ft. long, it is found that face is 100 ft. from oreshoot. Crosscutting for ore is now under way.

**CALIFORNIA****Amador County**

**DREDGING IN COSUMNES RIVER** is to be undertaken by Guggenheim interests. One dredge is reported to be ready for operation and others are contemplated.

**KENNEDY EXTENSION VS. ARGONAUT CASE** was decided June 29, in favor of defendant.

**Calaveras County**

**VALLECITO PLACER DISTRICT** is being developed. Work is being done in old ground opened many years ago, but abandoned on account of water troubles. Chief work at present is being done in an old shaft and a drift 200 ft. below surface. Old channel is known to extend five miles with an average width of  $\frac{1}{2}$  mile.

**Lassen County**

**ENGLE (Susanville)**—It is reported that extraction of ore has been resumed, but smelting plant will remain idle for a time, on account of complaints of farmers against fumes. Ore will be shipped to Nevada.

**Nevada County**

**ZEIBRIGHT MINING CO. (Grass Valley)**—Following officers were elected at annual meeting held in June. Fred Searles, president; W. Englebright, vice-president; J. J. Jackson, treasurer; J. F. Colley, secretary; A. Hongle, director. Mine is in vicinity of Bear Valley.

**GOLDEN CENTER (Grass Valley)**—Board of directors has authorized an appropriation of \$35,000 for a 60-ft. headframe, an electric hoist and sinking of a new vertical shaft. Doubling capacity of 10-stamp mill and building of cyanide plant are also contemplated.

**Placer County**

**MAYFLOWER (Forest Hill)**—It is reported that this old mine formerly a large producer, is to be reopened by San Francisco and Buffalo, N. Y., men.

**Trinity County**

**OPTION ON DREDGING GROUND ON TRINITY RIVER** near Carrville, held by John Hays Hammond and associates has been extended. Further prospecting will be done. Ground extends for seven miles.

**ASBESTOS DEPOSITS ON EAST FORK OF TRINITY RIVER** are being developed on 10 claims. These are 18 miles east of Carrville. Sawmill with capacity of 10,000 ft. per day has been built to furnish material for necessary buildings. Situation is 18 miles from Castella on Southern Pacific, which is nearest railroad point. There is no road, so that machinery and supplies for present, must come in from Redding by way of French Gulch and Carrville, making a haul of 75 miles. While no company has yet been formed, development is being done by H. T. Mecum, of Oakland, and associates, both in Oakland and South Dakota. With economical transportation it is said enterprise will pay.

**Yuba County**

**YUBA NOS. 3 AND 4 DREDGES (Hammonton)**—Yuba Consolidated Gold Fields is constructing these dredges with new steel hulls. Steel hulls are being built by Yuba Construction Co. at Marysville.

**COLORADO****Boulder County**

**HOOSIER DYKE (Crisman)**—Idle since 1905, mine is being unwatered and reopened by owners, Golden Link Mines Co.

**Gilpin County**

**GILPIN MILL (Black Hawk)**—Howard Wherry has fitted this old plant with sluices and is treating old tailings with fair results.

**PITTSBURGH (Central City)**—Pump is handling 90,000 gal. per day. Regular shipments continue semi-monthly, as for years past, and returns are good.

**KEYSTONE (Central City)**—T. R. Cudahy has organized company of Grand Rapids, Mich., men who will develop new ground in this group, that is credited with a production of \$200,000. Gulch mining is active in all streambeds of Gilpin county.

**Gunnison County**

**DISCOVERY OF A SILVER VEIN** has been made 5 miles southeast of Pitkin, toward old camp of White Pine. Vein is in limestone.

**Jefferson County**

**PLACERING AT MOUTH OF CLEAR CREEK CANON** being done by James Myers, former superintendent of smelter at Golden. Myers is using a saving device of his own invention.

**La Plata County**

**CHRISTIE (Cave Basin)**—Copper ore has been struck.

**TOM BOY (Cave Basin)**—Samuel Parks will sink shaft, using whim, first piece of machinery in camp. He will also sink a shaft on his Half Moon claim, where he made his first discovery last autumn.

**MARY MURPHY (Cave Basin)**—Acord & Walker have 20 tons copper-silver ore sacked for shipment. This was taken from a 2-ft. streak and is expected to assay 20% copper and 100 oz. silver. They have also 10 ft. of similar ore of lower grade. Entire county is being prospected; every gulch and hill is being inspected. A small hotel, Pine Bough Inn, is doing business at Cave Basin, while a good general supply store has been opened.

**Routt County**

**BED ROCK GOLD DREDGING CO. (Hahn's Peak)**—Company is receiving equipment, materials and machinery to erect a dredge on Hornet placer in Way's gulch.

**San Juan County**

**BAGLEY TUNNEL (Silverton)**—Frisco Mines is completing connections with adit and will soon be ready to ship.

**San Miguel County**

**TOMBOY (Telluride)**—Steel tanks for cyanide plant have been hauled up from town.

**IDAHO****Coeur d'Alene District**

**PROSPECTS IN MURRAY DISTRICT** are being operated by hundreds of miners, besides work is going on in well-known mines. Bear Top, tied up in court proceedings for some time under a receivership, is now working under a lease. Cedar Creek is working steadily with a good force of men. Terrible Edith is under bond and preliminary work is now under way, looking to opening property at an early date. Jack Waite is working steadily. Samson, one of the most promising high-grade silver properties in north-side district, is preparing for further operations. Phedora, lying close to Jack Waite and in which some promising ore was recently uncovered, is working regularly, and Giant Ledge is preparing for extensive development.

**ST. JAMES (Wallace)**—Work has been resumed at this mine, adjoining Sunset mine, on Sunset Peak.

**MORNING (Mullan)**—Repairs now being made at Federal company's mine and mill, necessitating a temporary shut-down, are nearing completion, and a call has been sent to former employees, who were given leave of absence during suspension, to report for work not later than June 20. Repairs to hoist practically are finished, and also repairs to mill. Addition of flotation system is under way, but this will not delay opening of mine and mill.

**ALBANY LEAD MINING CO. (Wallace)**—Articles of incorporation have been filed at Wallace, Idaho. Company is capitalized for 1,500,000 shares at \$1. Principal place of business is Wallace. Incorporators, John Dunphy, C. C. Wynn and John H. Nordquist, are owners of Thisbe group of claims near Burke, which group recently was basis of a suit in district court to cancel a deed given by owners to Hector Mining & Milling Co., and it is probable that new corporation will acquire title to this property.

**BLACKHORSE (Murray)**—Concentrator is being overhauled and is to be used for milling ores of Paragon Consolidated mine. New rolls have been added and a harzjt jig installed, and it is expected that alterations will be completed soon, when operations will start. Paragon ores contain lead and zinc, and it is said Blackhorse mill does good work separating both, saving approximately 75%. Considerable ore already is blocked out in Paragon mine, and company intends to open new ground as rapidly as possible to keep mill working continuously so long as metal market will permit profitable work.

**CALEDONIA (Kellogg)**—After an idleness of nearly two years, result of litigation with Bunker Hill & Sullivan company mine has resumed operations, and it is now anticipated that property will be producing in a few weeks. One of the stipulations in compromise agreement that ended controversy between two companies was that a unit of Bunker Hill & Sullivan mill should be set aside for treatment of Caledonia ores. Plant has been under repair for several months, but was given a trial run recently that proved satisfactory. Mill was started running one shift daily last week and is now treating 100 tons per day. During shutdown connection by means of a raise was made between Caledonia workings and long lower tunnel of Bunker Hill & Sullivan, permitting Caledonia ore to be handled through Bunker Hill & Sullivan at much less expense than under former system of operating. There is a large tonnage in sight in mine.

**Idaho County**

**EVERGREEN CONSOLIDATED (Grangeville)**—A. Kincaid has given a bond to Theodore L. Lammers, of Spokane, for Evergreen Consolidated and Dewey groups, consisting of 14 claims, eight miles from Grangeville, on Clearwater River. Bond includes all equipment on property, also assay office and right of 250-hp. on Clearwater River. Lammers spent two weeks making an examination and will commence operations at once. Power will be obtained for present from Grangeville Power & Light Co., whose line is  $\frac{1}{2}$  miles from camp. About 7000 ft. of development has been done on property in last 15 years and shoots of gold-copper ore are known to exist. Bond includes interest of A. A. Kincaid and Martin Wagner, of Grangeville; J. Frank Watson, of Portland, and A. A. Boothe, of Spokane. Successful operation of this camp means much to Grangeville and Idaho County, as it is one of the best-known properties and will help in activity of entire district, including Ten Mile, Elk City and Euffalo Hump sections. Equipment will be installed by Spokane manufacturers and will first operate on high-grade fine-milling ores from St. Patrick claim.

**MINNESOTA****Duluth**

**MINNESOTA STEEL CO.'S MODEL CITY**, adjoining steel plant, has been named Morgan Park, for J. Pierpont Morgan. Steel company plans erection of a club house for bachelors, modern hospital, modern school and an office building, which four buildings will cost \$500,000. Town will have street-car connections with Duluth; tracks are being laid now simultaneously with cement streets.

**Cook County**

**JOHNSON NICKEL CO.**—A Chicago syndicate has purchased 6500 acres of mineral land in Cook County, from this company, for a consideration said to be \$1,500,000. Cook County is in extreme northeastern part of state, and it has long been known that iron ore existed there; however, most explorations have shown this to be titaniferous magnetite, too low-grade to be amenable to present-day furnace practice at a profit, probably being suitable only for electric-furnace use. Much speculation has taken place in these mineral lands for 20 years past, but this is largest single transaction recorded there. Explorations in territory have been meager, due to utter lack of railroad facilities. This, however, bids fair to be eliminated in near future, as several lines are now proposed. Johnson Nickel Co., so called because lands were originally taken up for their presumed nickel-bearing iron ores, is controlled by Minneapolis men and has long been dormant.



**Cuyuna Range**

**ROWE (Rivington)**—Ore shipments were to begin from this new pit June 29. Company expects to ship several hundred thousand tons this season.

**MERRIMAC MINING CO. (Crosby)**—New mine to be opened ½ mile north of Crosby has been named Croft mine for H. W. Croft, a Pittsburgh iron and steel man.

**ROGERS, BROWN ORE CO. (Crosby)**—President Chester D. Tripp has announced that season's output from Armour No. 2 and Kennedy has been sold, and that present rate of production will be maintained for remainder of season.

**Mesabi Range**

**GENERAL MESABI NOTES**—Albany, a new producer, began shipping ore over Duluth, Missabe & Northern Ry. June 1, at rate of 50 cars per day. Other large daily shipments over this line from Hibbing district are Hull, 160 cars; Clark (underground), 40 cars; Shenango, 125 cars. This railroad is hauling upward of 350 cars per day from Hibbing district. This traffic is, of course, far below normal and it is not expected that a material increase will be made during rest of shipping season. Great Northern Ry. is hauling nearly 2200 cars per day from Hibbing district, and officials state that somewhat of an increase is anticipated by Aug. 1. Season's largest single shipper on Great Northern lines is Leonard pit, from which comes a total of nearly 600 cars per day; part of this, however, is from large stockpile known as Leonard-Chisholm stockpile. Other shippers are Mississippi, Mace (underground), Dale, South Uno and Hill. Mississippi is shipping from stockpile. A large part of Great Northern's activity is due to shipments from Steel Corporation's Great Northern leases, in fact half of daily shipments are from such. Mahoning mine is said to be largest independent shipper from district over Great Northern track, shipping upward of 220 cars daily. Harrison-Quinn, at Nashwauk, made initial shipments June 13. Among those not shipping are Crosby, La Rue and Stevenson, all in vicinity of Nashwauk. Hudson mine of Pickands-Mather & Co., at Aurora, will put one or two shovels to work at once, and Meadows, also at Aurora, will start shipments from a 50,000 ton stockpile June 29. Silver, at Virginia, has suspended operations for three or four weeks. Stripping operations have been completed, and shutdown is in nature of a curtailment of output. Commodore, at Virginia, is loading an average of 100 cars per day, via Great Northern. New town of Bengal has just been platted in Sec. 1, 55-22, on line between St. Louis and Itasca Counties, 6½ miles from Nashwauk. There are some iron prospects in vicinity.

**ALPENA (Virginia)**—Fifty additional men have been put to work making a total of 800. This is only mine in Virginia district which is shipping its product. Other mines have men at work, but only on drifting and stockpiling. Operations are being rushed in Alpena pit operations, four shovels being in use.

**INTERSTATE IRON CO. (Grand Rapids)**—Shaft at Kintzville mine is now 50 ft. deep. Company's dredge "John B." used last season in hydraulic work, has not yet been put into commission. It is stated that exploration by hydraulic methods will be deferred until underground properties are more fully developed.

**Vermillion Range**

**CHANDLER (Ely)**—Forest fire menaced surface plant on night of June 23, but Ely fire department prevented serious damage.

**SUDAN (Tower)**—Mine has been shut down temporarily for installation of new crushing equipment.

**NORTH AMERICAN (Tower)**—Two shifts are now said to be at work extracting material from the so called gold-graphite lode. Material is being stockpiled for test later.

**MONTANA****Beaverhead County**

**PENOBSCOT MINING CO. (Elkhorn)**—Work on old Hecla mine is progressing and 10 tons of concentrates are shipped daily to East Helena. Hecla mine, which is 18 miles from Melrose, is one of the old gold producers of Montana, having paid \$2,500,000 in dividends. It was shut down in 1904 and sold to Penobscot company in 1912. Company equipped mines last spring with a 20-stamp mill and concentrator and at present employs 60 men at mines and mill.

**Granite County**

**PHILIPSBURG MINES DEVELOPMENT CO. (Phillipsburg)**—At a special meeting of company, held June 10 at Phillipsburg, it was decided to dispose of all property of company and close up its business affairs.

**UPPER STONY CREEK PLACERS**—These claims, located on Upper Stony Creek in the Rock Creek District, are to be extensively prospected by means of churn drills which have just been received by D. T. Conkling and associates. The claims are believed to be very promising.

**Jefferson County**

**WHITEHALL MINING, MILLING & DEVELOPMENT CO. (Whitehall)**—This company with T. T. Gates as president at its head, has been organized to take over and develop Burlington group of mines in St. Paul gulch, three miles northeast of Whitehall. Later a mill will be built.

**SUNLIGHT (Whitehall)**—This group of mines, consisting of 20 patented claims, has been sold to a New York syndicate. Several years ago American Mining & Development Co. had a bond on properties, but after an unsuccessful attempt to mill ore in a concentrator built at Whitehall, option was surrendered and concentrator dismantled. Present owners have made first payment and intend to start operations at once.

**Lewis & Clark County**

**PORPHYRY DIKE MINING CO. (Rimini)**—Preparations to operate on a large scale are being made. A contract for machinery for a 20-stamp mill has been let to Traylor Engineering & Manufacturing Co. Mill will be built at once and if it proves satisfactory, additional stamps will be installed. Ore is gold-bearing porphyry.

**Silver Bow County**

**CORBIN COPPER (Butte)**—No bids having been received for 92,000 shares of company's stock, offered at auction for delinquent assessment of \$1 per share, company made a nominal bid of assessment, turning stock into treasury.

**ELLA (Butte)**—During last few weeks, shipments of ore have been made from this mine, which was recently acquired by Anaconda Copper Mining Co. Ore amounting to 12 carloads has been extracted, while retimbering old drifts and shaft is now completed to 400-ft. level. In addition to repair work on 300- and 400-ft. level of mine, preparatory to future exploitation, an air shaft is being sunk to 300-ft. level, 165 ft. of which is now completed.

**BUTTE & BALLAKLAVA (Butte)**—In annual report to stockholders, President Freimuth calls attention to financial conditions of company, which have been seriously affected by costly controversy with Anaconda Copper Mining Co., which has recently been settled out of court. Since resumption of mining, following settlement, operations have been limited and not productive of profits. Thus far officers of company have taken upon themselves almost entire burden of protecting stockholders' interests by directly replenishing treasury and by personally guaranteeing obligations of company. Such conditions, it is pointed out, are not healthy and cannot continue for an indefinite time without disaster. President therefore impresses upon stockholders importance and seriousness of situation in order that they may at this time take action to place company upon a sound and safe financial basis and make the exploitation of property a profitable undertaking. He urges stockholders to provide means to at least partly liquidate outstanding obligations and to sink shaft to 1800 level, to exploit Jessie vein on that level, thereby increasing output and decreasing general expenses. Development thus far has been confined to opening up 1600 level, where drifting east and west has disclosed a continuous oreshoot, with indications that it extends to both east and west boundary of vein. This would mean an oreshoot of 420 ft. in length.

**NEVADA****Lincoln County**

**GOLD CHIEF (Callente)**—Crosscut is being driven on 300-ft. oreshoot opened on level above. Mill has been running on ore assaying \$5.50 per ton, making an extraction of 86%.

**AMALGAMATED POCHE (Pioche)**—Development work on 14th level of shaft No. 1 is progressing with satisfactory results. West drift on Raymond and Ely fissure has cut shoot of zinc ore assaying in gold and silver. A two-car shipment of zinc ore was made from 12th level stopes recently.

**Lyon County**

**EMPIRE NEVADA**—After drilling six holes, General Development Co. has relinquished its option on this property near Yerington station.

**SILVER STATE (Yerington)**—Shipment of bullion was made recently from this property, on Mount Grant. It is planned to make regular monthly shipments of bullion.

**MASON VALLEY MINES CO. (Thompson)**—A 10-ton, experimental leaching plant is being installed at Thompson smelting plant.

**Mineral County**

**NEVADA NEW MINES CO. (Rawhide)**—Mine and 10-stamp mill are operating steadily, 900 tons per month being treated. Winze from 500-ft. level is down 35 ft. in good-grade gold-silver ore showing ruby silver. Shipment of 3100 oz. of bullion has just been made to Selby smelting plant, second shipment in June. Other companies now operating in Rawhide are Black Eagle, which is mining and milling 50 tons per day; Mint Lease, on Grutt Hill, operating through 400-ft. shaft and milling ore at own plant, and several leases and subleases.

**Nye County**

**CASH BOY (Tonopah)**—Shaft is now 1200 ft. deep.

**TONOPAH MERGER (Tonopah)**—Drifting west on 1170-ft. level in shipping-grade ore is being done.

**TONOPAH BELMONT (Tonopah)**—Full face of ore is exposed in Mizpah fault vein, struck on 960-ft. level. Good-grade oreshoot 2 ft. wide, has been opened in shaft vein on 1166-ft. level of Belmont workings.

**ROUND MOUNTAIN MINING CO. (Round Mountain)**—It is planned to hydraulick almost entire hill, known as Round Mountain. A 6-mile pipeline survey from Jett Creek has been completed. Capitalization is to be increased from 1,000,000 to 1,500,000 shares, and considerable new ground will be acquired.

**BIG PINE (Manhattan)**—Installation of large grizzly at bottom of shoot leading from glory hole has been completed and mining operations resumed. Grizzly is 7x10 ft. with 3-in. openings, and it is estimated that it will sort out one-third of the tonnage of schist as broken from glory hole, increasing the grade of screened product.

**COMMERCIAL MINES & MILLING CO. (Manhattan)**—It is rumored that a sale is being negotiated to outside men. Properties controlled by company are Crescent, Reilly Fraction, Jumping Jack, Stray Dog, Indian Camp and Chipmunk, with stock interests in Mustang, April Fool, and probably some other companies, also control of War Eagle mill of 20 stamps. It is rumored that sale may include other surrounding properties, notably Big Four and Big Pine, Mayflower and Gold Crater claims. No authoritative information is obtainable.

**WHITE CAPS (Manhattan)**—Raising of 50-ft. headframe completes installation of equipment. Property now has the largest mine plant in camp. Installation of air lines for machine drills is to be started immediately, and within another week, mining operations should be under way again. Sinking of vertical shaft from its present depth of 210 ft. for another 100 ft. lift, is to be most important mining work carried on, although it is intention of management to do development work both in east and west oreshoots from intermediate levels.

**Ormsby County**

ARTICLES OF INCORPORATION HAVE BEEN FILED recently with the Secretary of State at Carson City, of following mining companies: Sebastopol Mining Co., formerly known as Golden Fleece, six miles north of Schurz, Mineral County; capitalization, 1,000,000 shares, par value of \$1 per share; Contact Consolidated Mining Co., Contact, Elko County; capitalization, 1,000,000 shares. Owns Buckhorn Nos. 1, 2, 3 and 4 mining claims.

**Storey County**

MEXICAN (Virginia City)—Suits were settled June 30, and company will rejoin pumping association.

OPHIR (Virginia City)—Incline winze, it is stated, will be sunk from 2500-ft. level, as soon as other work above is finished, permitting a large volume of air to reach that level to col it. Work in two Ophir winzes will be discontinued and rock trammed through 2500-ft. level to C. & C. shaft. Sierra Nevada Co., which has discontinued operation of Union shaft, will then be able to tram through this level also, to C. & C. shaft.

**White Pine County**

CONSOLIDATED COPPER MINES CO. (Ely)—It is stated that preparations are being made to use Giroux mill as testing plant to determine best method of treating company's ores.

LUCKY DEPOSIT MINING CO. (Aurum)—Extension of option has been refused and company will resume operations on copper section of property. Gasoline engine and pump will be installed. It is expected that shipping of copper ore will commence within 60 days. Development work on lead-silver section of property is progressing with satisfactory results.

**NEW MEXICO****Bernalillo County**

SANTA FE DREDGING CO. (Golden)—Installation of machinery on placer ground is progressing rapidly and plant will be in operation by July 1. Company is considering purchasing a second dredge.

**Colfax County**

STELLA (Red River)—Operations are to be resumed. Smelting ore was mined from vein in early days. Vein is cut by crosscut.

CARIBEL (Red River)—Development of ore reserves is progressing rapidly. Vein has been cut in two places, 70 ft. apart on tunnel level; average width 5 ft. Assays exceed \$30 per ton. Ore treatment experimental work is being done preparatory to enlargement of present plant to 40 tons daily capacity.

**Grant County**

GAIL MILLER (Redrock)—A California engineer is examining property negotiating for lease and bond.

WELCH CLAIMS (Hanover)—Regular shipments of zinc-carbonate ore are being made to Iola, Kan., by J. C. McKee and lessees. Ore is high grade.

GYPSY QUEEN MINING & DEVELOPMENT CO. (Lordsburg)—Company is organizing. Capital stock to be \$1,000,000, divided into \$1 shares. Company will operate in Animas Valley.

LUCKY BILL MINING CO. (Bayard)—Company is sinking main shaft from 100- to 200-ft. level and is driving north on 100-ft. level. Two ore shipments per month are being made to El Paso.

**Lincoln County**

EAGLE MOUNTAIN MINING & DEVELOPMENT CO. (Carrizozo)—Arrangement are reported to be under way with a Chicago power-plant company, to construct electrical generation plant at Carrizozo for operations of mines and mills near Nogal.

**NEW YORK****Ulster County**

HUDSON IRON CO. (Highland)—Suit to force sale of property of company was brought June 23 by Columbia-Knickerbocker Trust Co. Iron concern owns Hudson mine at Highland, and other mining property at Woodbury, N. Y., and Secaucus, N. J. Company has defaulted in payment of \$19,525 interest due on its bonds on Feb. 1, and has also failed to make sinking-fund payments amounting to \$10,000. Columbia-Knickerbocker Trust Co. is trustee under mortgage, which is dated Mar. 5, 1906, and against which \$802,000 bonds are outstanding. Trust company took possession of property June 20 through Oswald G. Villard, its agent, and is carrying on business, but it has found that receipts are not sufficient to meet obligations under mortgage. Hudson Iron Co. was incorporated under laws of New Jersey with a capital stock of \$1,500,000 in 1904.

**OREGON****Baker County**

GOLD NUGGET—This mine on Gold Mountain has been taken over by John Susman, who is driving a new tunnel.

HELEN B—A 20-ft. vein of free-milling gold ore has been struck at this mine in Sumpter district, now operated by Henry Myers.

BLUE MOUNTAIN MINING CO. (Cable Cove)—Last Chance mine is being developed. President announces that company has purchased Psyche 20-stamp mill near Greenhorn. Machinery will be dismantled and hauled to Last Chance mine, a distance of 40 miles. Machinery weighs over 100 tons.

**Jackson County**

J. A. TORNEY & L. SOULE (Medford)—Property of these men will be equipped with a cyanide plant.

GOLD STANDARD—This mine which has been closed for last two years, is to be reopened this summer by Kubli Bros. of Gold Hill. Development work will be started at once, and it is hoped to have property shipping at an early date.

**UTAH****Beaver County**

SHEEP ROCK (Beaver City)—It is reported that this property has been sold to Eastern men, and that options have been taken on Beaver Butte, Beaver Gold, Busy Bee, and other claims in vicinity.

BEAVER BUTTE (Beaver City)—Work is to be resumed at this property near Sheep Rock. There are 15 claims thought to be on extension of vein, from which Sheep Rock is mining gold-silver ore. A shaft is down 150 ft., with crosscuts on vein at every 25 ft. Width of vein was found to increase with depth. Ore is worth from \$5 to \$8 per ton. No mill tests have been made.

HORN SILVER (Frisco)—Report for 1913 shows that 25,183 tons of ore, slag and concentrates were marketed, bringing \$149,380. Other income brought receipts to \$153,286. Operating expenses were \$146,990, leaving \$2390 profits from operations. Returns for year would have been greater, but for necessity of expending a large sum for repairs to shaft and bad ground in mine. Development was retarded by caves. Shaft is now safe to 900, and will be repaired to 1100, where it is intended to continue development. Lead-zinc ores, zinc ore, tailings from old operations, crude ore, and slag were marketed. It is expected to treat further tailings, which are to furnish funds for further operations.

**Salt Lake County**

ALTA CONSOLIDATED (Alta)—Ore chutes are being built to transfer ore to bins, which are connected with tram.

UTAH METALS (Bingham)—Proposed reorganization plans have been outlined to stockholders as follows: New company is to be formed with 500,000 shares, par value \$1; 396,176 shares will be issued, holders of present shares being offered one new share for four shares of old on payment of 10c. per share on old stock. Of new shares 120,000 are to be issued to dispose of present floating debt of \$134,000. New company will hold property free from all indebtedness except present bonds and unpaid coupons. Arrangements have been made to extend \$375,000 of bonds to Apr. 1, 1919. Coupons due are to be taken care of for present by notes. Stock not taken by present holders has been underwritten, and underwriters have option to take balance of treasury stock at \$1 per share. Future exploration and development will be done with money provided by reorganization plan, and income derived from present sale of water.

**WASHINGTON****Chelan County**

MONTANA MINING & DEVELOPMENT CO.—An oil engine, rock crusher, two Nissen stamps and other equipment are being installed. There is a haul of 63 miles from the nearest shipping point. Company expects to make early shipments.

**Ferry County**

GALENA HILL (Orient)—A new vein of high-grade ore has been encountered. Company will soon begin shipping.

**Okanogan County**

NEW RAILROAD FROM WENATCHEE TO OROVILLE is now in operation. This service will mean much to all mines in this district, which heretofore have been hampered in marketing ore. A number of mines will build tracks up to their properties, and operations on claims undeveloped will be started in near future.

**Stevens County**

IMPERIAL (Chewelah)—Operations are to be resumed as soon as mine is unwatered. Considerable improvements are being planned.

**CANADA****British Columbia**

GRANBY CONSOLIDATED (Anyox)—Hidden Creek property has been making a slight profit from the first. This has strengthened confidence of the management regarding the future prospects of this acquisition. With its three furnaces running, new smelter has increased its tonnage to 1500 tons of ore daily. Company has under consideration acquisition of a quartz property which carries copper, gold and silver. Some of the quartz has been used at Anyox as a flux for Hidden Creek ores. Its value would be two-fold, as a flux and for its precious metals contents, which would reduce cost of handling material.

**Ontario**

TRETHEWEY (Cobalt)—A dividend of 5% has been declared calling for a disbursement of \$50,000, which will leave about \$100,000 in treasury. Property is now producing from \$8000 to \$10,000 monthly above expenses.

LA ROSE (Cobalt)—In a recent interview president stated that unless development at mines is more favorable this summer or company acquires new properties in near future, that surplus will probably be distributed among shareholders.

YORK-ONTARIO (Cobalt)—Capitalization of this company has been increased from \$1,000,000 to \$1,500,000. Mill on old King Edward property will be put into good condition and operations resumed as soon as possible. Shaft will be put down to 1000-ft. level.

LABINE CLAIMS (Sesekinika)—A rich find has been made on these claims, 15 miles northwest of Kirkland Lake. Four veins ranging in width from 1 to 4 ft. have been uncovered for 1000 ft. Assays are stated to run high in gold and silver and discovery has caused a rush to district.

CHAMBERS FERLAND (Cobalt)—At adjourned meeting of this company held June 10 at Cobalt proposed bylaw for transfer of assets to Aladdin Mining Co. was strongly opposed by minority stockholders and matter was postponed to a meeting to be held at Salisbury House, London, July 1. A writ has been served on company by Henry Cecil to restrain them from concluding deal.

**COLOMBIA**

POCHET DREDGE (Zaragoza)—Louis Pochet has moved his dredge to Pinea, a few miles below Zaragoza, but on opposite side of Nechl River. Dredge has been overhauled and is reported to be digging at rate of 1500 cu.yd. per day.



# The Market Report

## METAL MARKETS

NEW YORK—July 1

The metal markets generally are still quiet, with a tendency to easier prices. No large buying movement is apparent at present.

### Copper, Tin, Lead and Zinc

**Copper**—The sharp reduction of price mentioned in our last report was carried further, and on June 25, 13½c., delivered, usual terms, was accepted for some round lots. Business was done on the following day at the same price. Domestic manufacturers bought moderately. However, the demand was not sufficient to check the decline, and there was further shading of price on June 27. On June 29, round lots were offered at 13.40, delivered, usual terms, without finding buyers, while certain agencies accepted orders from Europe which netted them less than 13.25c., New York. With these reductions of price more business was done than for many weeks previous. However, the aggregate was not very large. Sales to Europe apparently exceeded those for domestic delivery. On July 1, the sharp recovery in the London standard market, together with the better demand that had been stimulated here, caused an up-turn in this market.

The average quotation for electrolytic copper during the week is 13.296 cents.

Lake copper was to be had pretty much through the week at 13½ cents.

L. Vogelstein & Co., New York, have issued "Statistical Compilations about Copper," being extracts from the statistics compiled and published by Aron Hirsch & Sohn, Halberstadt, Germany. This is the 22d year for which this publication has been made.

The London standard market showed small fluctuations, varying little from £60 until Wednesday, July 1, when there was a sharp rise to £61 for spot and £61 2s. 6d. for three months.

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 14½@15½c. per lb., carload lots at mill.

Copper exports from New York for the week were 5190 long tons. Our special correspondent reports exports from Baltimore for the week at 836 tons.

Imports of copper into France four months ended Apr. 30 were 43,577 metric tons, an increase of 6957 tons over the corresponding period last year.

**Tin**—The London market received a severe jolt on Thursday of last week, when pessimistic reports from this side brought about a decline of over £3. Prices here were even below the London parity, as low as 29¼c. being quoted. At this level, buying on the part of consumers becoming very liberal, all London offers were accepted and that market thereby again put on a better footing. Sellers withdrew and this gave the market a chance to advance, which it did readily. The close is firm at £140 15s. for spot and £142 15s. for three months, and about 31¼c. for July tin here.

Shipments of tin from the Straits, six months ended June 30, were 30,730 long tons in 1913, and 32,785 in 1914; increase, 2055 tons.

**Lead**—The weaker tendency mentioned in our last report became more evident this week. The price in New York has held firmly at 3.90c., but the business reported done on the St. Louis basis has been at 3.77½ cents.

Lead was rather heavy abroad and declined to £19 for soft Spanish; English lead, 2s. 6d. higher.

**Spelter**—This metal also has been weaker. The early part of the week a substantial tonnage sold at 4.80c. The latter part, the metal was offered in round lots at 4.80c., without finding buyers.

Spelter was generally quiet in London, but closed slightly higher, at £21 12s. 6d. 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.

### Other Metals

**Aluminum**—The market is reported quiet and sales are slow. Prices are about the same, 17½@18c. per lb., New York, being quoted for No. 1 ingots. The foreign market is also rather slow.

**Antimony**—Only the usual consumptive business is being done. The market is quiet and prices unchanged. Ordinary brands—Chinese, Hungarian, etc.—are 5.65@5.90c. per lb. Cookson's is quoted at 7.15@7.35c. per lb.; for other special brands 6.90@7c. is asked.

### DAILY PRICES OF METALS

NEW YORK

June July	Sterling Exchange	Silver, Cts. per Oz.	Copper		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.
25	4.8800	56½	@13.30	29½	3.90	3.77½	4.92	4.77
26	4.8765	56½	@13.30	30	3.90	3.77½	@4.97	@4.82
27	4.8790	56½	@13.25	30½	3.90	3.77½	@4.92	@4.82
29	4.8775	56½	@13.25	30½	3.90	3.77½	@4.90	@4.80
30	4.8750	56½	@13.25	30½	3.90	3.77½	@4.90	@4.75
1	4.8755	56½	@13.35	31½	3.90	3.77½	@4.95	@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, 15½c.; St. Louis-Chicago, 6c.; St. Louis-Pittsburgh, 12½c.; New York-Bremen or Rotterdam, 15c.; New York-Havre, 16@17½c.; New York-London, 16c.; New York-Hamburg, 18c.; New York-Triests, 22c.

LONDON

June-July	Silver	Copper				Tin		Lead		Zinc	
		£ per Ton	Cts. per Lb.	3 Mos.	Best Sel'd	Spot	3 Mos.	£ per Ton	Cts. per Lb.	£ per Ton	Cts. per Lb.
25	25½	60	13 04	60½	65	135½	137½	19½	4 21	21½	4 62
26	26½	60½	13 05	60½	65	137	138½	19½	4 21	21½	4 62
27	26	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
29	26½	60½	13 07	60½	64½	137½	139½	19½	4 21	21½	4 67
30	26	60½	13 05	60½	64½	137½	139½	19½	4 18	21½	4 67
1	26½	61	13 25	61½	...	140½	142½	19	4 13	21½	4 70

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 = 2.17½c.; £15 = 3.26½c. = 25 = 5.44c.; £70 = 15.22c. Variations, £1 = 0.21½c.

London quotations for English antimony are £28@29 per long ton; equal to 6.33c. per lb., average.

**Quicksilver**—Business is fair and the market is firm, but there has been no change in prices. 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 quoted for export business. London, £7 per flask, with £6 17s. 6d. quoted from second hands.

### Gold, Silver and Platinum

**Gold**—The rush for gold has subsided a little, and no premiums were paid this week, the price remaining at 77s. 9d. per oz. for bars. A good part of the gold arriving went to the Bank of England. In New York about \$6,000,000 was exported to France in the early part of the week; but the outward movement seems to have stopped for the present, though exchange is still at a high point.

Imports of gold into France, four months ended Apr. 30, were 202,169,000 fr.; exports, 33,222,000 fr.; excess of imports, 168,947,000 fr., against 129,907,000 fr. last year.

**Platinum**—The market is a little more active than it has been, but prices have not changed. Dealers ask \$43@44 per oz. for refined platinum and \$46@51 per oz. for hard metal, according to quality.

Two men are under arrest, charged with stealing \$40,000 worth—about 1000 oz.—of platinum wire from the Commercial Research Co., of Tuckahoe, N. Y. Where they sold it is not stated.

**Iridium**—Demand is about as usual; supplies are rather small, but the metal is still quoted at \$76@79 per oz., New York.

**Silver**—The market continues dull and quiet, without special feature. Indian Bazaar buying has supported the market and unless China buys freely prices are apt to fluctuate within narrow margins.

Shipments of silver from London to the East, Jan. 1 to June 18, as reported by Messrs. Pixley & Abell:

	1913	1914	Changes
India.....	£3,437,000	£3,617,000	I. £180,000
China.....	344,500	40,000	D. 304,500
Total.....	£3,781,500	£3,658,000	D. £124,500

The stock of silver at Bombay is reported at £795,000, or nearly double what it was two or three weeks ago.

Imports of silver into France four months ended Apr. 30 were 74,068,000 fr.; exports, 101,659,000 fr.; excess of exports, 27,591,000 fr., against 19,426,000 fr. last year.

### Zinc and Lead Ore Markets

#### JOPLIN, MO.—June 27

Blende sold at \$44 per ton on an assay base ranging from \$39@41 per ton of 60% zinc, and metal base prices were \$38.50@39.50. Calamine sold very strong at \$22@23 per ton of 40% zinc. The average price of all grades is \$38.88 per ton. Lead is still selling on a base price of \$46 per ton of 80% metal content and the highest price reported is \$47.50 per ton, with an average of all grades \$46.36 per ton.

Nearly 4000 men have left the mining district now for the harvest fields; some mines are closing down tonight and others follow on July 3 for an indefinite period from lack of laborers.

#### SHIPMENTS WEEK ENDED JUNE 27

	Blende	Calamine	Lead	Values
Totals this week..	10,033,080	595,200	1,294,340	\$236,580
Totals 6 months..	269,777,080	18,242,660	46,201,740	6,604,545
Blende value, the week,	\$199,430; six months, \$5,285,890.			
Calamine value, the week,	\$7170; six months, \$208,405.			
Lead value, the week,	\$29,980; six months, \$1,110,255.			

#### PLATTEVILLE, WIS.—June 27

The base price paid this week for 60% zinc ore was \$40@40.50 per ton. The base price for 80% lead ore was the same as last week, \$48 per ton.

#### SHIPMENTS WEEK ENDED JUNE 27

	Zinc ore, lb.	Lead ore, lb.	Sulphur ore, lb.
Week .....	2,871,010	60,000	410,200
Year .....	73,743,340	2,782,610	20,708,330

Shipped during week to separating plants, 3,985,580 lb. zinc ore.

The letter of June 20, delayed in transmission, shows shipments for the week of 2,798,320 lb. zinc ore, and 396,000 lb. sulphur ore. Deliveries to separating plants were 2,075,540 lb. zinc ore. Base prices for 60% zinc ore was \$40 per ton; for 80% lead ore \$48 per ton.

## IRON TRADE REVIEW

### NEW YORK—July 1

June has been the best month in several months in bookings of steel orders. With different companies the increases over May bookings range from 10 to 60%, and a general average, excluding rails, tin plates and wire products, which are out of season, is 35 to 40%. In the case of the National Tube Co., the June bookings were 12% in excess of the average in the preceding five months. While conditions are difficult to judge, the common opinion is that the better rate of bookings will continue in July, with little if any decline on account of the time of year. If the expectation is borne out the condition will be very satisfactory, as July is almost invariably a very dull month.

The production of steel has increased slightly in the past two or three weeks, and June shipments on the whole probably exceeded those of May.

The Pennsylvania R.R. has placed orders for 100,000 tons of rails, which is in addition to 37,000 tons already contracted for. Of the order now given 15,000 tons are to be of 120 lb. per yard, the heaviest section yet made in this country.

A celebration is being held at Catasauqua, Penn., this week to commemorate the first make of pig iron with anthracite coal. This was done in 1840 by David Thomas.

### PITTSBURGH—June 30

General reports that there will be extensive closings of steel mills in July are not borne out. Most of the producers having headquarters in Pittsburgh report that from present indications they will turn out a somewhat larger tonnage in July than in June. Some of the independent sheet and tin mills closed at the end of last week, or will close tonight, when the Amalgamated Association wage scale expires, but this movement is not general, and the union mills comprise less than 20% of the total in operation.

It is reported that the criticism of the Washington administration by large interests will shortly be curtailed; that it has become recognized no useful result has been accomplished, and that more good could be done for business by expressing hopeful feelings. Certainly in the steel trade there is more ground for feeling hopeful for the future than there was 30 days ago.

Steel-mill operations have averaged fully 65% of capacity in the past 10 days, representing a slight improvement over the rate of 30 days ago. Pig-iron production has not correspondingly increased, there having been rather a slight slowing down, due not so much to the blowing out of blast furnaces as to the operation of individual furnaces being slowed down a trifle. Some large interests have lately been reducing their stocks of pig iron, whereas three months ago they were accumulating pig iron.

Steel prices are practically stationary. There has been no declining tendency in the past week, and indeed in some directions there has been a slight stiffening tendency. Plates, shapes and bars are quite firmly on a basis of 1.10c. There have been divergences in plates, down to 1.05c. in some instances, but these are reported to have become quite infrequent. In black sheets the 1.80c. price is reported to be less common. In nearly all commodities the refusal of mills to sell for forward delivery at present prompt prices is more of a feature in picturing the situation, in that the mills have lately been under more pressure than formerly to sell for forward delivery and their failure to yield up to this date is giving buyers more confidence in the future of prices.

**Pig Iron**—For No. 2 foundry, the market is \$13 at furnace. There have been several fair-sized sales of bessemer at the regular figure of \$14, Valley. Basic is quiet, but well held at \$13, Valley. Cherry Valley furnace, at Leetonia, which has lately held to a minimum of \$13.50, furnace, when other Valley furnaces were quoting \$13, will be blown out at the end of this week. Some fair-sized sales were effected at the price, but not enough to keep the furnace in operation, and the owners were unwilling to cut the price. We quote: No. 2 foundry, basic and malleable, \$13; bessemer, \$14, at Valley furnaces, 90c. higher delivered Pittsburgh, but would note that some furnaces having a 75c. rate to Pittsburgh would sell foundry at \$13, furnace.

**Ferromanganese**—The market is quiet with prices well held on the basis of \$38, Baltimore, prompt or forward.

**Pittsburgh, July 1 (By Telegraph)**—W. P. Snyder & Co. today announce bessemer pig iron average for June at \$14 Valley, unchanged from May, with about 10,000 tons entering into average. June basic average \$13 Valley, unchanged from May with about 15,000 tons involved. There has just been a



sale of 10,000 tons basic at \$13 Valley, over third quarter, details of which are not yet announced.

**Steel**—Consumers are taking little interest in billet or sheet-bar contracts for third quarter, though there are some negotiations in progress. It is admitted that sheet bars can be done at 50c. less than formerly, or at \$20, f.o.b. maker's mill, Pittsburgh or Youngstown, while billets are still quoted at \$19.50. Rods are easier, and \$25 at mill can be done, if not shaded.

**IRON ORE**

The French Creek iron mine at St. Peter, in Chester County, Penn., which has been idle for 15 years, is to be reopened. The ore carries about 55% iron, but requires roasting on account of a high sulphur content. It will now be crushed and desulphurized by sintering. The mine is being reopened by the E. & G. Brooke Iron Co., which owns one-half and leases the other; and the ore will be used in that company's blast furnaces at Birdsboro.

Argument is in progress in the Minnesota Supreme Court in the suits brought to determine the ownership of iron ore under the beds of lakes on the Mesabi range. The owners of adjoining lands claim the right to this ore, but the state asserts its rights to all the land and minerals under the water.

**COKE**

**Connellsville Coke**—Early last week one producer of high-grade furnace coke closed three contracts for second-half delivery, aggregating 27,000 tons a month, all at \$2 at ovens. One of the buyers, taking about 8000 tons a month from this interest, purchased about 4000 tons a month from a Greensburg district producer, at 20c. less base price and with 20c. less freight. Two or three other purchasers were in the market and were expected to pay this figure, but it appears now they refuse to close at this time and will likely buy July coke at the lower figures possible for that delivery. The market on the whole shows a firmer tone, based upon better expectations for the iron and steel industry, but on the other hand there are a number of contracts expiring today and the producers may now throw more coke into the open market than it can absorb. Many foundry coke contracts have been closed for the twelvemonth at \$2.50 to consumers or \$2.35 for dealers, the dealers being required to sell at the full \$2.50. This is for the best brands, other brands being offered at various lower prices. We quote: Prompt furnace, \$1.75 @ 1.80; contract furnace, \$1.90 @ 2; prompt foundry, \$2.35 @ 2.50; contract foundry, \$2.35 @ 2.50, per ton at ovens.

**Coal Tonnage Through Sault Ste. Marie Canals, season to June 1, short tons:**

	1913	1914	Changes
Anthracite.....	626,150	287,938	D. 338,221
Bituminous.....	2,890,789	2,192,001	D. 698,788
Total.....	3,516,948	2,479,939	D. 1,037,009

The coal trade reported in June was the lightest in several years, and the movement had hardly begun in that month.

**Exports of fuel from Great Britain, five months ended May 31, long tons:**

	1913	1914	Changes
Coal.....	29,519,825	28,852,718	D. 667,107
Coke.....	424,334	444,446	I. 20,112
Briquettes.....	837,070	852,326	I. 15,256
Steamer coal.....	8,366,021	8,500,680	I. 134,659
Total.....	39,147,250	38,650,170	D. 497,080

Imports of coal for the five months were only 13,524 tons in 1913, and 13,961 tons this year.

**CHEMICALS**

**NEW YORK—July 1**

The general markets are quiet and business is light. July and August are unusually dull months, and no material change is expected before September.

**Arsenic**—The market is quiet, with only a moderate demand. The prices are unchanged. Quotations remain about \$3 per 100 lb. for both spot and futures.

**Copper Sulphate**—On a fair business prices remain unchanged. Quotations are \$4.65 per 100 lb. for carload lots, and \$4.90 per 100 lb. for smaller parcels.

**Nitrate of Soda**—There is some business forward in this article, but no special activity. Quotations are unchanged at 2.13½c. per lb. for spot, and 2.10c. for futures.

**Pyrites**—Imports at Baltimore for the week included 5971 tons pyrites from Huelva, Spain.

**Potash Salts**—Further consideration of the proposed new regulations for producers in Germany has been postponed until fall. Meantime there is much complaint of the over-production, which the new law was intended to stop.

**PETROLEUM**

Oil production in California in May is reported at 9,221,446 bbl.; deliveries, 8,528,996 bbl.; stocks on hand, 50,318,025 bbl. on June 1. There were 57 new wells completed during the month.

At a meeting of Oklahoma oil producers in Tulsa, June 25, it was resolved to recommend the State Corporation Commission to order a cessation of drilling for 90 days, excepting only in cases where work may be necessary to hold leases.

**COPPER SMELTER'S REPORTS**

This table is compiled from reports received from the respective companies except in the few cases noted (by asterisk) as estimated, together with the reports of the U. S. Dept. of Commerce as to imported material, and in the main represents the crude copper content of blister copper, in pounds. In those cases where the copper contents of ore and matte are reported, the copper yield then is reckoned at 97%. In computing the total American supply duplications are excluded.

	February	March	April	May	June
Alaska shipments	1,803,579	2,069,960	1,279,537	585,387	
Anaconda.....	21,300,000	23,800,000	22,900,000	23,500,000	
Arizona, Ltd.....	3,062,000	3,286,000	3,570,000	3,092,000	
Copper Queen...	6,987,366	7,637,042	7,562,723	8,388,203	
Calumet & Ariz...	5,596,850	5,875,000	5,450,000	5,495,000	
Chino.....	5,642,426	5,399,814	5,926,591	5,496,875	
Detroit.....	1,814,214	1,973,725	1,790,926	2,105,034	
East Butte.....	1,193,960	1,546,180	1,178,000	1,179,962	
Giroux.....	90,017	287,980	45,948	429,553	
Mason Valley....	1,254,000	1,250,000	862,000	916,000	
Mammoth.....	1,400,000	1,800,000	1,850,000	1,750,000	
Nevada Con.....	4,588,243	5,218,257	4,880,043	4,959,589	
Ohio.....	582,000	597,520	610,518		
Old Dominion....	3,066,000	2,997,000	2,779,000	3,302,000	
Ilay.....	5,432,000	6,036,908	6,089,362	6,300,847	
Shannon.....	903,761	1,082,000	1,012,000	1,056,000	
South Utah.....	333,874	406,381	247,641	55,394	
Tennessee.....	1,232,812	1,262,184	1,370,800	1,336,950	
United Verde*...	2,700,000	3,100,000	3,000,000	3,100,000	
Utah Copper Co..	9,207,111	12,323,493	12,739,757	13,208,483	
Lake Superior*...	8,500,000	11,000,000	13,000,000		
Non-rep. mines*..	7,600,000	8,200,000	8,000,000	8,200,000	
Scrap, etc.....	2,500,000	2,500,000	2,500,000	2,500,000	
Total prod.....	96,790,213	107,036,667	108,554,846		
Imp., bars, etc...	19,918,448	22,676,605	17,043,191		
Total blister...	116,708,661	129,713,272	125,598,035		
Imp. ore & matte.	9,713,164	7,029,646	10,400,122		
Total Amer....	126,421,825	136,742,918	135,998,157		

Miami.....	3,316,482	3,361,100	3,130,772	3,347,000
Shattuck-Arizona	1,134,480	1,136,458	1,386,594	1,353,043
Brit. Col. Cos.:				
British Col. Cop.				
Granby.....	1,661,212	1,775,852	1,692,102	
Mexican Cos.:				
Boleo.....	1,984,080	2,535,680	2,204,720	2,213,120
Canea.....	2,688,000	4,260,000	2,632,000	2,222,000
Moctezuma.....	2,642,543	2,882,884	2,654,926	2,834,616
Other Foreign:				
Bradon, Chile...	2,362,000	1,810,000	2,720,000	2,480,000
Cape Cop., S. Af.	459,200	660,800	468,160	
Kyshtim, Russia.	1,534,400			
Spassky, Russia.	902,720	896,000	904,960	
Exports from				
Chile.....	6,720,000	6,944,000	9,072,000	7,616,000
Australia.....	7,952,000	8,176,000	7,168,000	8,400,000
Arrivals-Europe†	18,354,560	17,572,800	17,299,520	13,558,720

† Boleo copper does not come to American refiners. Miami copper goes to Canea for treatment, and reappears in imports of blister.

‡ Does not include the arrivals from the United States, Australia or Chile.

**COPPER STATISTICS**

Month	United States			Visible Stocks.		
	U.S. Refin'y Production	Deliveries, Domestic	Deliveries, for Export	United States	Europe	Total
Year, 1912	1,581,920,287	819,665,948	746,396,452			
VII, '13	138,074,602	58,904,192	78,480,071	52,814,606	77,904,000	124,808,606
VIII...	131,632,362	73,649,801	73,263,469	53,594,945	66,420,480	120,015,385
IX.....	131,401,229	66,836,897	73,085,275	38,314,037	63,716,800	102,030,837
X.....	139,070,481	68,173,720	68,123,473	29,793,094	53,625,600	83,418,692
XI....	134,087,708	48,656,858	70,067,803	32,566,382	48,787,200	81,353,582
XII....	132,990,421	21,938,570	73,542,413	47,929,429	46,592,000	94,521,429
Yr., '13	1,622,450,829	767,261,760	869,062,784			
I, 1914.	131,770,274	47,956,955	87,955,501	91,438,867	53,916,800	145,355,667
II.....	122,561,007	47,586,637	83,899,183	87,296,685	50,108,800	137,405,485
III....	145,651,982	69,852,349	89,562,166	78,371,852	47,376,000	125,747,852
IV.....	151,500,531	63,427,633	82,345,216	64,609,319	46,435,200	111,044,519
V.....	142,308,287	55,592,170	72,710,477	70,337,001	52,371,200	122,708,201
VI....				84,342,641	61,062,400	145,405,041
VII....						

Note—Visible surpluses in Europe do not include copper float.

**Assessments**

Company	Delinq.	Due	Amt.
Caledonia, Nev.	July 3	July 24	\$0.05
Cedar Talisman, Utah	June 12	July 6	0.005
Central Eureka, Calif.	June 20	July 11	0.03
Cons. St. Gothard, Calif.	June 17	July 8	0.25
Cons. Virginia, Nev.	June 16	July 7	0.10
Crown Point, Nev.	July 6	July 28	0.10
Dry Canon, Utah	June 10	July 6	0.01
Emerald, Utah	June 15	July 11	0.13
Gould & Curry, Nev.	June 24	July 15	0.03
Hamburg-American, Ida.	June 6	July 6	0.001
Hypothek, Ida.	June 12	July 14	0.01
Idaho-Los Angeles, Ida.	June 19	July 17	0.003
Imlay, Nev.	July 1	July 18	0.005
Indian Pete, Utah	June 27	July 15	0.005
Laclede, Ida.	June 20	July 14	0.003
Manhattan Cons.	June 9	July 9	0.01
Mayflower, Mich.	July 9	July 9	1.00
Melcher, Utah	June 30	July 18	0.02
Michigan, Utah	June 10	July 6	0.0025
Montello, Utah	June 10	July 6	0.005
Robbers' Roost, Calif.	June 20	July 15	0.01
Saltese, Mont.	June 20	July 20	0.0025
Santaquin King, Utah	July 11	July 27	0.0025
Scorpion, Nev.	June 15	July 7	0.01
Seg. Belcher, Nev.	June 22	July 17	0.02
Silver Mt., Ida., postponed	June 22	July 22	0.003
Silver Peak, Nev.	June 22	July 27	0.01
Snowshoe, Ida., postponed	June 22	July 27	0.005
Union Cons., Nev.	June 26	July 17	0.05
Utah-United, Utah	July 6	July 27	0.01

**Monthly Average Prices of Metals**

**SILVER**

Month	New York			London		
	1912	1913	1914	1912	1913	1914
January	56.260	62.938	57.572	25.887	28.983	26.553
February	59.043	61.642	57.506	27.190	28.357	26.573
March	58.375	57.870	58.067	26.875	26.669	26.788
April	59.207	59.490	58.519	28.284	27.416	26.958
May	60.880	60.361	58.175	28.038	27.825	26.704
June	61.290	58.990	56.471	28.215	27.199	25.948
July	60.654	58.721	57.140	27.919	27.074	26.553
August	61.606	59.293	57.325	28.375	27.335	26.553
September	63.078	60.640	58.087	29.088	27.986	26.553
October	63.471	60.793	58.087	29.299	28.083	26.553
November	62.792	58.995	57.000	29.012	27.263	26.553
December	63.365	57.760	56.000	29.320	26.720	26.553
Year	60.835	59.791	57.000	28.042	27.576	26.553

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

**COPPER**

Month	New York		London			
	Electrolytic		Standard		Best Selected	
	1913	1914	1913	1914	1913	1914
January	16.488	14.223	71.741	64.304	77.750	69.488
February	14.971	14.491	65.519	65.259	71.575	70.188
March	14.713	14.131	65.329	64.276	70.658	69.170
April	15.291	14.211	68.111	64.747	74.273	69.313
May	15.436	13.996	68.807	63.182	74.774	67.786
June	14.672	13.603	67.140	61.336	70.821	66.274
July	14.190	13.400	64.166	60.446	69.446	65.274
August	15.400	14.200	69.200	74.313	74.313	69.313
September	16.328	15.128	73.125	78.614	78.614	73.614
October	16.337	15.137	73.383	79.250	79.250	74.250
November	15.182	14.222	68.275	73.825	73.825	68.825
December	14.224	13.224	65.223	69.583	69.583	64.583
Year	15.269	14.269	68.335	73.740	73.740	68.740

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

**TIN**

Month	New York		London	
	1913	1914	1913	1913
January	50.298	37.779	238.273	171.905
February	48.766	39.830	220.140	181.556
March	46.832	38.038	213.615	173.619
April	49.115	36.154	224.159	163.963
May	49.038	33.360	224.143	150.702
June	44.820	30.577	207.208	138.321
July	40.260	28.511	183.511	138.321
August	41.582	28.731	188.731	138.321
September	42.410	193.074	193.074	138.321
October	40.462	184.837	184.837	138.321
November	39.810	180.869	180.869	138.321
December	37.635	171.786	171.786	138.321
Av. year	44.252	206.279	206.279	138.321

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

**LEAD**

Month	New York		St. Louis		London	
	1913	1914	1913	1914	1913	1914
January	4.321	4.111	4.171	4.011	17.114	19.665
February	4.325	4.048	4.175	3.937	16.550	19.606
March	4.327	3.970	4.177	3.850	15.977	19.651
April	4.381	3.810	4.242	3.688	17.597	18.225
May	4.342	3.900	4.226	3.808	18.923	18.503
June	4.325	3.900	4.190	3.810	20.226	19.411
July	4.353	4.223	4.223	4.038	20.038	19.411
August	4.624	4.550	4.550	4.206	20.406	19.411
September	4.698	4.579	4.579	4.248	20.648	19.411
October	4.402	4.253	4.253	4.032	20.302	19.411
November	4.293	4.146	4.146	3.934	19.334	19.411
December	4.047	3.929	3.929	3.718	17.798	19.411
Year	4.370	4.238	4.238	3.973	18.743	19.411

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

**SPELTER**

Month	New York		St. Louis		London	
	1913	1914	1913	1914	1913	1914
January	6.931	5.262	6.854	5.112	26.114	21.533
February	6.239	5.377	6.089	5.228	25.338	21.413
March	6.078	5.250	5.926	5.100	24.605	21.460
April	5.641	5.113	5.491	4.963	25.313	21.569
May	5.406	5.074	5.256	4.924	24.583	21.393
June	5.124	5.000	4.974	4.850	22.143	21.393
July	5.278	5.128	5.128	5.092	20.592	21.393
August	5.658	5.508	5.508	5.206	20.706	21.393
September	5.694	5.444	5.444	5.148	21.148	21.393
October	5.340	5.188	5.188	4.914	20.614	21.393
November	5.229	5.083	5.083	4.818	20.581	21.393
December	5.156	5.004	5.004	4.714	21.214	21.393
Year	5.648	5.504	5.504	5.246	22.746	21.393

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

**PIG IRON IN PITTSBURGH**

Month	Bessemer		Basic		No. 2 Foundry	
	1913	1914	1913	1914	1913	1914
January	\$18.15	\$14.94	\$17.35	\$13.23	\$18.59	\$13.90
February	18.15	15.06	17.22	14.12	18.13	14.09
March	18.15	15.07	16.96	13.94	17.53	14.18
April	17.90	14.90	16.71	13.90	16.40	14.10
May	17.68	14.90	15.80	13.90	15.40	14.23
June	17.14	14.90	15.40	13.90	15.10	13.97
July	16.31	15.13	15.13	14.74	14.74	13.97
August	16.63	15.00	15.00	14.88	14.88	13.97
September	16.65	15.04	15.04	14.93	14.93	13.97
October	16.60	14.61	14.61	14.80	14.80	13.97
November	16.03	13.91	13.91	14.40	14.40	13.97
December	15.71	13.71	13.71	14.28	14.28	13.97
Year	\$17.09	\$15.57	\$15.57	\$15.77	\$15.77	\$13.97

**STOCK QUOTATIONS**

COLO. SPRINGS June 30		SALT LAKE June 30	
Name of Comp.	Bid.	Name of Comp.	Bid.
Acacia	.02	Beck Tunnel	.03
Cripple Cr'k Con.	.006	Black Jack	.05
C. K. & N.	.04	Cedar Talisman	.00
Doctor Jack Pot.	.05	Colorado Mining	.11
Elkton Con.	.47	Crown Point	.01
El Paso	1.45	Daly-Judge	4.90
Findlay	.008	Gold Chain	.08
Gold Dollar	.03	Grand Central	.55
Gold Sovereign	.01	Iron Blossom	1.40
Golden Cycle	1.00	Little Bell	.15
Isabella	.11	Lower Mammoth	.00
Jack Pot.	.05	Mason Valley	2.00
Jennie Sample	.04	May Day	.07
Jerry Johnson	.03	Ophongo	.01
Lexington	.004	Prince Con.	.17
Old Gold	.01	Silver King Coal'n.	2.85
Mary McKinney	.53	Silver King Cons.	1.72
Pharmacist	.009	Sioux Con.	.03
Portland	1.12	Uncle Sam	.04
Vindicator	1.09	Yankee	.02

TORONTO June 30		LONDON June 19	
Name of Comp.	Bid.	Name of Comp.	Bid.
Bailey	.00	Foley O'Brien	.25
Conlagas	7.15	Hollinger	18.75
Peterson Lake	.33	Imperial	.01
Right of Way	.02	Jupiter	.05
T. & Hudson Bay	65.00	Pearl Lake	.03
Timiskaming	.14	Poreu. Gold	1.01
Wettlaufer-Lor.	.05	Preston E. D.	.01
Big Dome	8.25	Res.	.13
Crown Chartered	1.00	Swastika	.01
Dome Exten.	.07	West Dome	.06

**SAN FRANCISCO**

June 30

Name of Comp.	Bid.	Name of Comp.	Bid.
Comstock Stocks	.08	Misc. Nev. & Cal.	6.75
Alta	.27	Belmont	.97
Belcher	.05	Jim Butler	.01
Best & Belcher	.43	MacNamara	.01
Caledonia	.02	Midway	.21
Challenge Con.	.03	Mont-Tonopah	.60
Chollar	.20	North Star	.27
Confidence	1.20	West End Con.	.63
Con. Virginia	.14	Atlanta	.14
Crown Point (Nev.)	.20	Booth	.04
Gould & Curry	.03	C.O.D. Con.	.02
Hale & Norcross	.03	Comb. Frac.	.05
Mexican	.52	Jumbo Extension	.21
Occidental	.70	Pitts-Silver Peak	.34
Ophir	.17	Round Mountain	.35
Overman	.21	Sandstorm Kendall	.08
Potosi	.01	Silver Peak	.08
Savage	.05	Argonaut	3.00
Sierra Nevada	.10	Brunswick Con.	1.50
Union Con.	.15	Central Eureka	.13
Yellow Jacket	.35	So. Eureka	1.25

**N. Y. EXCH. June 30**

Name of Comp.	Cig.	Name of Comp.	Cig.
Amalgamated	69	Adventure	1
Am. Sm. & Ref. com.	62	Ahmeek	270
Am. Sm. & Ref. pf.	102	Alaska Gold M.	27
Am. Sm. Sec. pf. B.	82	Algomah	90
Anacoda	31	Allouez	39
Batoplas Min.	1	Am. Zinc	15
Bethlehem Steel, pf.	85	Ariz. Com. cts.	4
Chino	40	Bonanza	51
Colo. Fuel & Iron	26	Butte & Balak	21
Federal M. & S. pf.	32	Calumet & Ariz.	64
Great Nor. ore, ctf.	32	Calumet & Hecla	400
Guggen. Exp.	53	Centennial	16
Homestake	114	Cliff	1
Inspiration Con.	17	Copper Range	35
Mex. Petroleum	60	Daly West	11
Miami Copper	22	East Butte	91
Nat'l Lead, com.	45	Franklin	41
National Lead, pf.	108	Granby	79
Nev. Consol.	14	Hancock	13
Ontario Min.	21	Helvetia	31
Phelps Dodge	175	Indiana	3
Quicksilver, pf.	11	Island Cr'k, com.	49
Ray Con.	201	Island Cr'k, pf.	87
Republic I&S, com.	221	Isle Royale	19
Republic I&S, pf.	84	Keweenaw	3
Sloss Sheffield, com.	24	Lake	6
Sloss Sheffield, pf.	84	La Salle	3
Tennessee Copper	33	Mass.	4
Utah Copper	58	Mayflower	4
U. S. Steel, com.	61	Michigan	50
U. S. Steel, pf.	109	Mohawk	43

**N. Y. CURB June 30**

Name of Comp.	Cig.	Name of Comp.	Cig.
Beaver Con.	.28	Old Colony	3



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