

# Mining Journal



VOLUME 100

SEPTEMBER 11, 1915

NUMBER 11

## A Trip Through Bolivia

BY STANLEY C. BULLOCK\*

*SYNOPSIS*—The general manager of a Chilean mine visits the alti plano of Bolivia, inspecting some of the leading tin-mining operations. His notes and the data about the train and hotel accommodations should be useful to engineers who contemplate traveling in this South American country.

The Bolivian frontier is crossed a few kilometers after leaving Ollague, the last station on the Chilean section of the Antofagasta & Bolivia Ry. The distance from Antofagasta by rail is roughly 440 km., and the time required by the express train is 18 hr. At the time of writing—March, 1915—only one express was being run weekly, reaching Ollague on Sunday, but, as the intention was to go first to Potosí, it was necessary to take a slow train in order to make the connection at Rio Mulato, from which place the train leaves only once a week—on Saturday. Ollague therefore was left on Thursday at 3 p.m. (La Paz time), and Uyuni, at which place the train stopped, was reached the same night at 8:30 p.m. The hotel here—the Uyuni—is good for the size of the place, and the charges reasonable—bed, dinner, breakfast and attendance costing 5 bolivianos (1 boliviano = 15d. = \$0.30, March, 1915).

### OLLAGUE TO UYUNI—UNINTERESTING TABLELAND

From Ollague to Uyuni the country is most uninteresting, being comparatively a level plain 12,000 ft. high, with little or no vegetation and very saline in character; mirages of water are seen continually along the route. There are a few mines on a branch line from Uyuni to Huanchaca, but these were not visited, since work was said to have been much curtailed and my time was limited.

The next stage of the journey started at 8 a.m. on Friday morning, and Rio Mulato, where it was neces-

sary to stop until the next morning, was reached at 11:30 a.m. The country between Uyuni and Rio Mulato is a little more fertile than the previous section; llamas and donkeys were grazing along the line, and in places the ground had been tilled and barley grown.

There is a river at Rio Mulato, from which the place presumably gains its name, but were it not for the junction to Potosí, it would be of no importance. The hotel here is poor, and since there is no competition it has little inducement to improve. The prices are comparatively high, the charge made being 6 bolivianos per diem, though the food is not good.

The train for Potosí left at 8:30 a.m.; the fare was 14 bolivianos, the same as from Ollague to Rio Mulato. The railway gage from Rio Mulato to Potosí is 1 m. and though the main line from Antofagasta is being changed to this also, the alteration has not yet been completed.

From Rio Mulato the line starts to ascend, reaching an altitude of 16,000 ft. and then descends to Potosí, which is about 14,000 ft. above sea level. The country passed through is attractive, well-watered, and cultivated on the mountainsides. Hundreds of llamas and donkeys can be seen grazing, while occasionally a bunch of



ORURO, THE COMMERCIAL CAPITAL OF BOLIVIA

vicuñas is visible fairly close to the railway line.

The only point of mining interest is the concentration plant of the Porco Tin Mines, Ltd., in course of erection at Agua Castilla, which is about 7 hr. from Rio Mulato. The mill is right at the railway, while the mine is connected to it by an aerial tramway. As the train, however, only stopped a few minutes, there was no opportunity of looking over the mill which is said to be one of the most up-to-date in Bolivia, the plant including stamps, sand and slime tables and Hardinge mill for regrinding.

The train should have arrived at Potosí at 4:30 p.m., but owing to various delays on the line, was more than an hour late. On arriving a coach conveyed the passengers up to the main part of the town, which is about 1½ mi. from the station. The hotel was safely reached, though the state of the roads and the united efforts of the driver and his mules at times made this appear in the light of

\*General manager, Poderosa Mining Co., Ltd., Mina Poderosa, Collahuasi, Antofagasta, Chile.

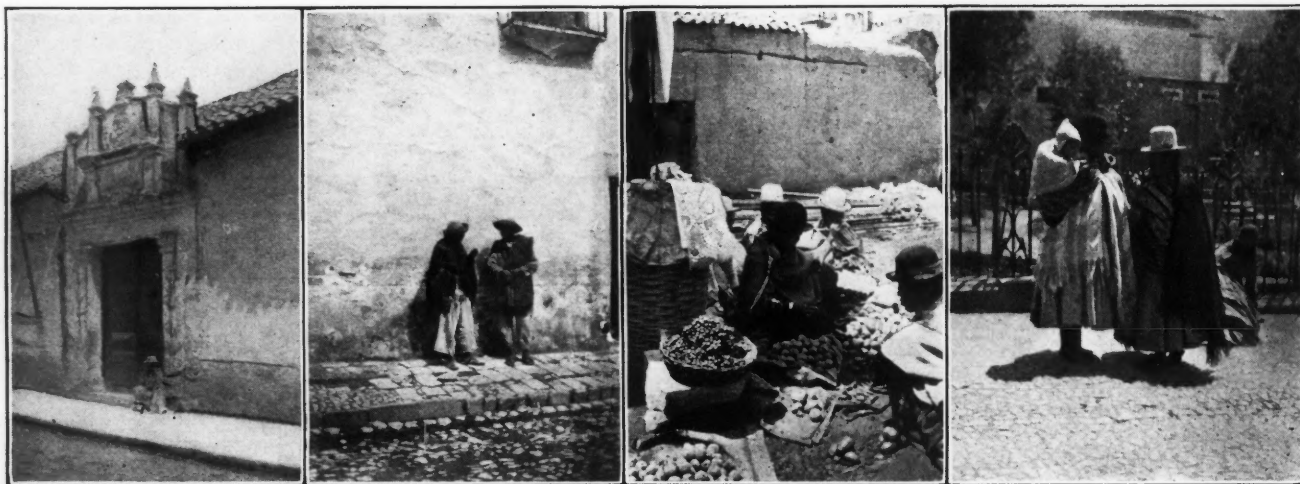
an impossible undertaking. The Hotel Splendide had previously been recommended as the best in the town, and here the food and attendance were good and the charges reasonable—5 bolivianos per day.

The next day—Sunday—was spent in looking over the town, which is most interesting, being one of the oldest in Bolivia. There are three principal mining companies in operation here, controlled respectively by English, French and Bolivian capital.

The English company is situated highest up the valley, but at the time was only working in a restricted manner. The plant is badly arranged for economical working and a new one is under consideration. The ore is partly sulphide containing about 10% tin, and is also rich in silver. It is first broken to about 1 in. and then crushed to 1 mm. in a ball mill from which it passes to a classifier feeding a jig, four tables and a Deister slimer. The concentrates average about 20% Sn, the seconds 10% Sn and are retreated. The tailings average 2.5% and go to storage dumps for future retreatment. The con-

Wilfley tables, from which the first two products have the same destination as the previous concentrates, while the third product is reground in a Huntington mill. The feed to this mill assays about 5% Sn and the discharge runs to a classifier feeding more Wilfley tables and a Humboldt slimer. These tables make four products, the third assaying about 2% Sn and being retreated, while the tailings run about 0.5% Sn and are stored for future retreatment. Any oxidized ore mined is smelted with the low-grade concentrates, the tin for shipment assaying about 97% tin.

The plant is run partly by water power and partly by a gas engine driving a generator. The workmen here in a great many cases work for 24 hr. on end for which they are paid 5 bolivianos against 8 to 9 bolivianos before the war. Living here is cheap as meat, fruit and vegetables are obtained from the neighboring villages. Some of the prices ruling in March were: Meat 30 centavos per lb., eggs 50 centavos per doz., oranges and bananas 10 for 20 to 30 centavos, grapes, peaches and



STREET SCENES IN BOLIVIA'S PRINCIPAL CITIES—ORURO, POTOSI AND LA PAZ

centrates are calcined in hand-rabbed furnaces of the reverberatory type, fired by a small amount of *taquia* (llama dung). After calcining, the silver and any copper in the ore is leached out and the calcined concentrate is treated on four Wilfley tables, where concentrates are obtained running about 55% Sn, the tailings assaying about 2%. Power is obtained from two water turbines, each capable of transmitting 60 hp. Wages at present average about 2.50 bolivianos per day of 12 hr., while before the war they were from 4 to 5 bolivianos.

The French company is operating lower down the valley and is close to the railway station. The ore is brought to the plant by an aerial tramway, 3 km. in length, and contains about 15% Sn. It is crushed in rolls to 2 mm. and the silver and copper leached out. It is then passed over jigs and tables, the concentrates from which are calcined in hand-rabbed furnaces. After calcination the concentrates are further reduced to 1 mm. in rolls, the product from which is classified and passed to jigs and Wilfley tables. The first concentrates run about 60% Sn; these are shipped. The second assay about 30% Sn and are smelted to about 97% Sn, while the third product contains about 10% Sn, and is crushed by stamps. From the stamps the pulp runs to more

figs 20 centavos per lb. Onions, beets, cabbages, lettuce, etc., were correspondingly cheap.

Potosí was left on Tuesday morning at 7:30 a.m. and Rio Mulato was reached about 5 p.m. the train being half an hour late. A dining car is attached to this train, the charge being 3 bolivianos for lunch and 50 centavos for tea, both of which meals are excellent. Tickets can be obtained direct from Potosí to Oruro, the fare being 24 to 40 bolivianos; the journey is broken at Rio Mulato for the night.

The Oruro train leaves Rio Mulato at 11:30 a.m. and does not reach its destination until 6:30 p.m. and as there is no dining car, due to some contract with a refreshment room at a small station en route where the food is not attractive, it is advisable to obtain provisions before leaving Rio Mulato. The country between Rio Mulato and Oruro is well watered and cultivated. Llamas and donkeys are seen in great numbers along the route.

At Challapata, the Llagua company ships most of its products and this is, therefore, an important town. The company is controlled by Chileans and owns one of the largest and most profitable mines in Bolivia. Some of the ore is rich enough to be shipped straight from the mine. The company has a concentration plant for the poorer grades, but this was not visited.

The next station of importance is Machacamarca, from which Señor Patiño has built a branch line of 1-m. gage that runs up to his mines which adjoin those of the Llallagua company. These mines are the most productive in Bolivia. At Machacamarca there is a branch line to the Oruro company's mill which was seen at a later date.

The best hotel at Oruro is the Quintanal; the charge was only 5 bolivianos per head and the accommodation most comfortable. The most important mines here belong to the Oruro Mining Co. and, by the courtesy of the manager the main workings were visited.

#### ORURO ORE TREATED AT MACHACAMARCA

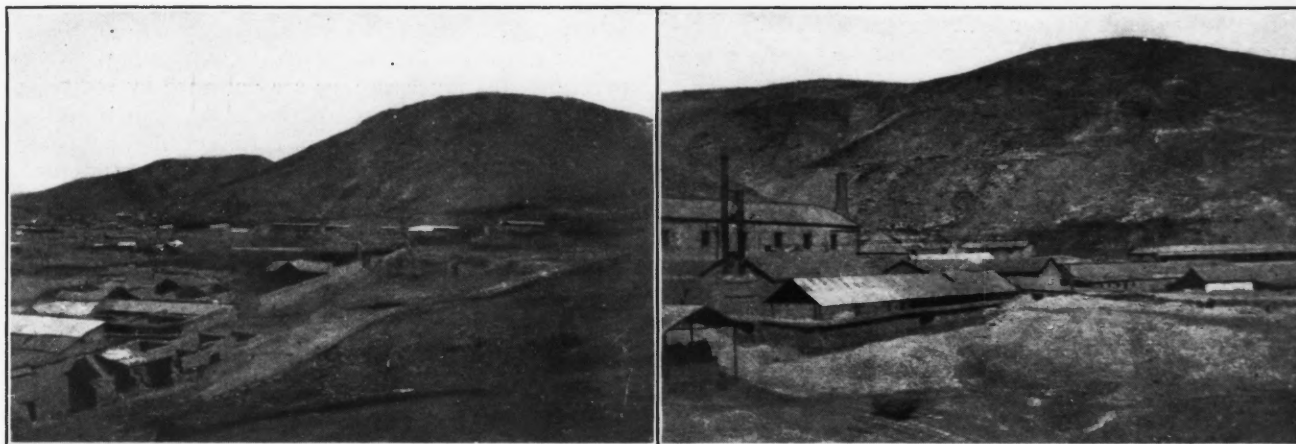
The tin ore being extracted from the chief mine runs from 2 to 3% Sn and the present workings are 300 m. deep from shaft collar, this being about 50 m. above the railway. There are seven levels, the ore being hoisted by a vertical shaft, which at present only goes to the third level, but this will eventually be continued to surface. Now the ore is trammed from the shaft to an inclined shaft which hauls to the surface. It is then crushed, passed over picking belt and trammed to

from the Oruro mine with the richer ores from the company's mine across the hill, in order to make a profit at the mill. Now, on account of reduction in wages and various other economies the company has been forced to make, it can operate on the low-grade ores alone at a profit. The miners earn about 3 bolivianos per day against 5 to 6 bolivianos previously.

#### ORURO A GAY CITY

Oruro is a gay city and the chief commercial center of Bolivia. The band plays every Thursday and Sunday, when the plaza is an interesting spectacle, everyone promenading, exchanging greetings and inspecting costumes. There is a native market where meat, fruit and vegetables can be obtained cheaply, though they are a little dearer than at Potosi.

Oruro was left at 8:30 a.m. and La Paz reached about 5 p.m., a change of trains being necessary at Viacha, where another company runs to La Paz. Just before reaching La Paz the steam locomotive is taken off and an electric one takes the train down the 1000-ft. hill into the city. The journey from Oruro to La Paz is interesting, and a good dining car is attached to the train.



SAN JOSE MILL ON THE OUTSKIRTS OF ORURO

loading station of a ropeway that carries it to another crusher station with small trommel, reducing the ore to 1 in. and automatically loading railway trucks for transit to the company's concentrating plant at Machacamarca.

Jackhammer drills are in operation in the mine. The air pressure at surface is 80 lb. per sq.in., the air being supplied by an Ingersoll-Rand compressor driven by motor. The atmospheric pressure here is about  $9\frac{1}{2}$  lb. per sq.in., the altitude being roughly 14,000 ft. above sea level. Timber is not much used. When mine supports are necessary stone walls are built wherever possible. Little water is encountered and it is taken out by bailing. Electric power is used for hoisting, lighting, and other power purposes, the generator being direct coupled to Sulzer oil engines, which are entirely satisfactory. The power plant has a capacity of 250 hp., but only 100 hp. is at present being used.

The aerial tramway which connects another mine belonging to the same company was supplied by Messrs. Pohling, of Cologne, the hauling-rope system with fixed cable being used. That the war has been in many ways beneficial to Bolivia is well exemplified by this mine. Before the war it was necessary to mix the poorer ores

The railway runs on a plateau between ranges of hills, and the whole plateau is more or less cultivated, while herds of llamas and donkeys are continually seen and occasionally a small troop of vicuñas is visible.

La Paz is the center of government but there is little other business done there. The principal factories are for the manufacture of Bolivian beer, which is doubtless due to the flow of excellent water through the valley. The chief hotel is the Guibert, but the prices are higher and the rooms less comfortable than those at Oruro.

The charges here were 7 bolivianos per day in spite of the fact that there is a plentiful supply of vegetables and fruit in the neighborhood. La Paz is probably one of the prettiest places to visit in Bolivia, but is of little interest from a mining point of view. The nearest mines of any consequence are those of the Corocoro United Copper Mines, the ore being chiefly native copper finely disseminated in a sandstone gangue. They are about 100 km. from La Paz, but I did not have time to visit them. Electric trams are running in La Paz and a long trip can be made down the valley to a place called San Jorge. La Paz was left at 1:40 p.m. for

the down trip to Oruro, which was reached at 9 p.m. the same night.

Having received an invitation to see the concentration plant of the Oruro Mining Co. at Machacamara, this was visited on Saturday in company of the manager. The tin ore as it comes from the mines is crushed to 16 mesh in two 16x36-in. crushing rolls, the oversize from the first being returned by means of a trommel to the second. It is then passed to calcining furnaces, rabbled by hand, the silver and copper leached out and the calcined ore passed through grinding pans, which, in turn, deliver to classifiers, feeding tables, vanners and Deister slimer. From these, 60% concentrates are obtained and this product is brought up to 65% by hand.

The oxidized ore is treated in another section of the mill, stamps being the crushing machine, the pulp from which flows to a Richards-Janney classifier, the different spigots feeding tables and vanners, the concentrates from which run about 50% Sn.

#### McDOUGAL FURNACE VOLATILIZES SILVER

A new sulphide mill is being erected equipped with Hardinge mill, thickeners, Deister concentrators and slimers, the plant having a capacity of from 80 to 100 tons per day, and the concentrates are expected to assay from 67 to 68% Sn. Edwards roasting furnaces are also to be tried, as the labor cost on the present furnaces is excessive. A McDougal furnace has been tried, and although successful on straight tin ores, the losses are high where silver is also contained. This furnace, therefore, is not at present in use. The plant is run by gas engine, though the present management would prefer oil engines, direct coupled to generators, were a new plant contemplated. The new mill when completed should be one of the most up-to-date and economical in Bolivia.

Labor is plentiful. During working hours, the natives are continually chewing the leaves of the coca plant, from which the well-known drug cocaine is extracted. This habit has descended from the days of the ancient Incas, and is supposed to satisfy all pangs of hunger as well as supplying the eaters with remarkable powers of endurance.

The fuel chiefly used is yareta and taquia. Yareta is a resinous moss of a fibrous nature found locally. The Indians collect and bring in these fuels from varying distances and the price varies accordingly from 60 centavos to 1 boliviano per Spanish quintal—100 lb. These fuels are worth about one-third their weight in coal as regards calorific powers.

Oruro was left on Monday morning at 7:45 a.m. and at 6 p.m. Uyuni was reached, where it was necessary to stay for the night as the train went no farther that day. Next morning Uyuni was left at 7:30 a.m. and Ollague reached at 1 p.m., and thence on through Chile to the coast at Antofagasta.

The total trip lasted for practically three weeks at a cost of approximately \$100 per head, including all expenses. Bolivia is undoubtedly a country well worthy of further development from a mining standpoint, and with the decreased cost and wages now obtaining, together with up-to-date power plants, mining and milling machinery, there should be a profitable return on carefully expended capital, provided the prospects of any mining enterprise embarked upon are thoroughly gone into by a reliable mining engineer, well acquainted with the country and the people.

## Anaconda and the Unions

SPECIAL CORRESPONDENCE

On the occasion of their picnic at Anaconda a few days ago C. F. Kelley, vice-president and managing director of the Anaconda Copper Mining Co., addressed the members of the Mill and Smeltermen's Union and took occasion to paint in proper color the labor disturber, the soap-box agitator and the demagogue who fatten on honest labor; commended the honest leader of labor, and spoke of the necessity of reciprocal relations.

"It is my opinion that the greatest mistake that can be made is to view this relationship exclusively from the standpoint of one side or the other," he said. "The relation, together with its duties, is reciprocal, and inasmuch as there may be abuses and grievances on the part of one, so there may, and have been, on the part of the other. Unlimited and unrestricted power is the greatest cause of the abuse of power. Men are human, no matter in what capacity they act, and what may create injustice and oppression in one capacity will do so in another. There is no distinction in injustice, whether it be practiced by a corporation, an individual, or a labor union, nor should it be more excusable in one instance than in another.

"No single institution created by man is perfect. Corporations, inasmuch as they are governed by individuals, possess the same frailties and incur the same mistakes as men. Much has been said in criticism of the Anaconda company, and much of that criticism has been unfounded. One thing can be asserted as a fact—that throughout its entire industrial career it has been characterized by an unflinching spirit of fairness to its employees.

"I feel that I have an extraordinary right to make that statement, for its policy in this respect I have known from the time when I was employed by it in the humblest capacity until charged with more or less responsibility for its action. That such a policy of fairness will characterize its future conduct I have no doubt, and whatever may be said by the demagogues, I trust that the feeling of mutual confidence which has been built up will continue to prevail. Such a foundation furnishes a more satisfactory assurance that mutual obligations will be fulfilled than can the words of any written contract characterized by the distrust of the parties to it."

### Tin Smelting at Pittsburgh

The Standard Smelting Co., Pittsburgh, has been organized with a capital of \$100,000, and has installed in the works formerly occupied by the R. D. Nuttall Co. two Wile electric furnaces for smelting Bolivian tin concentrates, says *Iron Age* of Aug. 26, 1915. Another furnace of the same type is now being installed. The works will then have a capacity for smelting 20 tons of concentrates every 24 hr., from which it is expected to recover 12 to 14 tons of tin. The company expects to sell the greater part of its tin output to consumers in the Pittsburgh district. The incorporators of the Standard Smelting Co. are H. S. Glenn, C. E. Glenn, C. R. Buchheit and R. S. Wile.

**Swiss Prohibition of Exports**—The Swiss Federal Council has issued a decree extending the embargo on contraband articles to tubes made of the following metals or their alloys: Copper, lead, zinc, tin and nickel.

# Ore Dressing at Clausthal

By E. MACKAY HERIOT\*

**SYNOPSIS**—In describing the operation of concentrating lead and zinc ores at Clausthal, emphasis is placed upon the satisfactory results secured through the use of old-fashioned machinery, much of which can be built at any mine. Harz jigs and buddles are used, as are also spitzkasten and other well-known types. The ore and the treatment system are described.

Many years ago when I was a student at Clausthal I took the opportunity of working through a practical course at the state concentrator. The plant was a large one and in every way uptodate, employing 450 men and boys. It had the ordinary rockbreakers and rolls and 176 stamps for fine crushing. There were a number of jigs and Harz buddles for the ore concentration. The capacity was about 270 metric tons of crude ore in 10 hr.

### A NEW CONCENTRATOR ERECTED IN 1905

This installation was completely scrapped in 1905 and a new concentrator erected by the Humboldt firm. It takes up less room than the former one, employs only 250 men and boys and has a capacity of 360 metric tons of crude ore per 10-hr. day. It is in every sense of the word a model plant, as is proved by the results achieved, and anyone interested in this class of dressing would do well to visit it. In this model plant there are 96 Harz jigs working. The old type of spitzkasten has taken the place of patent hydraulic classifiers. There are 14 specially constructed Harz buddles for concentrating the finest slimes. Since the installation was laid down many improvements have been carried out.

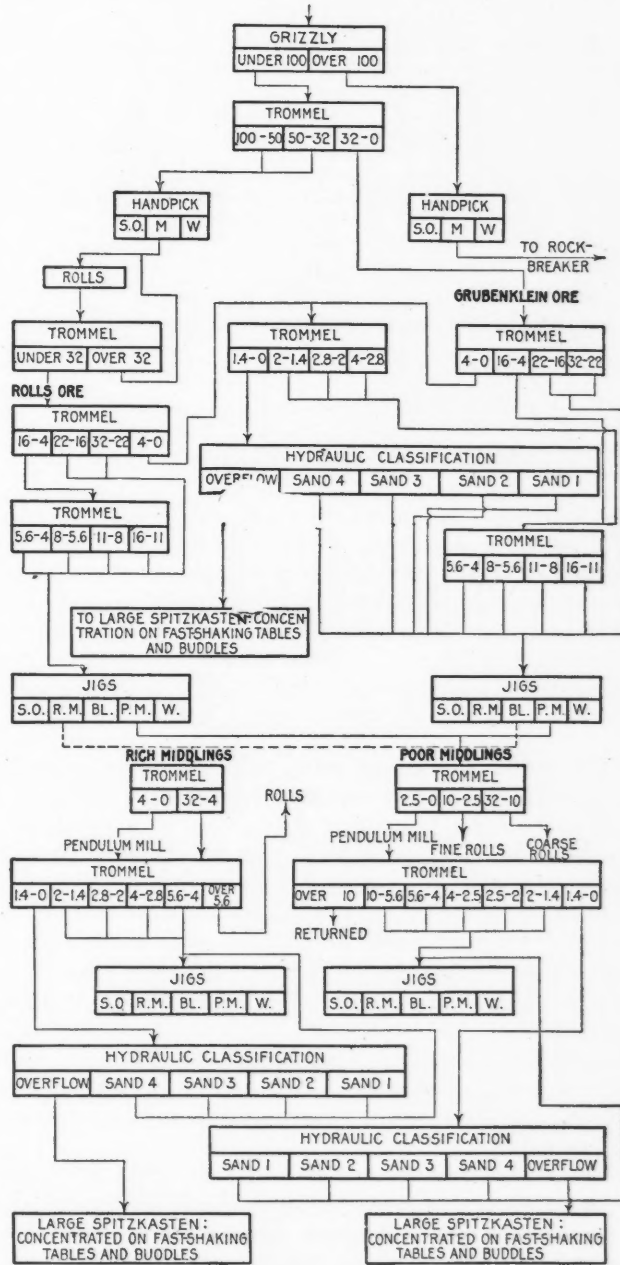
In these days, when it is thought by many that a modern dressing plant must have some special patented system or a combination of systems, it is a pleasure to see the old-fashioned apparatus doing such excellent work and holding its own so easily. There is one particular reason why one should be pleased, and that is because jigs, spitzkasten and buddles can be made at almost any mine with the help of a local foundry. I do not mean to suggest that a concentrator should in all cases be made locally, especially if the plant be a large one. There are firms who can carry out the very best arrangements. However, it often happens that a mine cannot afford to put up a large plant at the outset, but could, with the aid of a good dressing expert, rig up a reasonably good installation. It often happens that after a small plant has been put up one sees the mistakes and in the construction of the large plant these mistakes are guarded against. I shall refer later on in some detail to the old-fashioned apparatus, and hope that the notes I give will have a practical value.

### COMPOSITION OF THE CLAUSTHAL ORE

The ore treated at the Clausthal plant is of an ordinary kind. The minerals are galena, blende and copper pyrite in small quantities. An average analysis is: 4.17 to

7.83% PbS; 10.51 to 20.95% ZnS; and in some cases, 0.23% CuFeS<sub>2</sub>.

The gangue is composed of calcspar, quartz, graywacke, thonschiefer and, in the Rosenhofer district, spathic iron ore in small quantities. The composition of the ores is much the same, but the structure shows considerable variations. At the Unterer Burgstaedter Revier con-



FLWSHEET, CLAUSTHAL ORE-DRESSING WORKS

centrates of 11-mm. size can be obtained, whereas at the Rosenhof, 4 mm. is the largest. On this account the ores are not mixed, but held apart in large reserve bins.

The plant consists of two parallel installations. From the bins on the ground floor the ore is hoisted by an electrically driven lift to the top story of the main

\*Mining engineer, Rio Tinto, Huelva, Spain.

building. Each truck passes over a self-registering weighing machine and is dumped on a grizzly with bars 100 mm. apart. All material over 100 mm. is hand-picked. The middlings are broken in a crusher and hoisted again to the grizzly. Stuff under 100 mm. falls into a bin, from which it is mechanically fed into a trommel, which classifies 100-50, 50-32 and 32-0 mm. sizes. The first two are hand-picked on revolving tables. The middlings, called rolls ore, are crushed in rolls. The 32-0 mm. size is called *grubenklein* (fines). It is richer than the rolls ore and is therefore treated separately. The *grubenklein* is classified by trommels into sizes 22-16, 16-11, 11-8,

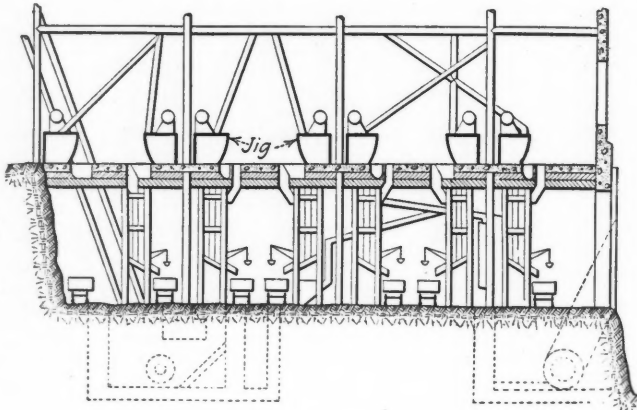


FIG. 1. JIGS AND CONCENTRATE BINS

8-5.6, 5.6-4, 4-2.8, 2.8-2, 2-1.4, 1.4-0. The last-named size passes on to a sand spitzkasten; all the former are treated on Harz jigs. The middlings are divided into two classes, rich middlings and poor middlings, and each is treated separately. The overflow of the sand spitzkasten passes on to a large spitzkasten system. This material is concentrated on fast-shaking tables and Harz buddles.

#### TREATMENT OF RICH AND POOR MIDDINGS

The "poor middlings" referred to are sorted in trommels. The size above 10 mm. goes to the coarse rolls and 10-2.8 to the fine rolls. Material under 2.8 is crushed in *pendelmühlen*, whence it goes to sand spitzkasten. These products are jigged. The overflow of the sand spitzkasten goes to a large spitzkasten system.

The "rich middlings" contain a considerable amount of ore that is really clean, therefore the sizes from 4-1.4 mm. are jigged again. The middlings from this process, together with the larger sizes, are crushed in the mills, but the 2.8-0 is ground in a *pendelmühle*, whence it flows into a sand spitzkasten. These products are treated similarly to those of the "poor middlings," but of course separately.

The blende ores are soft and are therefore not suitable to stamps, as too much powder would be the result; thus material under 2.8 mm. crushed in *pendelmühlen*, using 1-mm. screens. This mill is an improved Huntington type. Its capacity, working through a 1-mm. screen, is 1600 kg. per hr. The mill ring lasts for from about 3500 to 4000 tons.

As regards the rolls, I noticed that the application of a corundum wheel kept the shells in order. The corundum wheel is driven by a belt and does not disturb the working of the rolls. The milling is all done on one floor, but the rockbreakers are on a different level. Each

machine has its foundation separate from that of the building.

The jigs are the well-known Harz machines and are built of wood. Material of 22-11 mm. is dressed on 3-compartment jigs, 11-2.8 on 4-compartment jigs and 2.8-1.4 and sand on 5-compartment jigs. The jigs are placed in one large room. There are 96 of them, and here I observed a great improvement which cannot be too strongly recommended. The jigged products are run into small deposits in the floor and emptied from time to time into bins which lie alongside. The tops of these bins are on a level with the ground floor of the hall. On the floor below, the bins are emptied into trucks. All the bins are arranged in neat parallel lines. The jig hall is clean from end to end—there is no water and no sand about the place. One man can attend several machines, as he has very little to do except control the working and move the material one or two feet from hole to hole. The jig room is shown in Fig. 1.

I think in many cases where Harz jigs have not been found practical it is because they have not been properly operated. An expert hand is required to control these machines. So much depends on the class and height of the bed, the height of the bridge, the number and length of strokes, amount of fresh water, etc. With so many items to look after, one can make any number of combinations which may prove disastrous. On the other hand, by small alterations, great advantages may be gained. I give a case in point. The jigs in the old plant were

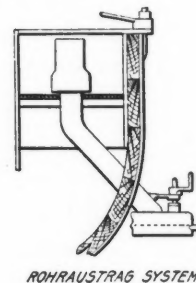
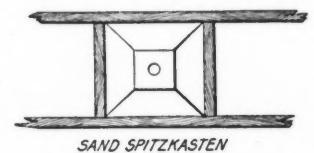
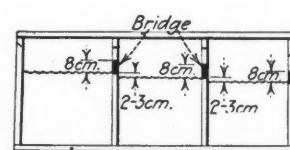


FIG. 2

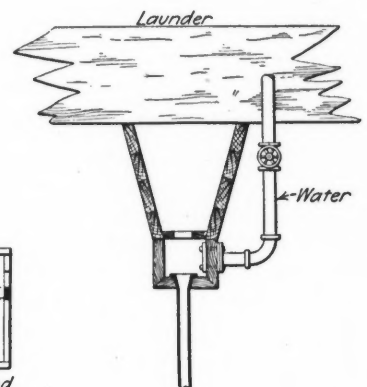


SAND SPITZKASTEN



Showing Height of Bridge and Difference of Screen Level

FIG. 3



To Jig

FIG. 4

FIGS. 2 TO 4. DETAILS OF CLASSIFYING APPARATUS

so constructed that the bridge between the screens was 10 cm. high. In the new plant the bridges are 8 cm. high. By this alteration the capacity has been increased 64%, or from 600 to 986 kg. per hour. Each machine uses about  $1\frac{1}{2}$  hp.

#### DETAILS AS TO WORK OF THE CLAUSTHAL JIGS

I now propose to give some detail of the jigs working in the Clausthal installation. The screens are 0.85 m. long by 0.48 m. broad. Sizes from 8 mm. to sand No.

4 are concentrated through a bed. In a four-compartment jig the first product is lead concentrate; the second, rich middlings; the third, blende concentrate; the fourth, poor middlings, and the overflow, in most cases waste.

Another interesting item is the size of hole in the jig screen. Some examples are shown in the accompanying table.

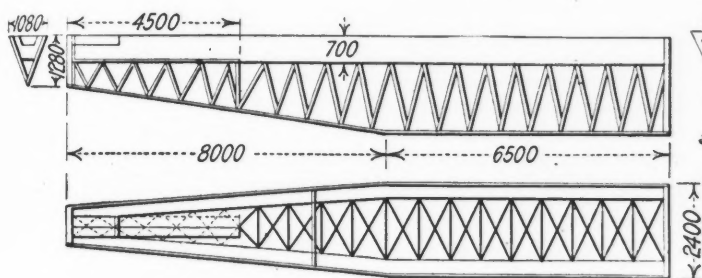
DATA OF THE CLAUSTHAL JIGS

Size of Material, Mm.	Number of Strokes per Min.	Length of Stroke, Mm.
22-16	120	46
16-11	140	30
11-8	160	30
8-5.6	180	25
5.6-4	200	20
4-2.8	220	15
2.8-2	240	13
2-1.4	260	8
Sand No. 1	280	5
Sand No. 2	300	5
Sand No. 3	300	5
Sand No. 4	300	5

SIZES OF HOLES IN JIG SCREENS

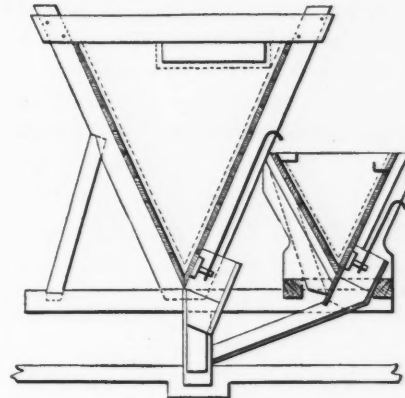
Size of Material, Mm.	Diameter of Hole in Screen, Mm.
Sand	1
1.4	2-3
2.8	3-4
8-11	2
11-16	4
16-22	4
22-32	8

It must be here stated that all material over 8 mm. is not concentrated through the screen, but worked on the Rohraustrag system—that is to say, the concentrates



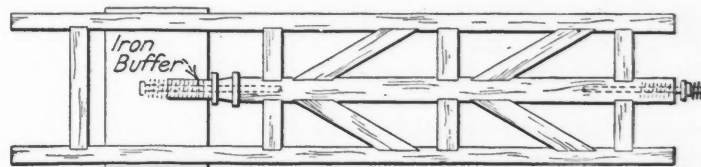
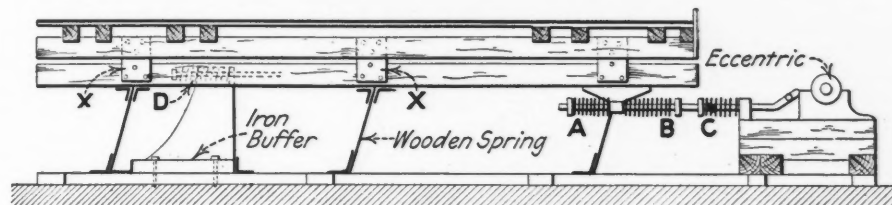
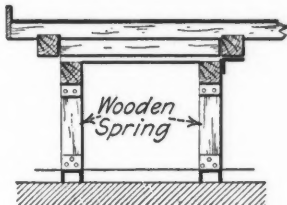
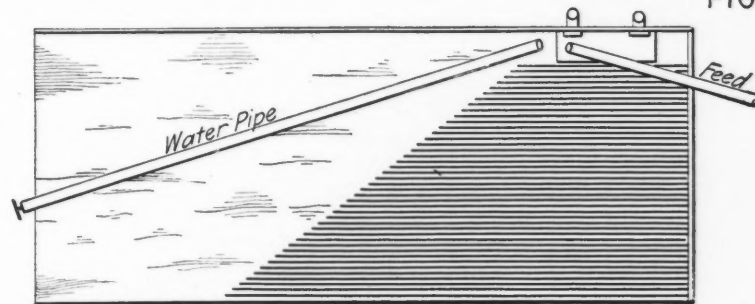
LARGE SPITZKASTEN SYSTEM (CLAUSTHAL)

FIG. 5



SPITZKASTEN AND VORSPITZKASTEN

FIG. 6



SHAKING TABLE AS USED AT CLAUSTHAL

FIG. 7

FIGS. 5 TO 7. DETAILS OF CONCENTRATING MACHINERY

In the poor-middlings department the bed of the first compartment is galena; the second and third, galena and blende; the fourth, blende with gangue. In the rich-middlings department the third and fourth are blende, but otherwise the same as previously mentioned.

are extracted from the top of the screen through a pipe. An outline of this method is illustrated in Fig. 2.

As has been already stated, the height of the bridge is an important factor in the working of a jig; so is also the difference of level from screen to screen. In general

the bridge is 8 cm. high and the difference of screen level 2-3 cm., as shown in Fig. 3.

The patent iron hydraulic classifiers that were originally erected have been removed and the ordinary rising-current spitzkasten put in their places. They are arranged in sets of four and their products are concentrated on jigs. There has been much argument about working spitzkasten products on jigs, but even where six of these are placed together the result has been in every way good. It is well known that any material under 1 mm. cannot be successfully sorted in a trommel. I will not argue the point as to whether the rising current should enter the spitzkasten at the bottom or side. Here it is at the side, and Fig. 4 shows a sketch of one drawn to scale.

#### THE SPITZKASTEN SYSTEM

The overflow from the sand spitzkasten is led to a large spitzkasten system. The spitzkasten are placed in

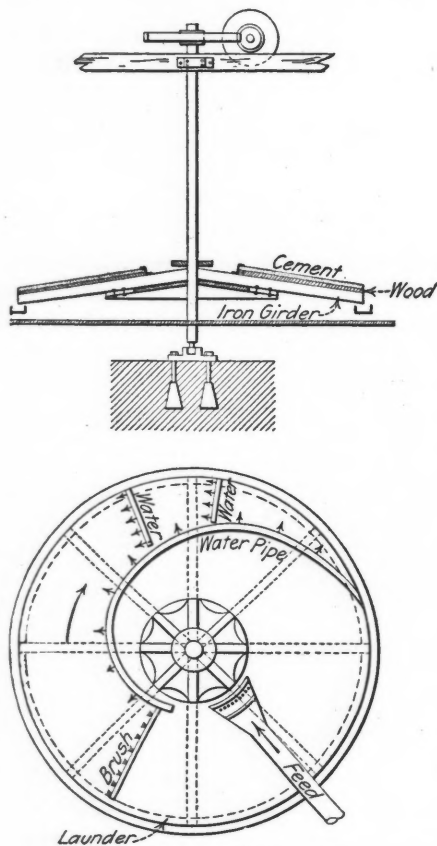


FIG. 8. MODERN ROUNDHEAD BUDDLE

two rows of 19 each, with a platform all around. The width of the first is 1030 mm., and it is 1280 mm. high. For the first 8 m. the machines grow larger and larger, but during the last 6500 mm. the size is the same, namely, 2400 broad and 2500 mm. high, as shown in Fig. 5. Most of the products of the spitzkasten are concentrated on fast-shaking tables, but the very finest are treated on Harz buddles.

The large spitzkasten are fitted with so-called vor-spitzkasten. These are smaller ones placed in front and serve to take off the superfluous water before the concentration takes place.

The vor-spitzkasten is 1300 mm. high by 1750 mm. broad, and 1100 mm. long. The drawing, Fig. 6, shows

the system. From the excellent work the tables do there is no doubt that this method is well worth copying.

#### HUMBOLDT FAST-SHAKING TABLES

The fast-shaking tables, of which there are 39 in use, are of an improved Humboldt model. The improvement was made by Mr. Northdurft, the plant manager, and has increased the capacity from 200 to 500 kg. of crude fines per table per hr. The working results are excellent. The supervision can be carried out by boys and the repair costs are practically nil. The table works any class of slimes except the finest. The amount of water used per minute is about 45 liters and the machine makes 360 r.p.m. Each revolution gives the table a backward and forward movement by aid of an eccentric on the driving shaft. When the table is moved toward the machine, three steel springs are tightened, and then let loose in the opposite direction with a jerk. The eccentric rod is

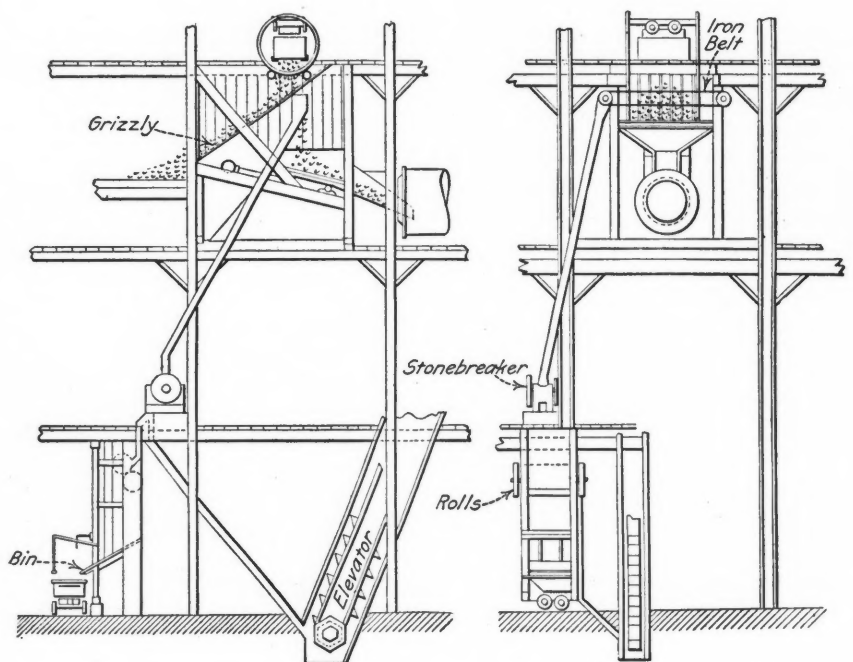


FIG. 9. CLAUSTHAL SAMPLING PLANT

not joined to the table but to a central beam. The further end of this beam fits into an iron buffer. By altering the tension of the springs *A* and *B* (Fig. 7) the shake movement can be modified at will. The incline from the vertical given to the wooden springs—six in number—depends on the fineness of the material to be worked, but it varies from 5 to 10 mm. By the aid of the three plates marked *X* and the hinges *E*, the slope of the table can be regulated. Several sketches of this table are given, because I think the results it has achieved make it worthy of being better known.

The Harz buddles are practically the same as those used in days gone by. The construction will be seen from Fig. 8. The face is cement and rests on wood. There



are eight iron bearers or girders. The diameter is 5 m. and the incline of the face varies between 1.10 and 1.15. It makes about 0.6 r.p.m. The whole plant as it works today gives satisfaction; 76.56% of the lead is saved and 81.54% of the zinc. The lead is concentrated to 73% and the zinc to 54.60%. The marketable lead ores have 3% of zinc and the marketable zinc ores 2% of lead.

Electrically driven pumps are employed to pump back the water after it has been cleared in large tanks. Two cu.m. of fresh water is used per minute. The total power used in the dressing plant is 688 hp. Like other modern installations, the Clausthal plant has a mechanical sampler. This was erected in 1911. Under the 100-mm. grizzly, where the crude ore from the mine is first treated, there is an endless belt. This takes about 20 kg. from each truckload and passes it down a pipe into a small crusher, which breaks it to 16 mm. This crushed material falls in equal parts into two launders. One part is returned to the floors by aid of an elevator, while the other part is crushed in a small mill and falls into a bin. After each shift the bin is emptied and the sample reduced to 1 kg. A monthly average sample of this material is analyzed. It is taken into consideration that the material over 100 mm. does not enter the sample. The plant uses 7 hp. In Fig. 9 is shown a sketch of the sampler.

At the Silbernal mine, near Grund, the middlings from the wet concentrator are being treated by the Murex magnetic method. This is a combination of the oil-fotation and magnetic processes. It has been described by Messrs. Achenen and Jungst in their book on ore dressing. Grund lies about five miles from Clausthal. The ores contain a considerable amount of heavy spar. The material under 3-4 mm. is mixed with water to a thin pulp. To this is added a composition of magnetite, paraffin oil, goudron and colophonium. The whole mixture is deposited in a cylinder, 1240 mm. in diameter and 2780 mm. long, which is revolved at the rate of 50 r.p.m. The cylinder contains 150 kg. of steel pieces of 4-6 mm. diameter and 150 kg. of pebbles (10-15 mm.), which serve to mix the oil and ore more intimately. The mixture flows from the cylinder through a 2x4 mm. screen on to a shaking table which has a magnet at the bottom end. The magnet lifts the magnetite and with it the oil and galena. The heavy spar and gangue remain on the table.

It is interesting to note that the difficulty of clearing the water of slimes has to a great extent been overcome at Clausthal and Lautenthal by adding magnesium chloride to the water. At Lautenthal a 7% magnesium-chloride solution is used, one liter in 10 min. for every 3 cu.m. per min. slime water. The amount of insoluble matter in one liter was reduced from 0.35 to 0.14 by this method.

✽

### Civilian Engineers to Aid Army

Plans for having immediately available for the nation's service in time of war associations or societies of engineers, bridge builders, electricians, telegraphers and other trained experts in civil life, are being worked out at the Army War College in connection with the general reorganization scheme now being studied.

Secretary Garrison said on Aug. 30 that he had received suggestions from the American Institute of Mining Engineers, the Electrical, the Civil and the Mechanical Engineers that the organizations might be of use to supplement the army engineer corps, should the need arise. William Barclay Parsons, of New York, and Elmer L. Corthell, of Massachusetts, representing many engineering societies, called upon the secretary on Aug. 30 to tender formally the services of the organizations.

Mr. Garrison obtained from them written suggestions as to ways in which the engineers in civil life could be useful, and the whole matter was turned over to the War College for the framing of a definite plan. The War College will submit a detailed report on the scheme, which probably will be included in the Secretary's report to Congress this winter.

✽

### Montana Power Construction Progress

SPECIAL CORRESPONDENCE

John D. Ryan, president, and officials of the Montana Power Co., which is owned by interests closely allied with the Anaconda Copper, have made an inspection of the different power plants of the company. The party arrived at Great Falls in time to see water turned over the big dam built across the Missouri River by the power company, the dam having just been completed. The company is practically ready to furnish the energy to the St. Paul R.R. for its electrified system, the contract calling for the delivery of the power by Oct. 15; but the company could have delivered it Sept. 1. The transmission line between Great Falls and Anaconda was connected a few days ago, and the work on the line to Two Dot is going on satisfactorily.

The big power dam at Great Falls is 1340 ft. long and its construction required 216,000 cu.yd. of concrete, to make which 1,000,000 sacks of cement was used. Three million feet of lumber, board measure, was used, and 6,000,000 lb. of reinforcing steel and 1,250,000 brick went into the structure. In all, 11,000 carloads of material went into the river to make the dam.

At Thompson Falls, in the western part of the state, work on the power plant is making rapid progress and will be in full running order by next winter. Two of the six units are already generating power. "When completed we expect to produce with our six units at Thompson Falls 50,000 hp.," said Mr. Ryan. "The main use of the electricity will be of course that of supplying the new electric system of the St. Paul R.R. Then we will supply the Cœur d'Alene mines, which we are already doing in part. We are, however, still in the market with our power, since we will have a great deal to spare." The Montana Power Co. owns practically all the important power plants and light plants in Montana, and under the plans of Mr. Ryan, the late John G. Morony, and the company's efficient managing expert, the late Max Hebgren, the power system in the state is being developed to a point where it will be second only to mining in industrial importance. It is already supplying power and light to Butte and all the Butte mines.

✽

At a Conference of Representatives of the Russian Gold-Mining Industry on May 7 it was decided to address a petition to the government for the establishment of a concern to manufacture cyanide of potassium.

# The Steel Headframe at No. 9 Shaft, Republic Mine, Vulcan, Mich.--II

BY FLOYD L. BURR\*

*SYNOPSIS*—Continuation of description of a modern steel headframe. Details of steel work and foundation taken up in this section. Complete costs of erection are given.

The height of the structure depended upon the necessary elevation of the skipsheave, and this was fixed by considering the elevation of the extreme top of the skip at its "full dump" position and allowing for about 12 ft. overwind. The position of the top of the skip depended of course upon the horizontal east-west position of the

inadequate in capacity and height, so the design of a larger and improved type of skip in use at one of the shafts at Vulcan was adopted as the basis of design for the headframe and the old skip was reconstructed to fit the new dump.

The elevation of the skipsheave, as determined by the conditions previously outlined, was 73 ft. The cagesheave was about 10 ft. higher. Allowing for plenty of headroom for tackle and handling of sheaves brought the lower flange of the trolley-beam crane up to an elevation of about 97 ft. The ladders extend up to an elevation of about 102 ft.

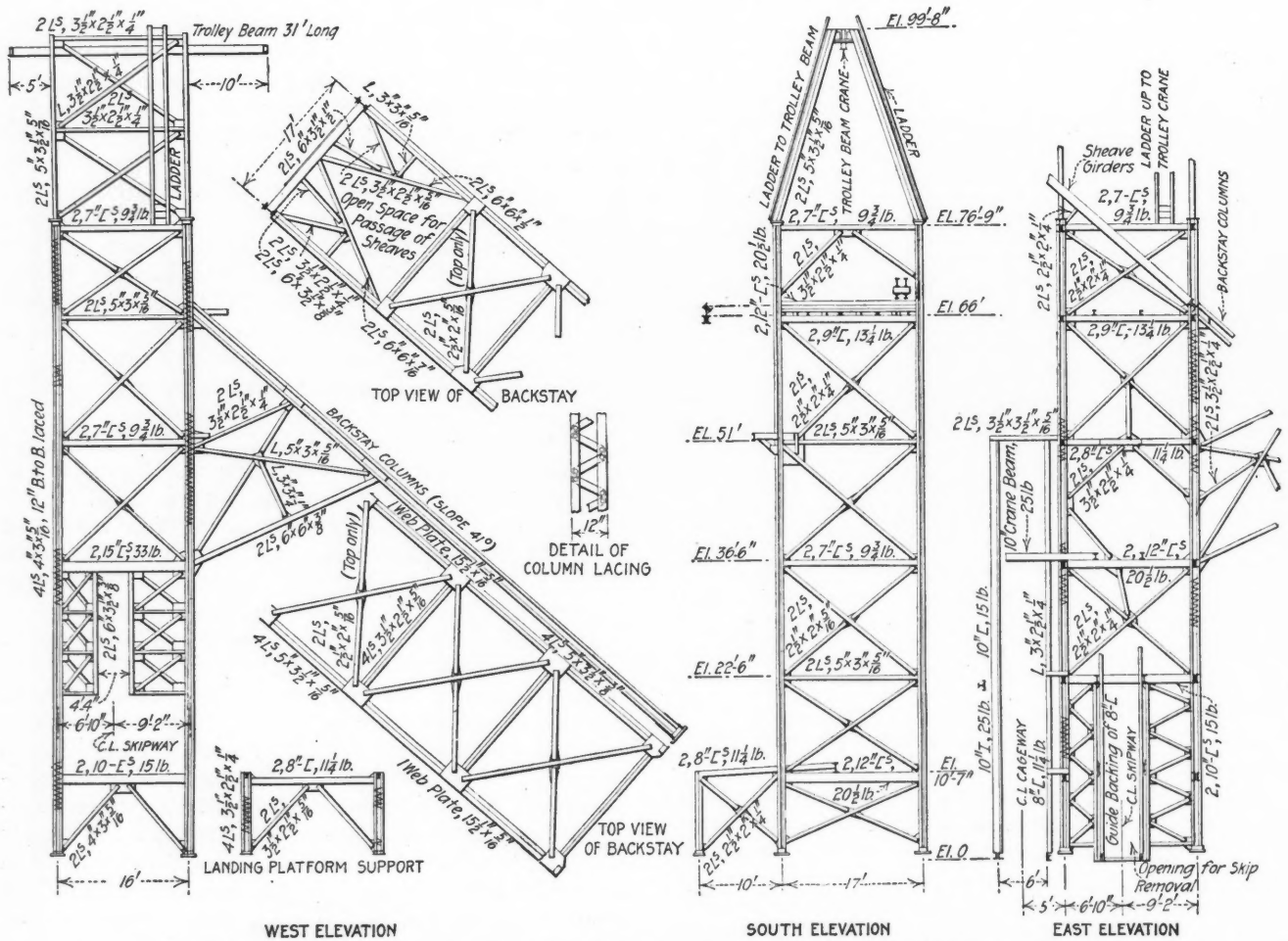


FIG. 7. DETAILS OF STEEL HEADFRAME REPLACING WOODEN STRUCTURE AT VULCAN, MICH.

car (or the discharge from the hopper); the height of the car; the necessary steepness of the slope for the bottom of the hopper or chute; the profile of the dumping guides; the necessary steepness of slope for the bottom of the skip box in "full dump"; and the height of the frame and other features of design of the skip.

It was thought that the old skip, which was and is yet in use, might at some time in the future prove

The dump hopper or chute was given careful consideration and required a large quantity of steel. Its construction is of 1/8-in. steel plates stiffened by 6-in. 8-lb. channels and provided with lining or wearing plates of hard steel 3/4 in. and 1/2 in. thick. These plates are in narrow units to promote economy in replacement when worn out. Two small platforms are supported at the outer end where a workman may stand with tools to reach into the chute in case large chunks of ore should choke the opening. The opening is so ample, however,

\*Vulcan, Mich. Formerly structural engineer, Republic Iron Co.

that such choking should seldom occur. The platforms are reached by means of ladders from the landing floor. The lower portion of this chute is made so that it may be readily removed to allow for a larger and higher car in case such a car should be needed in the future. The weight of this hopper or chute and its live load is supported largely by suspension from the heavy girt-girder just above. This girt is made up of two 15-in. channels and the suspenders are each two angles  $6 \times 3\frac{1}{2} \times \frac{3}{8}$  in. attached to the web of the girt by means of gusset plates. The whole affair is thoroughly braced.

The wooden guides of the cageway and skipway are attached to vertical supporting members consisting of an 8-in. channel with an angle riveted to its web for stiffening in the plane normal to the web.

A clear opening about 20 ft. in height is left in the lower panel on the east side opposite the skipway to allow handling the skip in and out.

To avoid danger on the ground around the shaft from

inclined plane, are laterally tied together and braced by plates riveted to the top and bottom flanges. These plates extend across wherever they may do so without interference with the sheave wheel or ropes.

It should be mentioned that an error was made in the calculations whereby insufficient allowance for eccentricity was given and consequently these sheave girder struts as designed were too light and weak, and do not possess the same liberal factor of safety that the rest of the head-frame has.

For the support of the bearings, plates are riveted to the top and bottom flanges of the girders and the usual bolts pass through the pillow-block casting and through the two plates, thus clamping the bearing to the girder. For the purpose of resisting the principal stress, which is of course longitudinal or parallel to the girders, other plates are riveted on the top of the upper plate, forming by their edges an end bearing for the castings. Of course the riveting of these plates had to be calculated to resist

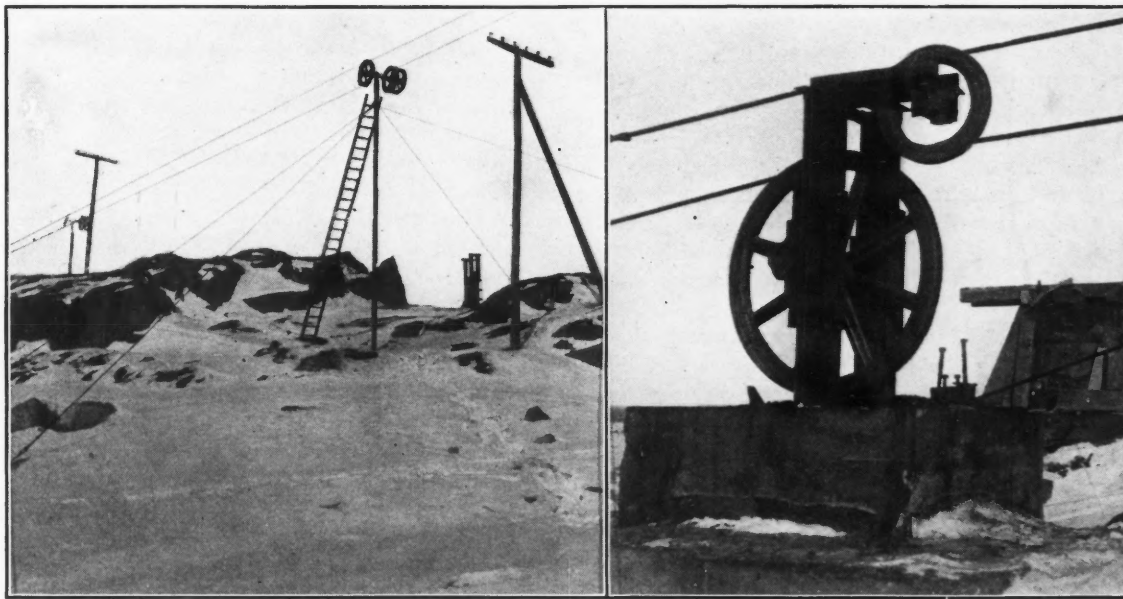


FIG. 8. ANGLE-SHEAVES AND IDLER PULLEY SUPPORTS

falling chunks of ore as well as the usual dangers of an open shaft, the skipway is inclosed for about 36 ft. of its height in a sort of box made of  $\frac{3}{16}$ -in. steel plate. The lower 20 ft. of plate on the east side is removable for taking the skip in or out.

To furnish necessary clearance for the take-on ropes the diagonal braces were replaced by knee braces in the middle panel on the east side. The take-on balance guides consist of two 6-in. I-beams standing on the south side of the tower and tied to the various girts. They reach from the ground up to an elevation of about 70 ft., where small headsheaves are located. From these sheaves the ropes lead horizontally in a diagonal direction over to small vertical sheaves. Going over these sheaves they descend vertically to elevation about 37 ft. where they pass under vertical sheaves and cross horizontally over the center of the skipway to their fixed-end support on the west side of the headframe. The sheaves mentioned are supported by various cantilevered beams.

The large headsheaves are supported upon a series of girders made up each of two 12-in.  $20\frac{1}{2}$ -lb. channels,  $\frac{1}{4}$  in., back to back. All the girders are in the one

maximum stresses. An open space of about  $1\frac{1}{2}$  in. was left at each end of the bearing casting to be filled up by steel wedges for adjusting purposes.

The bearings of the sheaves are  $45^\circ$  angle boxes of a special design (see Fig. 6). They are peculiar in that they are so designed as to retain all excess oil and deliver it through a hole tapped for  $\frac{1}{2}$ -in. gas pipe into whatever receptacle is desired. This feature was suggested by our experience with other headframes where all the upper portion of the structure is fairly drenched with oil that has dripped and blown away from the sheave bearings.

The trolley crane consists of two 12-in.,  $20\frac{1}{2}$ -lb. channels rigidly suspended from the framework by plates riveted between the two webs.

The power transmission ropes lead down through the south side of the tower portion of the headframe to a small concrete structure which contains and supports the haulage machinery. One man, called the lander, exercises the necessary supervision incident to receiving the skip loads of ore and operates the haulage drum. The operating floor of the lander's house is at the same level as the landing floor and is in immediate proximity to it.

This building rests upon the ground and in its lower story is a small space where the timber lander may go to leave tools or to avoid the weather. A stove in this lower room heats the whole building.

The building is constructed with a reinforced-concrete frame and floors cast monolithically, with hollow or air-spaced cement-plaster-on-metal-lath curtain walls. Plenty of large steel-sash windows admit light and ventilation and enable the lander to see in daytime the various points of destination of the transfer car. The machinery is provided with an indicator dial, however, so that sight of the car is not essential for its operation.

#### LOADS AND STRESSES

In the design of the various parts of the structure for strength, the backstays and their bracing were given first place in view of their carrying the greater part of the hoisting stresses. In general the idea was to produce with consistent economy a structure of ample strength to withstand safely such extreme conditions as might reasonably be expected. Steel was used freely in the backstay members, lavishly in the dump-hopper region and rather sparingly in the four vertical columns and diagonal bracing.

The skip, which was and is yet in use, was of about three tons capacity and was handled by a 1 $\frac{1}{8}$ -in. hoisting rope. It was thought possible that at some future time a larger skip, possessed of some weight-adding and height-increasing improvement features, might be wanted and so the headframe was designed to provide for such a condition.

Accordingly, the backstays were designed to withstand the stress produced by the breaking of any one of the four ropes while the other three ropes were carrying their working loads. For the skip and for the cage there was assumed a 1 $\frac{1}{4}$ -in., 6-strand 19-wire "extra strong cast steel" rope of 116,000 lb. ultimate strength; for each of the two balances, skip balance and cage balance, a  $\frac{7}{8}$ -in. similar quality rope of 60,000 lb. ultimate strength. A maximum working load of 27,000 lb. was assumed for the skip made up as follows: Empty skip 8000 lb., load of ore 12,000 lb., weight of rope 7000 lb. The working load for the balances were taken each as 12,000 lb. The ultimate strength of the ropes was taken as 104,000 and 56,000 lb. net after reduction for bending stresses.

The resultant loads from the four ropes were found to be: 137,000 lb. for breaking the 1 $\frac{1}{4}$ -in. rope; 74,000 lb. for breaking the  $\frac{7}{8}$ -in. rope; 36,000 lb. for working load on the 1 $\frac{1}{4}$ -in. rope, and 16,000 lb. of working load on the  $\frac{7}{8}$ -in. rope. For the severest conditions arising from the possible combinations of these stresses there was allowed for the purpose of design a stress of 121,000 lb. for the east and 84,000 lb. for the west column.

No allowance was made in the columns for wind stresses. The following was taken for the basis of design: Allowable per square inch compressive stress 16,000 lb.

— 70  $\frac{l}{r}$  allowable tensile stress 16,000 lb; maximum  $\frac{l}{r} = 100$  for primary compression members and 140 for secondary compression members.

In determining upon the section for these columns, consideration was given to the fact of the long unsupported (in vertical plane) span which would put some

bending load upon the columns because of their own dead weight. To give them stiffness in the vertical plane, the plate and angle section was chosen and a depth of 16 in. allowed. They are made up of a  $\frac{5}{16}$  x 16-in. web plate and four 5 x 3 $\frac{1}{2}$ -in. angles. The thickness of these angles was made  $\frac{5}{16}$  in. for the west column and  $\frac{3}{8}$  in. for the east column. In order to give lateral support and stiffness to both flanges of these columns, latticed angle girts were used. On account of the prime importance of this backstay portion of the structure, the minimum thickness of material was limited to  $\frac{5}{16}$  in. The bracing in the upper panel was designed to transfer the sheave-girder stress to the two columns, thus largely relieving the lateral girder from bending stress.

The design of the vertical tower portion of the headframe involved the dead weight of the structure itself, including the considerable weight of the concrete floors, loaded car, the non-measurable but serious pounding effects of ore dumping, the wind load, and various minor loads. From the combination of these various loads, the four vertical columns were designed to resist at their lower ends each a load of about 90,000 lb.

It was recognized that the operations of the hoisting, dumping of the skip and running the transfer car would tend to produce much jar or vibration—particularly the dumping. The effect of this might be very pronounced on account of the small width of the structure. It was accordingly decided to introduce a considerable amount of vibration-absorbing mass by inclosing the lower 40 ft. of the length of the columns in prisms of concrete. No computation was attempted for this feature, but the prisms were made as large in section as available space would permit, being cast 30 in. square; 36 yd. of concrete was required. Lengths of old wire rope were stretched up in each, near the faces, to act as longitudinal reinforcement.

In view of the incidental reinforcing effect of these prisms the section of structural steel for these columns was made rather light and consisted of four angles 4 x 3 x  $\frac{5}{16}$ -in. latticed 12 in., back to back with 2 $\frac{1}{4}$  x  $\frac{5}{16}$ -in. bars.

Many of the girts act also as girders and were designed for their local load conditions. The other girts were designed to suit the specification by which the value of  $l/r$  must not exceed 140, the stresses to be resisted being usually too small to require so large a section.

#### FOUNDATION

The foundation conditions for the structure were good. Solid rock ledge came nearly to surface at the site of the backstay piers. Excavation of loose material was made and some holes drilled down into the rock. Into these holes were anchored some steel rods reaching up into the pier. Four 1 $\frac{1}{4}$ -in. anchor bolts, bearing against a suitable anchorage grill near the bottom of the pier, attach the base plate of the column firmly to the pier. These piers were made 4 ft. square at the top, with vertical sides and front faces, and with back sloping at about 40° with the horizontal slightly flatter than the columns. These two piers were cast after the erection of the steel structure. It was intended to cast them in preparation for erection, but unexpected conditions prevented. As far as the erection of the steel backstays was concerned there was no disadvantage in thus casting the piers after erection of the steel.

The ground sloped so rapidly upward to the south of the shaft as to bring the top of the backstay piers some 15 ft. higher than the tower piers, thus saving materially in the length of the backstay columns.

The rock ledge was covered in the region of the shaft to a depth of from 6 to 14 ft. with a mixture of boulders and fine ore. The piers for the four main vertical columns were made 4 ft. square and, in case of three of them, reached down with the same section to a rock bearing. The other pier rested at 10 ft. depth on a compact broken rock material of good bearing value and was spread out at the bottom to a footing 5 ft. square. In connection with this concrete work it was planned to line the shaft from ledge up to surface with concrete

Meanwhile the foreman of the erection gang and some of his men began the preparation of tackle, gin pole, etc. The first column piece was grappled July 10, at 9:30 a.m. By Aug. 1, all of the tower portion and the upper section of the backstays had been erected (on bolts). The steel headframe during construction and completed is shown in Fig. 9. On Aug. 4 the gin pole was taken down for good after having erected the lower section of the backstays from a new position on the ground. No work was done on Sundays.

After the removal of the gin pole there were still some hand railing, "take-on" members, floor beams, guide-backing channels, etc., to put up. These were all in place by Aug. 6, with the exception of some hand railing

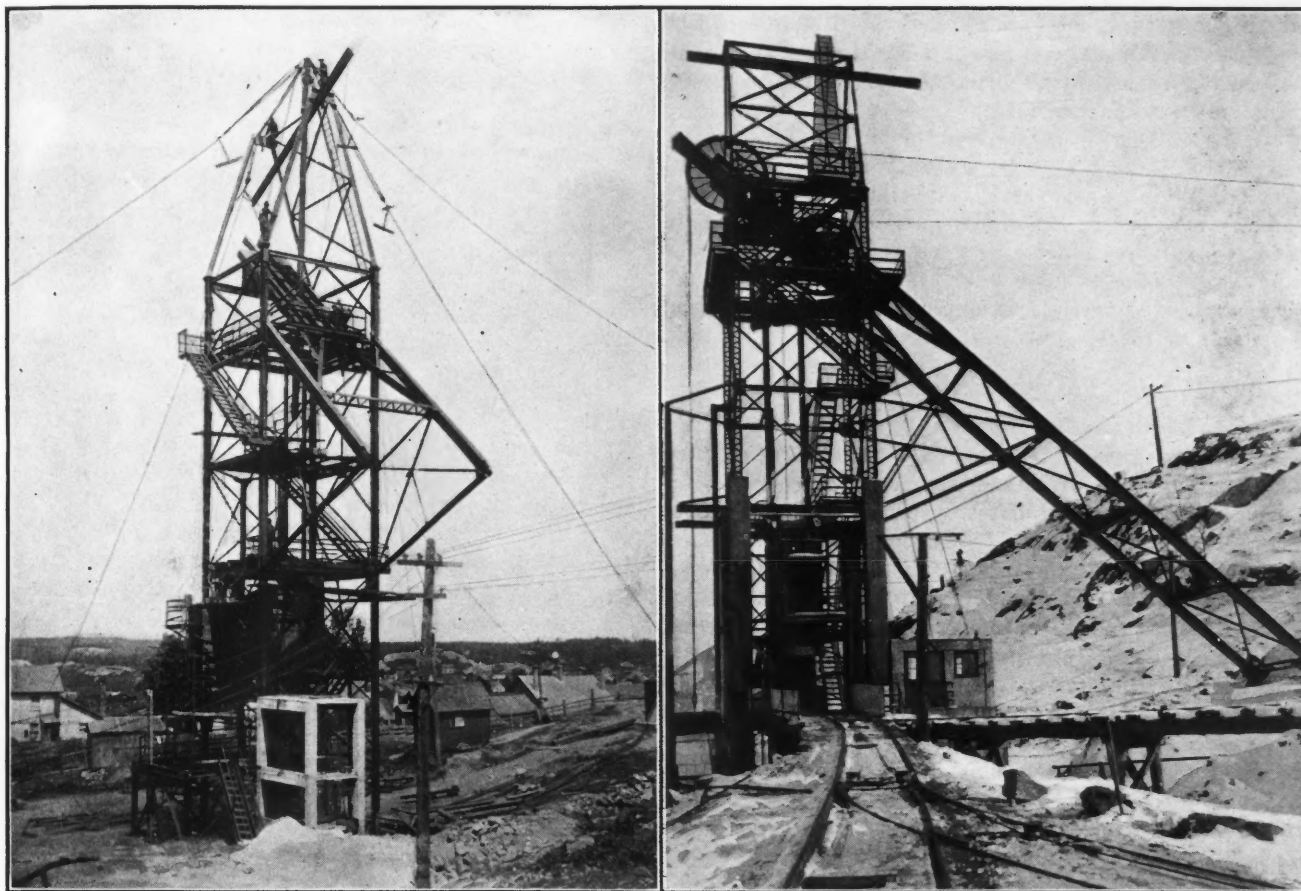


FIG. 9. NEW STEEL HEADFRAME DURING CONSTRUCTION AND AFTER COMPLETION

and to construct a concrete pavement to extend in all directions for a considerable distance from the shaft. It is to slope away from the shaft and is intended to do away with the unsightly mud hole so often found around shaft collars.

#### ERECTION OF HEADFRAME

The fabricated steel arrived in April and on July 7 work was begun to dismantle and demolish the old wooden structure (see Fig. 1), the regular mine surface force doing the work. After moving sheave wheels, dump plates, and a few other movable parts, the posts on the west side were sawed through and those on the east were actually removed for a few feet in height. Next the skip rope was made fast to certain members in the heart of the structure and the hoist started to wind up the rope, pulling the structure over toward the east.

which required refitting. Aug. 7 and 8 were spent in installing sheaves.

This erection work was done by a force organized and described as follows:

One foreman, four sky men, three ground men, one hoist man. Steel members were hauled to the site slightly ahead of erection by five men and a team. The steel had previously been unloaded from the cars and spread out systematically over available areas at some distance from the shaft. The foreman and two sky men belonged to the "trestle gang" at the Vulcan mine and were possessed of the advantage gained from their general experience in wooden headframe work and in addition, the special experience of employment in the erection of two large steel headframes at Vulcan. They did excellent work. The remainder of the gang were local men who were handicapped by entire lack of experience in such work.

However their spirit was most commendable and they became more valuable as they gained experience. An electric winch was used during erection for all hoisting purposes and was found to be very satisfactory.

The wooden treads of the stairs were assembled with the steel stringers on the ground and the completed flights installed as soon as the supporting framework was ready for them, thus helping greatly to facilitate safe travel up and down during erection.

Riveting was begun July 15 with two gangs of three men each, using pneumatic riveting hammers. On account of the entire inexperience of these men, progress was not at all satisfactory and from Aug. 11 to 15 a third gang was put on to hurry the work along. All riveting was completed by Aug. 20. This work, as well as the erection proper, was under the direction of the foreman above mentioned.

The foreman was on the job from July 7 to Aug. 20, while his two sky men from Vulcan were there from July 8 to Aug. 8. The local force continued after Aug. 20 to adjust sheaves, install wooden guides, construct concrete floors, rebuild tram-track trestle, complete lander's house, etc. Resumption of ore production began Aug. 25 with much finishing-up work still undone. The shaft was thus closed for seven weeks.

As soon as it was convenient, the structure was given two coats of paint—first coat, green; second coat, black.

#### IDLER-PULLEY FRAMES AND SMALL ANGLE-SHEAVE FRAMES

The change in the line of the ropes from the headframe to hoisting house, explained earlier in this article, involved the construction of many new idler-pulley frames for supporting the weight of the ropes and several angle-sheave frames for carrying the ropes through small vertical angles at the various humps on the hill. It was desired to construct them in a substantial and permanent manner.

For the angle-sheave frames, simple steel structures embedded in ample bases of concrete were constructed and seem to serve the purpose well. The deflection angle being small, very little load is exerted by the ropes upon the angle-sheaves, thus allowing the structure to be a very simple and light affair. The illustration (Fig. 8) shows one of these structures carrying an angle-sheave for the skip rope and an idler wheel for the cage rope. This structure is located at the brow of the hill and the hoisting ropes have no intermediate support between this structure and the headframe—a span of about 220 ft. On page 372 of the *Journal* of Feb. 14, 1914, there were published a photograph and a short description of another one of this series of angle-sheave frames.

For the idler-pulley supports (see Fig. 8), masts of scrap boiler tubes were embedded in holes dug into the rock ledge or in small concrete bases where the rock was not in evidence. Wheel axle shafts of 2-in. double strength pipe were put through holes in these tubes and carried the idler wheels. Where high masts were needed, they were stiffened by guys made of discarded wire ropes. A number of different details are possible in this general design. There was also a view shown in the *Journal* of Feb. 21, 1914, p. 417. Some of these structures made use of old 4-in. boiler flues, while in other cases discarded drill columns were used. In case of the boiler flues,

advantage was taken of the fact that a 4-in. standard pipe just telescopes over a 4-in. boiler flue, and the axle shafts were attached to the short lengths of 4-in. pipe instead of to the flue itself. Then the pipe was slipped over the flue, being made rigid by means of setscrews.

#### COSTS OF HEAD FRAME

An attempt to give a complete and intelligible record of classified costs of all the features mentioned in this description would not be very satisfactory since the conditions would not be readily understood by the reader.

#### UNLOADING AND STORING FABRICATED STEEL READY TO HAUL TO ERECTION SITE

222½ hours laborer labor.....@	\$0.22	\$48.95	
72 hours team labor.....@	.50	36.00	
294½ hours total miscellaneous labor.....@	.288 av.		\$84.95

#### HAULING FABRICATED STEEL TO ERECTION SITE

273½ hours laborer labor.....@	.22	\$60.17	
57 hours team labor.....@	.50	28.50	
330½ hours total miscellaneous labor.....@	.268 av.		\$88.67

#### ALTERATIONS DUE TO ERRORS AND INACCURACY OF FABRICATION

26 hours blacksmith-shop labor.....@	\$0.55	\$14.30	
14 hours foreman labor.....@	.375	5.25	
100 hours sky-man labor.....@	.35	35.00	
24 hours riveter labor.....@	.32½	7.80	
11½ hours riveter's helper labor.....@	.30	3.45	
10 hours brakeman labor.....@	.26	2.73	
19 hours machine-shop labor.....@	.25	4.75	
30½ hours laborer labor.....@	.22	6.71	
235½ hours total miscellaneous labor.....@	.34 av.		\$79.99

#### ALTERATIONS DUE TO CHANGES IN PLANS

3 hours autotruck labor.....@	\$1.00	\$3.00	
44 hours blacksmith-shop labor.....@	.55	24.20	
50 hours sky-man labor.....@	.35	17.50	
11 hours riveter labor.....@	.325	3.58	
5½ hours riveter's helper labor.....@	.30	1.65	
85 hours laborer labor.....@	.22	18.70	
198½ hours total miscellaneous labor.....@	.346 av.		\$68.63

#### ERECTION PROPER

3 hours blacksmith-shop labor.....@	\$0.55	\$1.65	
4 hours mason labor.....@	.425	1.70	
301 hours foreman labor.....@	.375	108.88	
1069 hours sky-man labor.....@	.35	374.15	
30 hours painter labor.....@	.30	9.00	
210 hours brakeman labor.....@	.26	54.60	
4 hours machine-shop labor.....@	.25	1.00	
67 hours laborer labor.....@	.25	14.75	
635½ hours laborer labor.....@	.22	139.81	
2323½ hours total miscellaneous labor.....@	.303 av.		\$705.54

#### RIVETING

50 hours foreman labor.....@	\$0.375	\$18.75	
5 hours sky-man labor.....@	.35	1.75	
1195 hours riveter labor.....@	.325	388.38	
623 hours riveter's helper labor.....@	.30	186.90	
90 hours laborer labor.....@	.22	19.80	
1963 hours total miscellaneous labor.....@	.314 av.		\$615.58

#### PAINTING HEADFRAME AFTER ERECTION

466 hours painter labor.....@	\$0.30	\$139.80	
5 hours machine-shop labor.....@	.25	1.25	
471 hours total miscellaneous labor.....@	.30 av.		\$141.05

#### SUMMARY OF ERECTION LABOR

5816½ hours total miscellaneous labor.....@	\$0.307 av.		\$1784.41
---	-------------	--	-----------

#### SUPPLIES

140,035 lb. fabricated steel for original design @	\$4.60	\$6441.61	
2,236 lb. fabricated steel for alterations and additions.....@	4.43	99.08	
Paint and brushes.....@		70.50	
Total supplies.....			6618.03
Total labor and supplies.....			\$8402.44

Accordingly I shall confine myself to the structural steel frame proper and its erection, leaving out entirely such related matters as administration and engineering costs, traveling and boarding expense, cost of tools, tackle, electric power, new sheave wheels, concrete foundations, floors, lander's house, etc.

The items covered will be the structural steel delivered by the steel company, steel used in alterations, paint,

and the labor of unloading, hauling, erecting, riveting and painting.

It is not to be understood that the items left out are of small importance. On the contrary they are very considerable, but by reason of their indefiniteness to one not familiar with local matters they would not be of much value for purposes of comparison or estimate. No special economy is claimed, but the cost figures are given rather as a simple statement of the actual cost of work done under average local mine conditions by mine forces of average ability.

The detail drawing and fabrication of the steel work were done by the structural department of the Cambria Steel Co. Erection of the steel headframe was carried on under the direction of P. Sala, foreman. The general design of the headframe and the accessories were made by the writer, who also exercised a general supervision over the erection, aided by R. B. Wallace, the local engineer for the Republic Iron Co.

✱

### Quartz Mining in Fairbanks District, Alaska

SPECIAL CORRESPONDENCE

The revival of interest in quartz mining, especially in the Fairbanks Creek portion of the district, is, aside from the Tolovana, the most important development of the year. The erection of the Heilig custom mill was largely responsible for this improvement. The little Huntington mill has proved to be too small, however, and it is planned to install a 7-ft. Lane Chilean mill during the summer. This, it is hoped, will give the plant a capacity on the soft Fairbanks Creek ores of about 40 tons a day.

Huddleston Bros. & McNeil have a 100-ft. shaft on a 4-ft. vein at the head of Too Much Gold Creek; in order to avoid the necessity of pumping at greater depth they plan to drive a 600-ft. crosscut adit. The vein has been traced on the surface for nearly a mile. The operators are building a road to the Heilig mill and will crush 375 tons of ore as soon as the mill is in condition to handle it. Previous runs on picked ore returned about \$40 a ton. The richest ore in the Fairbanks Creek belt is at the Mizpah mine, owned by Thompson, Geis & Hess. The last mill-run returned \$80 a ton. Most of the ore is free-milling, but rich silver-bearing lead carbonate is reported to have been found at one point. The mine has recently been equipped with boiler and hoist and is prepared to yield a good tonnage as soon as provision can be made for milling operations.

Shaeffer, Golden & Van Orsdale, on placer claim No. 16 Above Discovery, have sunk on what is thought to be the extension of the Mizpah vein. Although the ore is very rich the vein is smaller than at the Thompson-Geis-Hess workings. Stevens, Boyd & Kleinschmidt, lessees on the Mayflower claim, have more than 300 tons of ore ready for milling. The shaft is down 60 ft. Owing to the decomposed nature of the rock, both vein and country, no powder has yet been used, three men mining and hoisting 15 tons of ore a day with ease. The operators estimate that they have exposed between 4000 and 5000 tons of ore of an average grade of \$15. The Crites & Feldman 5-stamp mill on Moose Creek is running 10 hours a day. The most important vein on the group of claims embraced in the Crites & Feldman holdings is developed by two

adits, one 400 and the other 700 ft. long, most of the ore now coming from the longer tunnel. Foss & Farvin have driven 500 ft. on the McDonough & Mathews ground, lying at the extreme head of the creek. A 75-ton shipment crushed at the Burns mill showed the ore to be of a fair milling grade.

Although the most important recent developments are those on Fairbanks Creek, there is considerable activity in lode mining in other parts of the district. The Rhoads-Hall mine on Bedrock Creek, which is credited with a total production of considerably more than half a million dollars, is employing 25 men and the mill is running night and day. Martin Harris plans to build an arrastre, run by water-wheel, on the Moonlight claim, near Skoogy Gulch. Tyndall & Finn, in the Ester Creek belt, are driving a crosscut adit to tap an 8-ft. vein at a depth of 350 ft. About 700 ft. of driving is required, of which over 600 ft. has been completed. If values at depth are comparable with those found nearer the surface, a mill will be installed on the ground. Some prospecting has been done by contract at the Newsboy, but nothing of value appears to have been found.

✱

### Talc and Soapstone in 1914

The United States produces more talc and soapstone than all the rest of the world combined, this industry having nearly doubled in this country in the last decade. According to J. S. Diller, of the Geological Survey, the marketed production in the United States in 1914 was 172,296 short tons, of which 148,479 tons were ground, 17,824 tons were manufactured into various articles, such as crayons, gas tips, laundry tubs, etc., 2913 tons were sawed into slabs and 3080 tons sold in the rough state. The production in 1914 decreased about 2% from that of 1913 when 175,833 tons were produced.

New York, by reason of its large output of fibrous talc for paper making, continued to lead all other states with a production of 86,075 tons valued at \$821,286. Vermont was second in point of production with 50,698 tons, but Virginia's output of 21,687 tons exceeded it in value, because the Virginia production is principally manufactured soapstone products. The output in New Jersey and Pennsylvania declined to 7732 tons and in North Carolina to 1198 tons. There was a small production in Georgia, Maryland, Massachusetts, Rhode Island and California.

Prices in the United States averaged \$5.83 per ton in the rough, but some of it sold as low as \$2 per ton; ground talc brought from \$5 to \$10 per ton; manufactured articles in 1914 averaged \$27.98 per ton. Imports of ground or manufactured talc in 1914 amounted to 15,734 tons as against 13,770 tons in 1913. The principal importing countries were: Italy, 5535 tons; Canada, 5006; France, 4398. Smaller quantities were received from Austria-Hungary, England, Germany, and Japan. The imported talc is chiefly of the higher grades, ranging from \$5.24 for the cheapest French talc to \$112 for a special shipment from Germany.

✱

**Oil Possibilities near Vicksburg, Miss.**, forms the subject of a recent press bulletin of the U. S. Geological Survey which has made an investigation in Warren and Yazoo counties. The attitude of the rock beds is obscured by the recent deposits in this region and while no anticlines were noted, there are two monoclinical folds that offer favorable areas for the accumulation of oil or gas. A detailed report, with maps, is now in preparation by the Survey.

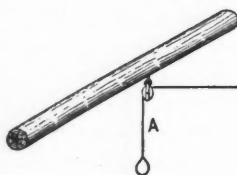
## Details of Practical Mining

### Improved Safety Door for Dump

By H. H. HODGKINSON\*

The safety door illustrated in the accompanying sketch has proved to be an improvement on the one described in the *Journal* of Dec. 12, 1914, though it is operated in the same manner. As will be seen from the illustration, the advantage lies in the fact that this door, on account of its construction, opens at each end, thus permitting a car to dump in the chute from either direction without the use of a second door or the necessity of unfastening the hemp rope.

By means of the rope *A* the door is opened and closed for cars approaching in that direction, while the rope *B* operates the door for cars from the other direction. Fig. 1 shows the door being opened by rope *A*, Fig. 2 by rope *B*.



The  $\frac{1}{4}$ -in. iron plate forming the door proper is hinged at one end to an iron frame made of two pieces of  $\frac{3}{4}$ x2-in. iron and two  $\frac{3}{4}$ -in. bolts as shown; the opposite end of the frame being hinged to the platform. The  $\frac{3}{4}$ -in. bolt to which the  $\frac{1}{4}$ -in. plate is hinged is twisted to form an eye for attaching the rope *A* to the frame. The plate has a small rectangular piece cut out of it over this eye to prevent the door from binding when rope *B* is operating the door.

The frame measures 22x36 in. over all, which permits the door to work nicely between the rails of a 2-ft. gage track.

The two hemp ropes *A* and *B* hang down from their respective pulleys about 5 ft. to permit enough slack rope for the door to fall back on the platform when opened from either direction.

### Turbo-Blowers and Turbo-Compressors

Basically considered, turbo-blowers and turbo-compressors are similar machines, only that the former are used for low pressures and the latter for high pressures. Both classes of machines are therefore constructively different with reference to the number of stages and the delivery volume. Usually the turbo-blowers and compressors of today are built on the principle of the centrifugal pump; that is, the gas to be compressed is conducted in radial paths. Among the few designs that depart from this arrangement is the Parsons, in which the flow direction, as in steam turbines, is axial.

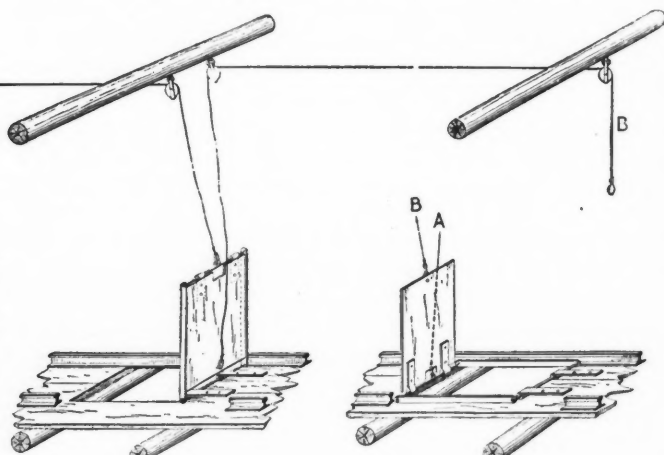
\*Mining engineer, Franklin Furnace, N. J.

It is difficult to define the boundary between turbo-blowers and turbo-compressors. All turbo machines used to supplant reciprocating blowers should be called turbo-blowers.—*Power*.

### Stripping with Dragline Excavators

The Balkan pit of the Verona Mining Co., at Alpha, Mich., is oval in shape. When the stripping is completed its long axis will be about 1200 ft., its greatest width about 700 ft. and the depth will run from 86 ft. to 107 ft.

The machines used are a Bucyrus class-24 dragline excavator with an 85-ft. boom and a  $4\frac{1}{2}$ -yd. bucket and a Marion model 261 of the same size. Both machines are mounted on skids and rollers. They travel on 4x12-in. planks 12 ft. long, placed 4 wide on each side of the ma-



FIGS. 1 AND 2. CHUTE DOOR FACILITATING DISCHARGE OF CAR FROM EITHER DIRECTION

chine. Dragline operation was started in 1914, and is approaching completion at the present time.

The two dragline excavators have been used on opposite sides of the pit, for the most part on different levels. The incline is a continuous spiral, the grade being about 2.6 per cent. with 35-deg. curves and slopes at 2 to 1.

The sharp curves, as well as the heavy grades from the lower levels which have been necessitated by the small diameter of the pit, have rendered it impossible to use standard-gage equipment. Consequently narrow-gage, 4-yd. cars are used. Inasmuch as the large buckets of the draglines could not load cars of such small capacity without a considerable amount of spilling and the consequent danger of derailments, large hoppers are used under which the trains are run. This method has proved most satisfactory. Instead of lining these hoppers with sheet iron, hard maple has been used, as this has been found to offer a better sliding surface for the sticky material encountered.



On the first or top lift, each dragline was served by three trains made up of ten 104-yd. cars each, but at the present time the contractors are using 9 trains and 12 locomotives, three of which are used as pushers on grade out of the pit.

The output of the draglines has been most satisfactory and has compared very favorably with steam-shovel operation on the Mesabi range. The material, however, is ideal for dragline work. The upper portion of it is a quicksand which when drained is easy to dig. Before operations were started, a small creek ran across the pit. The waters of this creek have been diverted, but the bed contains a rather heavy gravel formation. On the northern end of the pit deposits of blue clay, gravel and hard-pan have been found, while gravel and hard-pan exist under the sand at the southern end. The machines are swinging through an arc of about 180 deg. and making a cycle in about 40 sec. The output of the draglines depends of course to a great measure on the car service. The best monthly output for both machines, working two 10-hr. shifts, was 207,184 cu.yd.; the best daily output for both machines working two 10-hr. shifts is 2670 4-yd. cars. The best record for one 10-hr. shift was 800 4-yd. cars, made by the Bucyrus machine.—*The Excavating Engineer*, August, 1915.

### Proportion of Fatal Accidents in Metal Mining

In an investigation as to the best means of insuring a diminution in the number of accidents in the mines of Australia, particularly in New South Wales, the 1914 report of the Royal Commission on Mining Industry at Broken Hill states that the fatal accidents in metalliferous mines, in the year 1911, in New South Wales, were 1.81 per thousand of men employed, which was only exceeded in Australia by the number of fatal accidents in Western Australia, which were 2.33 per thousand men employed. Comparing these with the fatal accidents in metalliferous mines in other countries for the years 1909 and 1910, it is stated that only four countries had a larger number of fatal accidents in metalliferous mines per thousand men employed than these noted. These are: France, 3.16; Spain, 3.25; Transvaal, 4.29; and the United States, 4.19.

### Oregon and Douglas Fir and Redwood

The term "fir" is applied to the most common wood of the Pacific Northwest. Scientifically it is a bastard spruce, first named by Douglas. Locally it is known as fir or Douglas fir, and distinction is sometimes made between yellow and red fir. These come from the same kind of tree, the yellow fir being most common. The large trees yield yellow fir, while the wood from smaller trees is apt to show a reddish tint. Sun exposure also appears to affect the color to some extent. In California the wood is termed Oregon pine. This wood is strong, and can be obtained in long lengths. Mill run of commercial sizes probably averages over 20 ft. in length. It contains pitch, which forms in seams and pockets, normally occurring even in commercially clear wood within certain limits. The trees usually yield less than 25 per cent. of wood free from sap and knots.

Redwood grows on the Pacific coast from Santa Cruz north into southern Oregon. By reason of the average large diameter of the trees, the logs are cut shorter than in the case of fir, and the commercial mill run averages about 16 ft. in length. The wood is not so strong as fir. About 50 per cent. of the wood cuts up clear and free of sap.—D. C. Henny in *Engineering News*, Aug. 26, 1915.

### Keeping Conveyor Belt Records

A new method of recording the cost of various conveyor belts in operation has been worked out by the B. F. Goodrich Co., of Akron, Ohio, in the interest of all belt users.

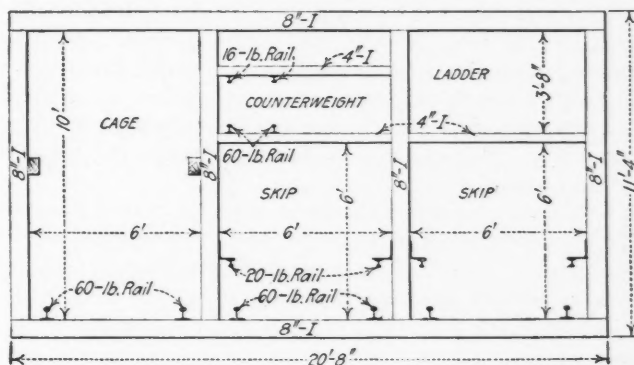
Ordinarily, accurate costs are rather difficult to determine, and many people have not the time to work out an adequate system for making computations. The use of various belts, however, is an important factor, and many a dollar can be saved when it is known where to cut down the tonnage cost.

The card record in question, which is mailed free on application by the Goodrich company, is simple, but most efficient. It will help to stop the small leaks where profit continually slips out.—*Coal Age*.

### Sinking New "C" Shaft at the East Norrie Mine

By B. G. BEST\*

Several years ago the Oliver Iron Mining Co. decided to sink a new shaft on the East Norrie property at Ironwood, Mich. As finally accepted the plans called for a shaft to meet the following requirements: Size, outside timbers, 11 ft. 4 in. by 20 ft. 8 in.; number of compartments, 6; sets, steel, placed 5 ft., center to center; lining,



PLAN OF "C" SHAFT, EAST NORRIE MINE

reinforced-concrete lath; inclination, 64 deg. from the horizontal.

The shaft was located about 250 ft. back of the foot wall in the quartz slates, which dip at an angle of about 64 deg. at this point.

On Dec. 2, 1912, work was started with the following crews: Three gangs of shaftmen—6 miners and 2 helpers—working 8-hr. shifts, 17 shifts per week; 4 fixers, or timbermen, working 10 hr. day-shift only; 4 landers—2 on each 12-hr. shift; 2 hoisting engineers; such men as were necessary from time to time making concrete lath.

The miners drilled, blasted, mucked, placed the steel sets, lath and bearers, cut hitches for the bearers and cut and timbered the stations. The timbermen took down the

\*Care of Oliver Iron Mining Co., Ironwood, Mich.

concrete and steel, drilled bolt holes in rails and back runners and placed them and assisted the miners in placing the sets.

The rock was hoisted through the middle compartment in a 1-ton sinking bucket on a trolley. The timber and lath were lowered on a truck in the cage compartment. The smoke was drawn out of the shaft through a 10-in. galvanized-iron pipe by an exhaust fan on the surface.

The drilling equipment included 12 jackhammer machines and 12 sets of 72-in. by 7/8-in. diam., 4-point drills. Six of these machines were used in the shaft at one time, while the remaining six were being overhauled. The repairs on the machines were light, however, and during the greater part of the time the six reserve machines were ready for instant use. There were also four No. 3 Ingersoll-Rand machines used for cutting hitches and bearers.

The ideal cut consisted of fifty 6-ft. holes, but at times it was necessary to drill as many as 58 holes. The average time required to drill a round of holes under an air pressure of 65 lb. was 3 hr. At times, however, this work has been accomplished in 2 1/2 hr. This is at an average rate of 16 2/3 ft. per machine per hour, and a maximum rate of 20 ft. per machine per hour. A cut broke five linear feet of ground, or 1171 cu.ft. Thus, in 1 hr. one machine, under average conditions, drilled holes to break 64.9 cu.ft. of ground, and under the most favorable conditions 77.6 cu.ft.

The charge per hole was five or six sticks of 80 per cent. 7/8x8-in. Giant gelatin dynamite, or about 1 1/4 boxes per cut. Firing was done by battery. The first fired were the sink holes in the center of the foot-side of the shaft; after these the holes adjacent to the outer edge of the sink were fired. From four to six blasts were necessary to break the entire cut. Under average conditions 20 min. was required to charge and fire the holes for each blast and 20 min. for the smoke to clear out. By this method after the sink holes had been fired there were always two free faces, and the rock was thrown up against the foot-side of the shaft, making the mucking a great deal easier. The mucking of the dirt from a full cut required about 8 hr.

In sinking the shaft, 14 sets of bearers—four 12-in. by 17-ft. I-beams and two 12-in. by 35-ft. I-beams per set—were placed. The time required to drill hitches and place a set of bearers was 4 1/2 eight-hour shifts.

Five stations, 10x22x17 ft., were also cut and timbered. Jackhammers were used on this work. A station was cut and timbered in 13 1/2 eight-hour shifts, or at the rate of 35.7 cu.ft. per shift.

On Dec. 2, 1913, at a depth of 843 ft., the shaft met a 5x7-ft. raise from the 17th level—1213 ft. below the collar of the shaft. In 12 months the shaft had been sunk 803 ft. through quartz, slates and hard dike. During this time the miners and helpers had worked 5821 shifts in sinking and timbering the shaft, and had removed 188,063 cu.ft. of rock. This is at the rate of 32.3 cu.ft. of rock per man per shift of eight hours, and 43.1 cu.ft. per machine per shift. The average sinking speed per week, based on actual working time, was 18.8 lin.ft. In 713 shifts the men had placed 10 sets of bearers and cut and timbered three sections.

Stripping was commenced immediately and continued to a depth of 1198 ft., 15 ft. above the 17th level. The three crews of shaft men did the stripping, using jack-

hammers and No. 3 drills. Because of the inability to handle the rock on the 17th level, the stripping was delayed to some extent; but in spite of this the average weekly progress (actual working time) was 34.17 lin.ft., or 5.7 ft. per drill per week. Including lost time, time required for cutting hitches, placing bearers, cutting and timbering stations, the average speed was 25 lin.ft. per week.

The greatest progress for one month was made in March, 1913, when the shaft was sunk 105 ft. and one set of bearers placed. The men worked 589 shifts sinking and timbering, and 32 shifts placing bearers. This is at the rate of 24.2 lin.ft. per week; 5680 cu.ft. per week; 1.426 lin.ft. per gang per shift; 9.47 cu.ft. per drill per week; 41.75 cu.ft. per man per 8-hr. shift; and 55.7 cu.ft. per drill per 8-hr. shift.

The accompanying table shows the number of shifts worked on the different parts of this job, and also the average progress for the different operations:

Month	Sinking	Bearers	Stations	Stripping
December, 1912.....	244.0	.....	.....	.....
January, 1913.....	515.0	37.50	.....	.....
February.....	519.0	32.00	.....	.....
March.....	589.0	32.00	.....	.....
April.....	530.5	72.00	.....	.....
May.....	476.0	.....	165.00	.....
June.....	490.0	70.50	.....	.....
July.....	537.5	.....	79.00	.....
August.....	586.0	25.00	.....	.....
September.....	449.0	41.00	90.00	.....
October.....	577.0	25.00	.....	.....
November.....	522.5	44.00	.....	.....
December, 1913.....	30.0	43.25	130.25	334.00
January, 1914.....	.....	72.00	75.00	473.00
February.....	.....	29.75	.....	517.75
March.....	.....	.....	.....	88.00
<b>Total number of shifts</b>	<b>5821.5</b>	<b>524.00</b>	<b>539.25</b>	<b>1,412.75</b>
Linear feet.....	803	.....	.....	355
Cubic feet.....	188,063	.....	19,250	83,141
Lin.ft. per gang per wk.	18.8	.....	.....	.....
Lin.ft. per gang per shift	1.1	.....	.....	2.01
Cu.ft. per man per shift	32.3	.....	35.7	58.8
Cu.ft. per machine per shift	43.1	.....	.....	78.6

The first month there was 40 ft. of overburden. This is not included in calculating rate of progress; the figures represent rock work only.

## Engineer's Emergency Level

Every engine room has the means at hand for the construction of the convenient and accurate level described herewith. It is so simple to make as to appeal to anyone (*Power*, Aug. 31, 1915).

It consists of a regular gage-glass, nearly filled with water, and with its ends plugged with putty or other suitable material of a cementing nature. The bubble can



LEVEL MADE FROM GAGE GLASS

be made as long as desired, depending on the work for which the level is to be used; and as the glass is straight the bubble will go the whole length of the glass if slightly elevated. The glass being round and usually reasonably straight, it can be turned over without affecting the location of the bubble or the accuracy of the level. Any suitable mark can be used at the middle to indicate when the instrument is level. This is not intended to supplant the regular level, but to serve in an emergency or to go into limited spaces.

# The Assayer and Chemist

## Analysis of Spelter

Methods of spelter analysis are the subject of a report from a subcommittee, which has been approved by the Supervisory Committee of the American Chemical Society on Standard Methods of Analysis.

Spelter ordinarily used for brass and similar alloys is usually considered in three grades: (a) "High-grade"; (b) "intermediate"; and (c) "brass-special," according to the amounts of lead and other impurities present. A fourth grade (d) "prime-western," principally used for galvanizing, contains more impurities than the three grades preceding. These grades are covered by the specifications of the American Society for Testing Materials.

The methods of sampling and analysis described below are those generally accepted in the United States for standard analysis in all the larger laboratories of both producers and consumers of zinc and zinc products. The methods of analysis are those originally proposed by Elliott and Storer and Price, whose work has been checked and elaborated by the members of the committee.

### SAMPLING SLABS

Select 10 slabs at random from a carload, and saw each slab completely across from the middle of one long side to the middle of the other, and use the sawdust as the sample; or drill three 9-mm. holes along one diagonal of each slab, boring completely through and taking care to make fine drillings; the holes should be drilled as nearly as possible at the middle and half way between either end and the middle of such diagonals. Go over the drillings or sawings with a powerful magnet to take out any iron which may have come from the drill or saw, and mix the sample thoroughly. The drill or saw must be thoroughly cleaned before use, and no lubricant shall be used in either drilling or sawing.

### METHODS OF ANALYSIS

**Lead**—The committee considers the electrolytic and "lead-acid" methods described to be of equal merit, so far as accuracy is concerned, but where laboratories are equipped for electrolysis the electrolytic method is preferred as a time-saver.

**Lead by Electrolytic Method**—Place 8.643 grams of the sample<sup>1</sup> in a 400-c.c. beaker and add sufficient water to cover the sample. Then add gradually and cautiously 30 c.c. of concentrated nitric acid (sp.gr. 1.42); when the action is complete boil the solution for a few minutes to expel nitrous fumes. Wash the watch glass and sides of the beaker, and transfer the solution to a 200-c.c. electrolytic beaker. Dilute to 125 c.c. and electrolyze with a current of 5 amp. The time required for the electrolysis is from one-half to three-quarters of an hour, depending upon the amount of lead present in the sample. Test the solutions for complete precipitation of lead by washing the watch glasses and sides of the beaker, so that the depth

<sup>1</sup>The empirical factor weight (8.643) is used instead of the theoretical one (8.66), as the dried dioxide is liable to contain some adherent and included water, expelled with difficulty.

of the solution is increased about 12 mm. Then continue the current for 15 min., and if the newly exposed surface is still bright, the lead is completely deposited. Wash the anode three or four times with distilled water, once with alcohol, and then dry in an oven or on a hot plate, at 210 deg. C. for half an hour, and weigh.

The weight of the  $PbO_2$  in milligrams, divided by 100, will give the percentage of lead. The  $PbO_2$  deposit can be readily removed by covering the anode with dilute nitric acid and inserting a rod of copper.

The electrodes are cylinders of platinum gauze with 400 meshes per sq.cm. The anodes are 30 mm. in diameter by 30 mm. high, with a stem 105 mm. long of No. 16 B. & S. gage wire (1.29 mm.), making the total height 137 mm. The cathodes are 12 mm. in diameter by 30 mm. high, with a stem 105 mm. long of No. 16 B. & S. gage wire, making the total height 137 mm.

**Lead by "Lead-Acid" Method**<sup>2</sup>—Place in a 350-c.c. beaker 25, 15, 10, or 5 grams of the drillings or sawings, according to whether the spelter is of grade (a), (b), (c), or (d) respectively, and add, according to the size of the sample taken, 300, 180, 120, or 60 c.c. of "lead acid" (prepared as indicated in footnote). After all but about 1 gram of the zinc is dissolved, filter on a close filter and wash out the beaker a couple of times with "lead acid" from a wash bottle. Wash the undissolved matter from the filter into the original beaker with water, and dissolve with a small amount of hot 1:1 nitric acid. Add 40 c.c. of "lead acid" and evaporate until strong fumes of sulphuric acid escape. When cool, add 35 c.c. of water (which is the quantity of water evaporated from the "lead acid"), and heat to boiling. Add the first filtrate (containing the greater part of the zinc, and possibly a small amount of lead sulphate), stir well, and allow to stand for at least five hours, preferably over night. Filter on a Gooch crucible, wash with "lead acid," then with a mixture of equal parts of alcohol and water, and finally with alcohol alone. Set the Gooch crucible inside a porcelain crucible in order to avoid reduction of lead by flame gases and mechanical disintegration of the asbestos mat. Ignite for five minutes at the full heat of a Tirrell burner. Cool and weigh as  $PbSO_4$ .

**Iron**—Place 25 grams of zinc in a tall 700-c.c. beaker and dissolve cautiously in 125 c.c. of nitric acid (sp.gr. 1.42). Boil, dilute to about 300 c.c., add 10 grams of ammonium chloride, and then ammonia until the precipitated zinc hydroxide has redissolved. Boil, let settle, and filter on an 11-cm. S. & S. "Black Ribbon" or similar filter paper. Wash with dilute ammonia and with hot water. Dissolve the precipitated ferric hydroxide with

<sup>2</sup>"Lead acid" is a solution of one volume of sulphuric acid in seven volumes of water, saturated with lead sulphate. It is prepared as follows: 300 c.c. of sulphuric acid (sp.gr. 1.84) is poured into 1,800 c.c. of water; 1 gram of lead acetate is dissolved in 300 c.c. of water and is added to the hot solution with stirring. The solution is allowed to settle for several days, and is siphoned off through a thick asbestos filter for use. When "lead acid" is used it is unnecessary to consider the solubility of the lead sulphate, since the solution is always brought back to the same volume as the volume of "lead acid" originally added; consequently, when the lead sulphate is filtered, no more lead remains in the filtrate than was originally added in the "lead acid."

hot 1:4 sulphuric acid, add 40 c.c. of 1:1 sulphuric acid, pass through a Jones reductor,<sup>3</sup> wash first with 150 c.c. of dilute sulphuric acid, and then with 100 c.c. of water and titrate with potassium permanganate. The potassium-permanganate solution contains approximately 0.2 gram of the crystals per liter. One cubic centimeter of permanganate solution will equal about 0.000334 gram of iron. Run a blank with the same amounts of acid and water, and correct accordingly.

Standardize the potassium permanganate against sodium oxalate. Weigh duplicate samples of sodium oxalate, 0.0200 gram each, an amount which may require between 49 and 50 c.c. of the permanganate solution. To convert sodium oxalate to iron, use the factor 0.833.

**Cadmium**—Place 25 grams or drillings in a tall 500-c.c. beaker; add 250 c.c. of water and 55 c.c. of concentrated hydrochloric acid, and stir. When the action has almost ceased, add more acid with stirring, using about 2 c.c. at a time, allowing it to stand after each addition of acid, until finally all but about 2 grams of the zinc has been dissolved. About 60 c.c. of acid in all are usually required; it is best to allow the first 55 c.c. of acid to act over night. Filter, first transferring one of the undissolved pieces of zinc to the filter, and wash a couple of times with water. Discard the filtrate. Wash the undissolved matter on the filter paper into the 500 c.c. beaker, cover and dissolve in nitric acid. Transfer to a casserole, add 20 c.c. of 1:1 sulphuric acid, and evaporate until fumes appear; take up with about 100 c.c. of water, boil, cool, and let settle for several hours (best over night). Filter off the lead sulphate on paper, wash with water, retain the filtrate, and discard the lead sulphate. Dilute the filtrate to 400 c.c., add about 10 grams of ammonium chloride, and pass hydrogen sulphide for one hour. It is occasionally necessary to start the precipitation of the cadmium sulphide by the addition of a drop or two of ammonia to the dilute solution. Allow to stand until the precipitate has settled, and then filter off the impure cadmium sulphide in a loose-bottomed Gooch crucible; remove the cadmium sulphide by carefully punching out the bottom into a tall 200-c.c. beaker. Wipe off any cadmium sulphide remaining on the sides of the crucible, using a little asbestos pulp, add 60 c.c. of 1:5 sulphuric acid, and boil for one-half hour. In case of spelters carrying large amounts of cadmium it may be necessary to add more acid. The dilute acid dissolves cadmium and zinc sulphides, but not lead sulphide. Filter and dilute to 300 c.c., add about 5 grams of ammonium chloride, and precipitate with hydrogen sulphide again in order to get rid of traces of zinc. In case a large amount of cadmium is present, a third precipitation may be necessary. After the final precipitation, let settle, filter, and transfer to a weighed platinum dish, cover, and dissolve in 1:3 hydrochloric acid. Also dissolve the sulphide remaining on the filter paper in hot 1:3 hydrochloric acid, and add it to the solution in the platinum dish. Add a little sulphuric acid, and evaporate the solution until copious fumes escape. Dilute with water, add a few centimeters of concentrated nitric acid to oxidize any filter paper shreds, and again evaporate the solution until fumes of sulphuric acid come off freely. Remove the excess of sulphuric acid by heating the dish cautiously

<sup>3</sup>If, before passing the solution through the reductor, a large amount of lead sulphate is present, it is well to filter it off so as to prevent it from clogging the reductor.

and finally heat to between 500 and 600 deg. C. or to dull redness, and weigh the cadmium as sulphate.

**Alternate Method for Cadmium**—Proceed as above until the cadmium sulphide has been dissolved in hydrochloric acid. Oxidize with nitric acid, and filter from sulphur. Transfer the solution to a 200-c.c. electrolytic beaker, add a drop or two of phenolphthalein, and then pure sodium- or potassium-hydroxide solution until a permanent red color is obtained. Add a strong solution of pure potassium cyanide with constant stirring until the precipitate of cadmium hydroxide is completely dissolved. Avoid using an excess of the potassium cyanide. Dilute the solution to 150 c.c., and electrolyze with a current of 5 amp., using gauze electrodes of the same size as in the lead determination. The time required is from 1 to 2 hr. The solution should always be tested for cadmium as follows: Raise the liquid in the beaker, and then note after 20 min. the newly exposed surface of the electrode. If it is still bright, the cadmium is completely deposited. Next wash the electrodes with distilled water, and then with alcohol. Dry at 100 deg. C., cool, and weigh. The increase is metallic cadmium.

⌘

### Methyl Red as an Indicator

Methyl red gives a sharper end-point than methyl orange when the two indicators are tested in water with acid or alkali, according to R. T. Thomson (*Analyst*, 1914, p. 518; abstr. *Journ. Soc. Chem. Ind.*), and its sensitiveness, unlike that of methyl orange, is not greatly affected by the presence of neutral salts, such as sodium chloride or sulphate. When methyl red is used as the indicator in the titration of carbonates with acids, the solution must be boiled after each addition of the acid in order to expel free carbon dioxide.

⌘

### Acid-Proof Table Finish

The following formula for an acid-proof table finish is published by the Bureau of Chemistry of the Department of Agriculture, according to the *Chemist-Analyst*:

**Solution A**—125 grams of copper sulphate and 125 grams of potassium chlorate are dissolved and diluted to 1000 c.c.

**Solution B**—60 grams of aniline hydrochloride and 90 cc. of hydrochloric acid, sp.gr. 1.20, are dissolved and diluted to 500 c.c.

Paint the wood first with "A," and as soon as it dries sufficiently, apply a coating of "B," and let dry for several hours. Wash with hot water and repeat operation, until the color is a dark green. Finish by rubbing with raw linseed oil until a jet-black surface is secured.

⌘

### To Bore Holes in Rubber Corks

The following kink is from the *Chemist-Analyst*: Wet the cork and borer with water before starting and occasionally during the operation. This reduces the friction and makes the cutting easy and smooth. The core will come out in one piece. Corks should be bored from the little end toward the large end. This makes the glass tubing fit tightly, as the hole where started is always bigger than where it ends, and when put in a bottle the neck of the bottle incloses the smaller end of the cork and hence tends to close the hole.

## National Exposition of Chemical Industries

When America's first National Exposition of Chemical Industries opens at the Grand Central Palace, New York City, on Monday, Sept. 20, it will mark an epoch in the history of the industries dependent on chemistry, and cannot fail to be far-reaching in its results. It will bring into closer contact than ever before the manufacturers, financiers, dealers and consumers. Elaborate exhibits are arranged, many of them working units, giving visitors the opportunity of seeing for the first time the processes or apparatus at work.

It is expected that President Wilson will be present and participate in the opening of the exposition, an invitation from the advisory committee, composed of well-known chemists and chemical engineers, having been sent to him. The committee is as follows: Raymond F. Bacon, Charles H. Herty, Henry B. Faber, A. D. Little, R. P. Perry, William Cooper Procter, E. F. Roeber, G. D. Rosengarten, T. B. Wagner and Utley Wedge.

Among the institutions which have coöperated to make this exposition a success are the American Chemical Society, the American Electrochemical Society, the American Institute of Mining Engineers, the American Institute of Electrical Engineers, the American Pulp and Paper Association's Technical Section and the Bureau of Commercial Economics.

### PROGRAM OF THE EXPOSITION

The program of the exposition will be as follows: Monday, Sept. 20, opening day.

Tuesday, Sept. 21—R. P. Pierce (Barber Asphalt Co.), "Work with the Ultra Microscope"; Howard H. Gross (President Tariff Commission League) will lead a discussion on the tariff question, in which other members of the league will participate; R. S. Frinck (President Frinck Pyrometer Co.), "The Relation of Chemistry and Mechanical Manipulation to the Evolution of the Glass Industry"; Harrington Emerson (The Emerson Co.), "Efficiency," and a meeting of the New York Section of the American Electrochemical Society will also be held.

Wednesday, Sept. 22—Thomas H. Norton (U. S. Department of Commerce), "Foreign Markets for American Chemicals"; F. W. Keough (President American Exporters Association), "Transportation and Shipping Facilities with Foreign Countries"; I. F. Stone (President National Aniline and Chemical Co.), "The Aniline-Dye Situation"; J. L. Lightner (Hershey Chocolate Co.), "The Manufacture of Chocolate."

Thursday, Sept. 23—J. L. Taylor (United States Bureau of Mines), "Explosives"; H. A. Huston (German Kali Co.), "Potash"; Linn Bradley (The Research Corporation), "Solution of Smoke, Dust and Fume Nuisances by Electrical Precipitation"; Percy Wilson (Secretary Association of American Portland Cement Manufacturers), "The History of Cement," followed by a meeting of the American Paper and Pulp Association.

Friday, Sept. 24—S. P. Sadtler (S. P. Sadtler & Sons), "American Contributions to Industrial Chemistry"; W. D. Coolidge (General Electric Co.), "The X-Ray"; L. H. Baekeland, "Chemical Industry," followed by a joint meeting of the New York Section of the American Chemical Society and the American Institute of Chemical Engineers.

Saturday, Sept. 25—John Barrett (Director Pan-American Union), "South American Opportunities"; George Frank Lord (du Pont de Nemours Powder Co.), "Farming with Dynamite"; C. B. Heckel (New Jersey Zinc Co.), "Zinc"; besides many other important papers and addresses.

### MANY MOVING PICTURES ARRANGED FOR

A partial list of films to be shown during the exposition is as follows:

Waterman Fountain Pen Co., "Hard-Rubber Manufacturing"; National Lead Co., "Manufacturing Uses of White Lead"; Lipton Tea Co., "Tea Industry in Ceylon"; National Tube Co., "From Ore to National Pipe"; Henry Disston & Sons, "Making of Saws"; Rogers, Brown & Co., "Steel Industry"; People's Natural Gas Co., "Boring and Piping Gas"; Hershey Chocolate Co., "Chocolate Industry"; Barrett Manufacturing Co., "Tarvia"; Barber Asphalt Co., "Asphalt from Lake Trinidad to Street"; American Cyanamid Co., "Fertilizer from Air"; German Kali Works, "Mining of Potash"; Association of American Portland Cement Manufacturers, "Uses of Cement on the Farm"; General Roofing Co., "Roofs from Rags"; Follansbee Bros., "Tin Industry"; Cheney Silk Co., "Silk Industry"; National Association of Manufacturers, "Crime of Carelessness," "The Man He Might Have Been," "The Workman's Lesson," "An American in the Making"; Printz Biederman Co., "Wool to Clothing"; City of Baltimore, "Sewage Disposal and Filtration"; Ed. Pinaud (Klotz & Co.), "Perfumery"; United Shoe Machinery Co., "Tanning Hides to Shoes"; Rice & Adams, "Cow to Consumer"; Reed & Barton, "Making Silver"; Larkin Co., "Soap"; Sherwin-Williams, "Paint"; Westinghouse Electric Co., "Electricity in a Home"; Universal Portland Cement, "Application of Cement"; The Research Corp., "Consuming Smoke"; Franche Estate, "Sulphur Mining (Louisiana)"; H. K. Mulford Co., "Hog Cholera," "Nitro-Germ"; General Electric Co., "Electricity in the Mine," "Electricity on the Farm," "The X-Ray," "Electric Lighting," "Motor Application," "Electric Power Transmission"; Bureau of Mines, "Mine Explosion and Rescue," "Safe Method of Bituminous Coal Mining," "Zinc Mining, Milling and Smelting," "Copper Mining, Milling and Smelting"; Starrett Mfg. Co., "Manufacturing of Files"; District of Columbia Paper Mill, "Manufacture of Paper."

The motion picture program given above has been arranged for the Exposition by the Bureau of Commercial Economics at Washington.

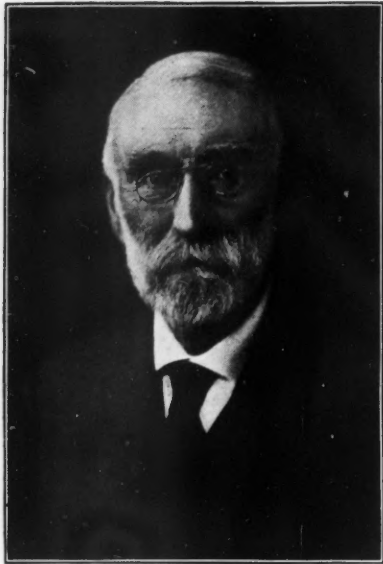
Many of the exhibitors will also have speakers in the auditorium, who will lecture and display by motion and slide pictures the work of their respective companies.

Under the auspices of the Bureau of Foreign and Domestic Commerce, about eight bureaus in the Departments of Commerce, Interior and Agriculture are now arranging noteworthy and instructive exhibits, each of which will be typical and demonstrative of the work of that bureau.



**Rutile Exports from Norway** in 1913 were 50,730 kg.; in 1914 they were about 50,000 kg., according to a recent consular report. The exports are all to European countries. In 1915 the production is believed to have decreased, as Norwegian firms have been trying to buy rutile in the United States to fill their orders. The demand has increased owing to the use of titanium carbide in electric lamps.

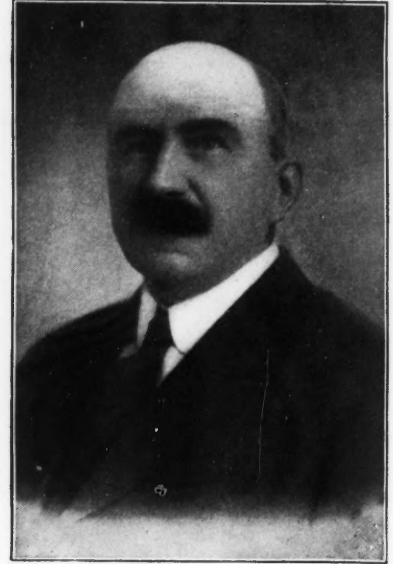
# International Engineering Meeting



DR. JAMES DOUGLAS



CHARLES W. MERRILL



E. P. MATHEWSON

Dr. Douglas will receive the John Fritz Medal at the International Engineering Congress on Sept. 20, 1915. Mr. Merrill edited the symposium on gold and silver, while E. P. Mathewson edited that on copper metallurgy



Photograph by Underwood & Underwood, New York City

## EASTERN FACADE, PALACE OF MINES, PANAMA-PACIFIC EXPOSITION

Added interest is given the mining and metallurgical exhibits by the meetings of the International Engineering Congress and various technical societies in San Francisco

## Lake Superior Iron Conditions

EDITORIAL CORRESPONDENCE

Ore is moving out of the Lake Superior district at a rapid rate at the present time and it is certain that there will not be any let up until navigation comes to a close when the cold weather sets in. All of the lake fleet are now in active operation and it is believed that the total shipments from the district for the season will reach close to 45,000,000 tons. The Oliver Iron Mining Co., the mining branch of the Steel Corporation, will move about 20,000,000 tons, very nearly the amount that was shipped in 1913, the banner year in the ore business. Some of the independents are not doing so well, but a few of the properties that have not shipped a pound of ore all year may still be able to send out some of their product, as the ore-buying movement has not stopped as yet. Most of the railroads that handle iron ore from the mines to the docks are working all of their equipment, and most of them have handled more ore to date this year than they did during the corresponding period of 1914. The Lake Superior & Ishpeming, which handles most of the ore from the Marquette range, is using every car it possesses and the management wishes that it had the 500 steel cars which were ordered in the spring and which have not been delivered. One day last week a new loading record was made at the Lake Superior & Ishpeming dock at Marquette, when eight ore carriers were loaded and discharged during 20 hr. All of these boats were taken care of at the new steel-concrete dock of the company, which was constructed two years ago.

### STOCKPILES MOVING WELL

In spite of the fact that ore is being moved at a lively rate, the mines are not working so strong as they might. This is because of the large stocks at the mines, which must be moved before the operators can take chances on loading up again. Some of the ore that is going down the lakes this year has been in stock for years. In fact, vegetation was growing on the piles of some that is going out and it had the appearance of waste rather than ore. The Cleveland-Cliffs Iron Co. alone had about 3,000,000 tons of ore in stock on the Marquette range in the spring, but over two-thirds of this will be gone by the time winter sets in. Although some of the mines are working with small forces, others are working to capacity in order to keep up with their contracts. The Breitung interests changed their working hours at their Negaunee mines this week, putting on three shifts instead of two, in order to increase the output. This company had considerable ore in stock a few months ago, but the management has stated that there will not be a ton in stock when the boats stop.

As stated previously, it is believed that there will still be some buying this year, as the furnace men are advancing the price of pig iron, which usually means that iron ore will command a higher price in the market, and many of the consumers may want to make a few more contracts before the prices are raised. It is also thought that the vessel rate in 1916 will be higher than it is at the present time, which may lead some to take advantage of the present carrying rates. Some of the operators are rather skeptical about the ore business, as they do not know what is going to happen to the iron and steel markets when the war is over. Others believe that the revival of business that will result in this country will more than compensate

for the falling off of war orders. However, the outlook is far from gloomy, and the coming winter should see considerable activity. When the ore piles are shipped the operators are always willing to take a chance on stocking, and they will be more than willing to take risks this winter, with the prospect that prices will be higher in 1916.

Little development work has been carried on in the district this summer, only a few of the companies having diamond drills in operation. There is still some drilling being done on the Cuyuna range, and a few drills are in operation on the Mesabi. The Cleveland-Cliffs Iron Co. has stopped most of the drills that it had working a few miles to the west of Ishpeming, and the conclusion is that ore in commercial quantities was not encountered. This company has a drill working in the City of Negaunee, and it is now down about 2400 ft., but no results are obtainable. A hole was put down a short distance from this one to a depth of about 3000 ft. Luther Brewer and associates have discontinued their drilling on the eastern extension of the Gogebic range, without finding ore. Several hundred feet of formation was found in some of the holes, but the ore was not present. However, it is believed that another campaign will be mapped out in the near future. A little drilling is being done on the Menominee range; but not many drills are working compared with the number that was employed a few years ago.

### TAXATION SYSTEM STOPS DEVELOPMENT

Since the Michigan State Tax Commission made its revaluation of all of the iron properties in the state, placing the mines on the assessment rolls at much higher figures than before, the companies have been very backward about looking for new deposits except when they are actually in need of the ore. They do not care about proving up orebodies and paying heavily in taxes unless the product can be disposed of. It is certain that the actions of the commission has greatly retarded new work in the state. Some of the companies have lands which they believe contain bodies of iron ore, but they are not going to start development work until they know that there is a demand for the ore. With an advance in prices and an increased demand it is quite likely that development work will be given a decided impetus.

With the higher taxes and the low price of iron ore the operators have had to economize in every possible way in order to make both ends meet; and some of them have had a difficult time getting a fair return on their investment. Some of the managements have been able to make substantial reductions in their costs by the use of new drill machines, lower-grade powders, electric power, etc. Electric power is becoming very popular on the Marquette and Menominee ranges and more of it is being utilized all the time. The Peninsular Power, which has a large power plant on the Menominee River, has recently closed a contract with the M. A. Hanna Co. to supply its Carpenter and Ravenna mines at Crystal Falls with current. A pole line is also to be extended to the Alpha district to supply the mines in that vicinity. A new 2400-hp. generator is to be installed in the company's steam auxiliary station at Iron River, a contract having recently been awarded to the Westinghouse Electric Co. to make the installation. The Oliver Iron Mining Co. and the Penn Iron Mining Co., on the Menominee range, and the Cleveland-Cliffs Iron Co. on the Marquette range, now have their own power plants. The last named company is not developing

enough current for its needs and is now planning to add another plant on another stream.

Among the mines that have entered the shipping list this year are the Wakefield and Palms-Anvil, on the Gogebic, the Isabella, on the Marquette, and the Carpenter and Balkan, on the Menominee. The Isabella shipped its first cargo of ore on Aug. 14. This property is owned by the Cascade Mining Co., of which O. B. Warren, of Hibbing, Minn., is president. Many of the officials of the company were on hand when the first train left the property, and the miners were given a half holiday with a picnic in a nearby grove. The first ore was taken from the Balkan pit this week by the contractors who are doing the stripping. The ore is taken out in the dump cars, which are run onto a trestle and dumped into the railway cars. Only a small tonnage will be taken out in this way, although it was thought at first that about 200,000 tons would be so mined this year. The Wakefield is the largest of the new mines to start shipping, and will mine about 800,000 tons this year, contracts having been closed for that tonnage. The Palms-Anvil has about 15,000,000 tons blocked out at present and will be a heavy shipper when the ore is required. The Carpenter is working with a full force and will ship steadily all season.

### International Engineering Congress

A general notice of the meeting of the International Engineering Congress was given in the *Journal* of Sept. 4, 1915. Fuller details are now available. The general sessions of the congress are to be held in the Auditorium Building. The opening session will be held Monday, Sept. 20, at 10 a. m., at which an address of welcome will be made by the mayor of San Francisco. General Goethals, honorary president of the congress, will then address the convention, and the John Fritz medal will be presented to Dr. James Douglas, past president and honorary member of the American Institute of Mining Engineers.

Papers will be presented by eminent engineers from all over the world at the following sectional and parallel sessions: Waterways; irrigation; municipal engineering; railway engineering; materials of engineering construction; mechanical engineering; electrical engineering; mining engineering; metallurgy, naval architecture and marine engineering and miscellaneous. The programs of the mining and metallurgical sections are as follows:

#### MINING ENGINEERING

Tuesday, Sept. 21, 10 a. m.—“Economic and Social Influence of Mining,” W. H. Shockley; “Valuation of Metal Mines and Prospects,” T. A. Rickard; “The Valuation of Oil Lands and Properties,” M. E. Lombardi; “Valuation of Anthracite Mines,” R. V. Norris; “Valuation of Coal Lands,” Samuel A. Taylor; “Evaluating Coal Properties in Western Canada,” R. W. Coulthard; “Status of Coal Mines in France,” E. Gruner; “Workmen’s Compensation and Mine Safety,” H. M. Wilson.

Wednesday, Sept. 22, 10 a. m.—“Functions and Work of Exploration and Development Companies,” H. W. Turner; “European Mining Finance,” J. L. Gallard; “The Financing of Mines in the United States,” Lucius W. Mayer.

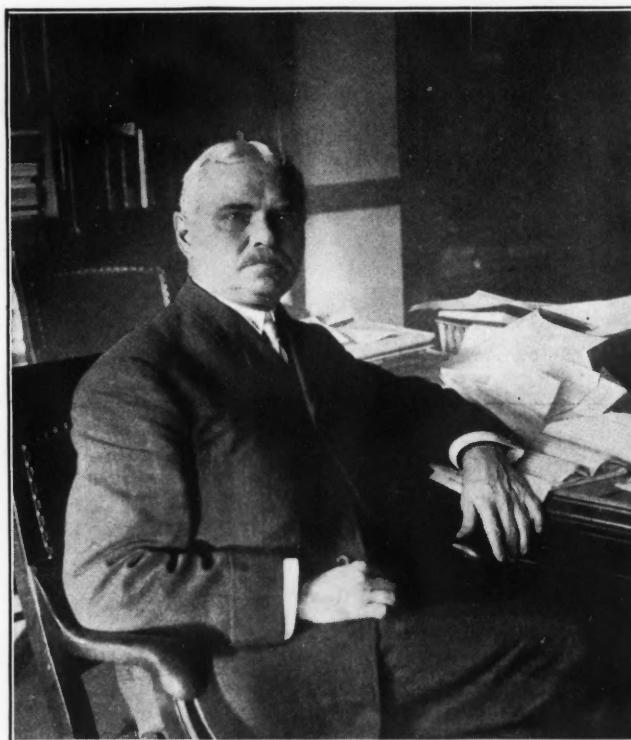
Thursday, Sept. 23, 10 a. m.—“Organization and Staff of Mining Companies,” W. H. Shockley, also R. E.

Cranston; “Relation of Governments to Mining,” Horace V. Winchell; “Mine Inspection,” J. W. Paul.

#### METALLURGY

Tuesday, Sept. 21, 2 p. m.—Symposium on Iron and Steel, edited by Henry M. Howe: “Iron and Steel Castings,” John Howe Hall; “Metallography and the Hardening of Steel,” Albert Sauveur; “Case-Hardening of Steel,” F. Giolitti; “The Duplex Process of Steel Manufacture,” F. F. Lines; “Methods of Preventing Piping in Steel Ingots,” Emil Gathmann; “Steel Alloys,” George L. Norris; “Electro-Metallurgy,” E. F. Roeber.

Thursday, Sept. 23, 10 a. m.—Symposium on Copper, edited by E. P. Mathewson: “Process in Copper Metallurgy,” Thomas T. Read; “Advances in Copper Smelting,” Frederick Laist; “Metallurgy of Copper in Japan,” R. Kondo; “Copper Metallurgy of the Southwest,” Dr. James Douglas; “Reduction Works—Copper Queen Con-



Copyright, Underwood & Underwood, New York City.

MAJ.-GEN. G. W. GOETHALS, U. S. A.

General Goethals is honorary president of the International Engineering Congress

solidated Mining Co., Douglas, Ariz.,” Forest Rutherford; “Advances Made in the Metallurgy of Copper, Globe District, Arizona,” L. O. Howard; “Improvements in Design and Construction of Modern Copper Plants,” Charles H. Repath.

Thursday, Sept. 23, 2 p. m.—Symposium on Copper (Continued): “Leaching Copper Ores,” W. L. Austin; “The Metallography of Copper,” William Campbell; “Boronized Cast Copper,” Dr. E. Weintraub; “Electrolytic Refined Copper,” A. C. Clark; “The Development of Electrolytic Copper Refining,” Lawrence Addicks; “Physical Properties of Copper,” Carle R. Hayward; “Metallography and Technology of Nonferrous Alloys,” William Campbell.

Friday, Sept. 24, 10 a. m.—Symposium on Gold and Silver, edited by C. W. Merrill: “Coarse Crnshing Plant:



1000 Tons Capacity," G. O. Bradley; "Crushing and Grinding," L. D. Mills, also M. H. Kuryla; "Solution of Gold and Silver, Including Classification," M. H. Kuryla; "Filtration or Separation of Metal-Bearing Solution from Slime Residue," L. D. Mills; "Precipitation," G. H. Clevenger.

Friday, Sept. 24, 2 p.m.—Symposium on the Metallurgy of Zinc, edited by Walter Renton Ingalls: "Some Main Points in the Economics of the Metallurgy of Zinc," Walter Renton Ingalls; "The Development of Zinc Smelting in the United States," George C. Stone; "The Smelting and Refining of Lead," Dr. H. O. Hofman.

Symposium on the Utilization of Fuels in Metallurgy, edited by C. H. Fulton: "Pulverized Coal in Reverberatory Furnaces," D. H. Browne; "Burning Pulverized Coal in Copper Reverberatories," E. P. Mathewson; "Gas Producer Development," Z. C. Kline; "Surface Combustion (What Is It?)," C. E. Lucke; "Ore Dressing," Robert H. Richards.

✱

### State Assistance to the Mining Industry in Australia

Recognizing the great public value of mineral discoveries, and knowing that it was the discovery of gold in large quantities which attracted population to Australia and laid the foundation of its nationhood, the state governments are prepared to assist in various ways all attempts made to discover and open up new mineral areas.

In New South Wales up to the end of 1913 the total sum distributed for the purpose of assisting prospectors amounted to £443,661. During one year £10,302 was advanced and £15,169 was paid by the government of that state as subsidy to the Miners' Accident Relief Fund. In Victoria, under the Mining Development and Surplus Revenue Acts, £417,257 was expended from revenue and £200,000 was provided out of votes during the period 1897 to 1913. In Queensland state assistance to mining during 1913 amounted to £21,698. This was spent in deep sinking, grants in aid of prospecting, construction of roads and bridges to mineral fields, and advances under the Mining Machinery Advances Act.

In South Australia aid is given to the mining industry under the terms of the Mining Act of 1898. Up to 1913 £58,209 had been distributed, a portion of which had been repaid to the government. The government also has a number of batteries at work in the state. In Western Australia advances are made by the government in aid of mining work and equipment of mines, erection of crushing plants, in aid of boring and providing transport. Over £1,200 was expended in one year on water supply, roads, cartage and subsidies for development below the 100-ft. level in small mines. In this state there have been 40 state-owned batteries or reduction plants in operation, the total cost of these being £332,378. Last year the receipts amounted to £47,981 and the working expenditure £55,362. These state-controlled plants have recovered gold and tin to the value of £4,189,955, resulting from the treatment of 960,989 tons of gold ore and 64,920 tons of tin ore.

In Tasmania state aid is also given under the Aids to Mining Act, and in one year £9,847 was expended in prospecting and development work. In the Northern Territory prior to 1912 prospectors were helped by

grants of rations and some monetary assistance, but it was found that these privileges were occasionally abused, and now provision is made for generous grants to discoverers of metalliferous ores. Aids granted to prospectors in 1913 amounted to £2,373, of which £633 was paid in respect of gold, £1,865 for copper, and £55 for other minerals. There are immense areas in Australia which have not yet been properly tested for mineral values, and genuine parties prepared to take up this work may, as is shown in the foregoing, expect encouragement from the state or Commonwealth authorities.

✱

### The Situation in Mexico

SPECIAL CORRESPONDENCE

Affairs in Mexico during the past few months have been very badly mixed and conditions "intolerable," and yet they do not appear just at this time to be any nearer a definite settlement than in the past. Obregon has developed a strength that is surprising and has driven Villa back through Leon, Aguascalientes and Zacatecas into Torreon, where he is preparing to make another stand. In consequence of these defeats, added to the fact that the printing press is providing a never-failing supply of currency, Villista money has dropped to 1c. to 2c. per peso. Corn is scarce in Chihuahua and Durango and when to be obtained is quoted at a price that makes it almost impossible to obtain by the Mexican laborers. Other food supplies are also scarce. The crops in consequence of a lack of rain will be much less in amount than in previous seasons, added to which is the fact that less of the land has been planted. In Sonora the Carranzistas have apparently been making considerable headway. The states now in part or entire control of the Villistas are Chihuahua, Durango, Coahuila, Sonora, and Sinaloa, the other states being largely controlled by the Carranzistas. Various decrees of Villa have been very inadvisable from a political standpoint, and have injured his prestige immeasurably. Villa's campaign against Guadalupe, instead of concentrating his strength in taking Matamoros and Tampico, may have been largely the reason for his late defeats, in consequence of which the important cities of Queretaro, San Luis Potosi, Saltillo, Monterey, Guanajuato, Aguascalientes and Zacatecas have been taken by the Carranzistas.

Carranza's strength appears to rest largely with Obregon. Gonzales is not considered a very heavy factor, although he has lately taken Mexico City from the Zapatistas. There is considerable speculation as to whether Carranza has any control over the forces under him, except such as they wish to extend to him, and many are of the opinion that should Obregon win out against Villa with his forces he will upon some pretext or other decide to ignore Carranza. Carranza's ideas are so impracticable and his sympathies so obviously antiforeign that it is considered very unlikely he will be recognized by the United States. If he should be recognized, many appear to think it will lead to the gravest trouble with one or more of the European powers when peace has there been declared.

Mining interests have been greatly disturbed by the decree of Carranza raising taxes on mining properties to amounts that range from at least twice to six or seven times the normal amount, and many of the foreign interests have refused to pay. Appeal to the Secretary of Hacienda through the United States State Department's

representative to restore taxes to the normal rate resulted in acquiescence on one day, followed in a few days by a complete reversal of position. In fact, no dependence can be placed on the promises or assurances of the various heads of departments under Carranza.

The appeal of the State Department to the various chiefs of opposing factions that they get together and elect a president has elicited favorable replies from the Villistas and unfavorable replies from all of the Carranzista chieftains that have so far been heard from. If such a movement could succeed, it would be the ideal arrangement and obviate the necessity of any foreign intervention. Whether the United States will recognize the provisional president selected by the various Villa and Zapata delegates and place an embargo on all arms and ammunition going to the Carranzistas is yet to be seen. Vasquez Tagle, the only member of Madero's cabinet who did not resign, has been favorably mentioned as acceptable to the Villistas and Zapatistas. Villa has announced his willingness to retire from the field in order to induce many to come into the convention who would not otherwise appear, yet whether he will do so is another question.

In the meantime nearly all of the mines in Mexico are closed. The only smelters now in operation are those at Chihrahua, Torreon, Mapimi and Cananea. Freight conditions are becoming so bad that it would not be surprising to see the Mapimi and Torreon smelters soon obliged to close.

There is daily train service between Nuevo Laredo and Monterey, and between Juarez and Torreon. Trains operate between Monterey and Tampico about twice a week. Military trains have been in operation between Tampico and San Luis Potosi, and possibly regular passenger trains are now in operation. Service is also established between San Luis Potosi and Aguascalientes, and between San Luis Potosi and Matehuala. The service between Torreon and Durango is interrupted owing to the fact that the city of Durango was lately captured by the Carranzistas. The railroad between Piedras Negras, Paredon and Torreon was, at last accounts, in the hands of the Villistas, with irregular train service.

### Copper Production in Russia

Recent official returns give the production of refined copper in Russia for two years past as follows, in metric tons:

	1913	1914	Changes
Urals .....	17,283	16,790	D. 493
Caucasus .....	10,003	7,123	D. 2,880
Siberia .....	5,656	5,616	D. 40
Chemical and refining works..	1,380	1,415	I. 35
Total .....	34,322	30,944	D. 3,378

The decrease in 1914 was chiefly because of war conditions in the latter part of the year. In the Urals the falling off was caused chiefly by shortage of labor. In Siberia there was only a very small change. In the Caucasus, where the loss was greatest, mining and smelting were stopped for a time by actual military operations.

### Chronology of Mining for August, 1915

Aug. 1—Workmen's compensation law went into effect in Colorado.

Aug. 5—Dredge of the Empire Gold Dredging Co. in the Leadville district, Colorado, launched, this being

the first dredge to operate in that district—Holdings of Mogollon Gold and Copper Co. sold to the Socorro Mining and Milling Co.

Aug. 13—Stocks of Belcher, Crown Point and Yellow Jacket dropped from the official list of the San Francisco Stock Exchange, these companies having been merged as the Jacket-Crown Point-Belcher Mines Co.

Aug. 15—Fire destroyed portion of the town of Upper Rochester, Nev.

Aug. 26—Zeila mine, Jackson, Calif., sold to Kennedy Mining and Milling Co.

Aug. 27—Vannoy H. Manning appointed director of the United States Bureau of Mines.

Aug. 31—Explosion at Orenda mine of Merchants' Coal Co., at Boswell, Penn.; 16 killed.

## Lake Superior Mining Institute Twentieth Annual Meeting

### EDITORIAL CORRESPONDENCE

The general program of the Lake Superior Mining Institute's meeting was published in the *Journal* of Sept. 4, p. 403. It has been rigidly adhered to up to the time of going to press. The first-aid contest on Monday at the ball park, Ironwood, Mich., included four problems unknown to the contestants until the time of the meet. Results were watched more carefully by spectators this year than last on that account. They were as follows: First prize, a trip to the Cuyuna range and the Minnesota State Fair, Minneapolis, Minn., won by team No. 4, Verona Mining Co., seven men, J. G. Williams, captain; score, 95.25; the prize was donated by the Gogebic Range Mining Association. Second prize, \$50, donated by the Du Pont powder company, won by team No. 1, Oliver Iron Mining Co., Mesabi Range, eight men, H. C. Lawry, captain; score 92. Third prize, \$30, donated by Lake Superior Mining Institute, won by team No. 3, Odanah Iron Co., seven men, M. Menestrina, captain; score 86.7. Fourth prize, \$20, donated by the Institute, won by team No. 2, Montreal Mining Co., seven men, Tim Kirby, captain; score, 86.5. The judging was done by Dr. A. F. Knoefel, a last year's judge, and seven physicians from Terre Haute and vicinity.

In the afternoon automobiles took the party to points of interest on the Gogebic Range. These included: "G" Pabst shaft of the Oliver company, Newport mine; permanent stock trestle at Colby mine; Anvil and Wakefield mines. At the last, the openpit and electrical installation are of particular interest. They are fully described in the *Journal* of Aug. 28. The first business session was held at 7:45, Monday night, in the New Central School, Ironwood, and was called to order by President L. M. Hardenburg. Edwin Higgins then presented the final report on first-aid meets recommending the appointment of a committee on rules and regulations governing such contests. Papers were then given as follows: "Sinking of the Woodbury Shaft at Newport Mine," read by title only, by J. M. Broan. William Kelly called attention to the great record made in sinking this shaft.

"Mining Methods on the Gogebic Range" was read by co-author O. E. Olsen, who pointed out the differences developed in the last five years in transportation underground, safety devices, etc. Heavier rolling stock had

necessitated heavier rails and from 7- to 8-ton skips are now used. The paper on "The New Stockpile Trestle at the Colby Iron Mining Co." was read by G. S. Barber. A new type with one-leg bents has reduced the difficulty with alignment. "Opening of the Wakefield Mine" was commented on by the author, W. C. Hart. It was devoted principally to the opening of the pit. A paper on "Grouting at the Francis Shaft of the Cleveland-Cliffs Iron Co." was commented upon by the author, J. R. Reigart. Edwin Higgins pointed out the problems presented in mining sheet ground in the Joplin zinc district. Little timbering is necessary, the shafts are shallow, mining methods are simple and there are comparatively few accidents. Fast hoisting is done without signals. He read some of their costs by way of comparison with those in the Lake Superior district. The principal points of the paper on the use of gunite in steel shafts were pointed out by Stephen Royce, the author. The nomination of the committees followed.

At the Monday evening business session the following committees were appointed: Nominations—J. M. Bush, Marquette; W. J. Richards, Crystal Falls; G. L. Woodworth, Iron River; W. P. Chinn, Virginia; F. W. Denton, Painesdale. Auditing Committee—Frank B. Goodman, Montreal, Mich.; J. E. Jopling, Ishpeming; C. H. Baxter, Loretto, Mich. Resolutions Committee—William Kelly, Vulcan, Mich.; C. Brewer, Ironwood; J. H. Hearing, Duluth; Charles D. Lawton, Hancock; J. C. Barr, Crosby. The Institute was met at Crosby Tuesday morning, Sept. 7, by George N. Crosby, the pioneer operator on the Cuyuna Range. A train of flat cars equipped with seats took the party through the North Range. The initial stop was the Kennedy mine, the first to be opened on the range. Following that the Croft mine was inspected. Here a large tonnage of bessemer ore is opened by a circular concrete shaft in course of sinking. This shaft went 11 ft. out of alignment, but this was corrected and sinking in the ledge is now in progress. The train then went to Armour Nos. 1 and 2 shafts of the Inland Steel Co. and to the Pennington openpit orebody, here 250 ft. wide. It is now stripped and steam shovels are loading ore.

The new hydraulic stripping operations at the Hillcrest mine in charge of W. R. Van Evera were especially interesting. About noon the train went through the openpit of the Rowe mine of the Pittsburgh Steel Ore Co., situated at Riverton, Minn. This property is in charge of J. C. Barr, who last year stripped the ore with hydraulic giants, the first to be used on the Lake Superior ranges. A buffet lunch was served at the Rowe Mine Club, where the Institute members were the guests of Mr. Barr. After this an inspection was made of the Rowe concentrator. This contains the usual log washers and trommels over strong double-deck tables and settling tanks. Raw ore is dumped from the railroad cars on to elevated traveling-chain grizzlies, the oversize crushed, and all elevated by an inclined traveling-belt conveyor to the concentrator bins. The concentrates are elevated in a similar manner and dumped into loading bins which deliver to railroad cars.

The final business session was held in the Crosby High School. A paper on "Some Aspects of Exploration and Drilling on the Cuyuna Range," by P. W. Donovan of the E. J. Longyear Co., was read by title, as was also "Rock Drilling in the Morris-Lloyd Mine of the Cleveland-Cliffs Iron Co.," by J. E. Hayden. Carl Zapffe pointed out important parts of his paper on "A Survey of Develop-

ments and Operations in the Cuyuna Iron-Ore District of Minnesota," and laid emphasis on the mines of the South Range not visited by the Institute. He pointed out that in the district as a whole water has caused practically no trouble, contrary to expectations, and notwithstanding the number of lakes adjacent to the mines. Mr. Zapffe also discussed the need for careful magnetic work brought out in Mr. Donovan's paper. "The Mining School of the Cleveland-Cliffs Iron Co.," by C. S. Stevenson, was read by title, and "Experiments in Concentration of the Cuyuna Ores," by Mr. Newton of the University of Minnesota was read in abstract. "Hydraulic Stripping at Rowe and Hillcrest Mines" was read in part by its author, Professor McCarthy of the Minnesota School of Mines.

The business was then taken up of sending a delegate to Washington in December to consider changes in the mining laws discussed and the Institute Council given absolute power to act. All applications for membership since the last meeting were granted. The thanks of the Institute were extended to the railroads, the Pittsburgh Steel Ore Co., J. C. Barr, George M. Crosby and others at Ironwood, Mich. Officers were elected for the ensuing year as follows: President, Charles E. Lawrence; secretary, A. J. Yungbluth. Tuesday evening a barbecue was given at Crosby Farm.

⌘

## Mineral Exports of Chile

The mineral exports of Chile during 1914 are reported by the *Boletin de la Sociedad Nacional de Minería* as follows:

Products	Units	Quantity
Gold bars .....	Kilograms.....	14,704
Silver bars .....	Kilograms.....	4,843,272
Auriferous silver bars.....	Kilograms.....	221,850
Gold and silver precipitate..	Kilograms.....	667,100
Copper bars .....	Metric tons.....	25,790,515
Copper matte .....	Metric tons.....	15,987,030
Cement copper .....	Metric tons.....	10,000
Gold ore .....	Metric tons.....	32,742
Gold-silver ore .....	Metric tons.....	369,328
Gold-copper ore .....	Metric tons.....	1,764,831
Silver ore .....	Metric tons.....	138,394
Silver-copper ore .....	Metric tons.....	493,302
Silver-lead ore .....	Metric tons.....	13,155
Gold-silver-copper ore .....	Metric tons.....	710,818
Copper ore .....	Metric tons.....	68,892,545
Copper-zinc ore .....	Metric tons.....	8,000
Molybdenum ore .....	Metric tons.....	2,704
Lead ore .....	Metric tons.....	105,251
Iron ore .....	Metric tons.....	63,505,600
Coal .....	Metric tons.....	266,972,000
Nitrate .....	Metric tons.....	1,846,783,000
Perchlorate .....	Metric tons.....	55,430
Borate .....	Metric tons.....	34,203,600
Iodine .....	Metric tons.....	488,952

The total fine copper contained in the exports was 45,682 metric tons, this figure being the greatest ever reached, due to the increased production of the Braden Copper Co. The nitrates and borates suffered a loss, owing to the closing of the European market, the exportations of the last half of the year being only about one-half of those of the first semester.

⌘

## Lake Freight Situation

The following information supplements the short article in the *Journal* of Sept. 4, p. 397.

Both grain brokers and ore shippers continue to call for more vessel capacity. During 10 days recently upward of 2,000,000 tons of ore were sold, with prospects for an additional 2,000,000 to follow. Grain brokers have placed several million bushels at 3c. and are offering more. Prominent vessel owners aver that a large proportion of the total vessel capacity is tied up for the remainder of the season.

## Editorials

### Accident Prevention in Smelting Works

The American Smelting and Refining Co. has joined the ranks of the concerns publishing monthly magazines with the view of reducing the accidents among their employees. The newcomer is *The Safety Review*. It is not so showy as some of its forerunners, but it is fully as spicy. Some of the statements in No. 1 of Vol. 1 are worthy of remark and comment.

In 11 plants of the company there was a decrease of 19% in the accident rate for the first quarter of 1915, compared with the corresponding period of 1914. In the Durango plant the reduction was 64%; in the Baltimore plant it was only 13%. It would be interesting to know whether these figures indicate anything important with respect to the differences among the works, their character, geography, etc. During the first six months of 1915 the Federal plant worked 136,400 hours, and the Durango plant 93,618 hours without an accident.

The company finds that in blast-furnace work and in the handling of hot metals, in which the men are frequently victims of hot splashes, the nature of the shoe worn is important. Consequently, the men are urged to wear congress shoes, which can be removed instantly, whereby many serious burns are prevented. As for the clothing worn, experiments are being made with treatment by a fireproof liquid. Heavy hot-metal splashes will char cloth so treated, but will not burn it, and there is ample opportunity to remove the metal in time to prevent burns of the person. Experiments with this fire-proofing liquid—"Antignite"—are being continued. The matter of shoes, however, is regarded as settled. In the works of the United States Zinc Co. foot-burns have been reduced 50% by the use of congress shoes.

Special emphasis is put upon the use of goggles by men working at the tap-holes of the furnaces, and attention is drawn to the importance of a proper choice of the goggles. "Care should be taken in selecting a measurement that will conform to the nose of the workman. In addition to this the frame should be bent so it will conform to the shape of the face and the temples, adjusted so they will rest easy back of the ears." Goggles are obtainable in assorted sizes complying with these specifications.

All of the foregoing advice is simple, obvious and helpful, but this great industrial company finds it worth while to dwell upon such minor points. Turning to some of the major matters, the great step in advance, without any doubt, is going to be in the more rigid enforcement of discipline. The following is from a report of certain officials of the American Smelting and Refining Co. who visited the works of the Illinois Steel Co. at South Chicago, Ill.:

Their discipline is of a strict nature, in the case of accident, as well as in all cases of disorder. The plant is policed, which is a necessity with such a large organization, and every man found guilty of disorderly conduct is compelled to appear before Mr. McKenney (assistant to the general manager), who sits on these cases each morning at 9 o'clock. The man is

given a hearing, as in regular court, and reprimand given, which might be discharge in severe cases, or a lay-off of one or more weeks.

Mr. McKenney spoke of the men, and particularly of the way the fellow-workmen would reprimand a man who is seen violating any of the rules or putting himself in unnecessary danger, and it has gotten to the point where the offender is more severely taken to task by his fellow-workmen than by the safety committee. We were told of the case of one foreman, only lately, injured by some bonehead act, and he was ashamed to return to work and face his men.

A similar policy appears to be developing in the American Smelting and Refining Co. The story is told of a foreman in the Tacoma plant who directed a man that had received a little cut to go to the doctor. The man refused. "After repeated urgings the foreman told Joe he was fired if he didn't go and see the doctor." A short time after this incident—probably there had been others of like nature—the Executive Committee of the company adopted a recommendation of the Committee on Safety and Labor that all general managers, managers, superintendents, and particularly foremen, be notified that each and every one would thereafter be held strictly accountable for accidents to employees under them, and that discipline, even to the extent of dismissal, would be administered when necessary in order to further the work of accident prevention. It is that kind of policy that will be more effective in reducing accidents than will be the idea of trying to make everything fool-proof.

✽

### Civilian Engineers and Military Service

A movement has been started, and is now well under way, for the organization of a reserve corps of civilian engineers, to be available for use in the country's defense in case of war. This movement, which is indorsed by Major-General Leonard A. Wood, has been taken up systematically by the large engineering societies of the country, including the civil, mechanical, electrical, chemical and mining engineers. All of these organizations working in harmony have appointed members to a joint committee now in touch with the War College at Washington, which is formulating a plan whereby the services of the various engineers shall be promptly available to the greatest advantages to the Government in case of need.

The United States at the present time has in its entire army only 212 engineer officers, most of whom are engaged on purely civil-engineering work in connection with river and harbor improvements. A number are too old, and still others are too young, to undertake some of the difficult problems presented by the necessities of the country's defense, and this work will necessarily fall largely to the civilian engineers who will enter the service when the time comes.

To no group of engineers do the military engineering problems appeal more than to the mining engineers, who are accustomed to working under trying frontier conditions and who are called upon to execute at short notice and in very great haste many difficult engineering

feats. In addition, the mining engineer's daily familiarity with explosives makes him a valuable adjunct to the engineer force of the army.

The mining engineer is also an organizer, and his familiarity with administration and handling men in bodies makes him particularly amenable to the requirements of the service.

Civilian engineers, however, must necessarily have some military training in order to be efficient at the start in their new work. It is not at all unlikely that when Congress convenes and takes up the question of military preparedness—as it undoubtedly will—considerable attention will be focused upon some means for getting the mining engineers into camp for a few weeks to give them the rudiments of military training in a way similar to what is being done in Plattsburg, N. Y., at the present time, where more than 1000 business men are in camp under the tuition of United States Army officers. This business-men's camp follows directly on the heels of a college men's camp at the same cantonment, conducted along similar lines, and will probably be followed by others.

In case of sudden necessity for mobilizing an army in the United States, 1,200,000 men would be required and 40,000 officers would have to be commissioned. At present it is utterly impossible to pick 40,000 men from our entire list of states who are adequately equipped to accept those commissions.

The opportunity which this offers to the mining engineer, both for work congenial to himself and valuable to the country, is entirely unappreciated by the engineer himself. The joint committee of the national engineering societies will, on a plan approved or laid out by the War College and now under consideration, take the lead in preparing the engineers of our country for military training.

✽

### Consumption of Zinc for Brass-Making

In the *Journal* of June 19, 1915, it was remarked that it was then assumed that the buying of spelter for ammunition purposes was endless, and in this connection it was suggested: "The brass-making capacity of America, if nothing else, imposes a limit. Assuming the brass-making capacity to be 450,000 tons at the outside, the spelter requirement would be 150,000 tons at the maximum. It is doubtful if in any year previous to 1915 any more than 75,000 tons of spelter was ever used for brass-making."

Since then the brass-making plant of the United States has been put fully into use, and important additions have been, or are being, made. It is now estimated that American brass works will soon be turning out about 45,000 tons of brass per month. This indicates a consumption of about 15,000 tons of spelter, or at the rate of 180,000 tons per annum, figuring on the ratio of copper and spelter in ordinary brass. This is a little in excess of the previous estimate, sufficiently explained by the additions to capacity.

We can begin to get an idea of how things stand. The exportation of spelter during the fiscal year ended June 30, 1915, was about 140,000 tons. Take 12,500 tons per month as the deficiency in Great Britain, France and Russia that must be supplied from here. Add 9,000 as the increased demand for brass-making here. The total is 21,500 tons. The excess over production as compared

with the rate of 1914 is somewhat between 15,000 and 25,000 tons. Something like the latter figure is in sight, but it will not be attained until 1916. The approach to it will probably be gradual.

On the other hand, domestic peaceful consumption has been enormously curtailed. But disregarding this, it is probable that production is coming into equilibrium with consumption—indeed, has begun to swing the scale the other way. This is indicated by the behavior of the market. A large, sudden buying demand turns it upward. Having been satisfied, the steady weight of production forces it downward again. We shall probably have a declining tendency that will each time carry the market to a new low level and then a rally that will take it to a point not quite so high as the previous one, until there begins to be a positive accumulation of unsold stocks, when there will no longer be any resiliency and consequently there will be no immediate rebound.

✽

### Copper in Germany

According to an American bulletin published in Berlin the German authorities estimate that there are available in Germany 2,000,000 metric tons of copper in one form or another, which quantity will meet the military requirements for upward of 10 years. Shall we then estimate the German use of copper in warfare at 200,000 tons per annum and that of the Allies at as much more, or a total of 400,000 tons—40% of the world's production in 1913? Probably no printed statement of this kind would be allowed in Germany if it were not correct, for certainly there would be no object in exaggerating the rate of consumption, although there might be with respect to the supply.

As to the latter, the reports do not read so comfortably as the bald statement of the huge quantity that is available. A registry of all the copper in the Empire has been made, and nobody is permitted to sell any copper article without permission of the authorities. For copper goods that were voluntarily deposited before Sept. 25 a price of 43.3c. per lb. is being paid. That figure, together with news coming privately, indicates that copper in Germany is becoming very scarce.

✽

Several months ago the *Journal* intimated that zinc ore might be imported into the United States from Sardinia. A cargo is now on the way to Baltimore, whence probably it will go to Langeloth, Penn., for smelting. This will be the first time that Sardinian calamine has crossed the Atlantic Ocean. At the outbreak of the war the Sardinian zinc-ore producers suffered severely, being cut off from their usual market with Belgian smelters. Now, however, they are operating profitably again, selling their ore to England and France.

✽

The United States Bureau of Mines has published a technical paper on "The Buying and Selling of Ores and Metallurgical Products," by Charles H. Fulton. Professor Fulton is an experienced metallurgist and is well qualified to write authoritatively upon this subject. His contribution is one of the best and most useful things that the Bureau of Mines has published and will be helpful in spreading knowledge respecting the conditions of buying and selling ores, especially such ores as go to the silver-lead and copper smelters.

## BY THE WAY

The dumps of the old copper mine about four miles from Bristol, Conn., are attracting the attention of some local men, who hope to get some copper out of them by modern methods. This mine, which was first opened in 1836, is said to have a shaft over 400 ft. deep. Connecticut does not rank as a mining state, and it will be a surprise to most people that there is a mining shaft 400 ft. deep within its boundaries.

✻

Patriek Clark, the well-known mining man who died recently in Butte, left an estate of about half a million dollars, consisting largely of loans on real estate. Stocks in different mining concerns of unknown value are listed, and among stock of apparent worth are listed the following: Butte-Bullwhacker Copper Co., 128,450 shares; Standard Silver Lead Co., 15,739 shares; Amy Silver-smith, 15,214 shares; balance on "Gotem-now" option, \$8961; one-quarter interest in Stack Supply Co., estimated at \$2500.

✻

In discussing the recent disclosures respecting alleged German activities in the United States, one of the New York dailies said: "For instance, a man who was connected with the German financial policy in the United States is responsible for the assertion that a shipload of 10,000 tons of copper had been sent straight to Germany, under cover of a manifest on Copenhagen." The American copper producers would like to know how this was managed. Any or all of them would like to sell some copper to Germany.

✻

Australian miners are digging for gold in the trenches on Gallipoli Peninsula, says a dispatch to the *Chicago News*. They were surprised at the similarity of the Gallipoli ground to the Australian gold fields, and their sharp eyes soon discovered traces of the yellow metal. In their spare time the miners built rude placer outfits on the seashore and began washing for gold. They found it, and now the Australian troops with mining experience are passing every minute when not fighting the Turks in washing clay, which is brought to the shore from half a mile inland. One soldier thus made \$5 in four hours.

✻

According to a newspaper item, when nitroglycerin was invented extraordinary precautions had to be taken to prevent accidents, but notwithstanding this so many disasters occurred that there seemed to be strong probabilities that its manufacture and use would have to be prohibited. One day when Nobel, the chemist, was at work on the problem he cut his finger, and to stop bleeding painted some collodion (a liquid preparation akin to guncotton) over the cut. Having done this he poured some of the collodion, by way of an experiment, into a vessel containing nitroglycerin, when he noticed that the two substances mixed and formed a jelly-like mass. He at once set to work to investigate this substance, and the outcome was blasting gelatin, a mixture containing 90% of nitroglycerin and 10% of soluble guncotton.

The metal markets as reported in Wall St. are often about as follows:

Boston—Electrolytic copper has been selling during the week at 18c. per lb., although not in large quantities. Smaller producers have adopted the same tactics that were in evidence up to a fortnight ago and have offered the metal down to and made sales at 17½c.

There has been no difficulty in making sales of lead at 4.90c. per lb., according to the larger producers, in spite of concessions offered by smaller interests and dealers.

Why anybody should pay dearly for what he can buy cheaply deponent saith not. But here is another report:

New York—One of the leading copper producers is still making sales of electrolytic at 18c., despite the fact that quotations in the outside market rule a half-cent or more below this figure. This is taken as confirming the view that dealers have little copper to offer, and that consumers will look to larger concerns for any considerable amount of metal. Offerings at lower level are being made, it is asserted, not so much for purpose of selling copper, as to depress price in order that dealers may buy.

The logic seems to be a little wobbly.

✻

"My kingdom for a horse!" said a king one day in a moment of excitement—but mules are worth real money. About three millions per mule is the value figured by Virginia City's "Oldest Inhabitant." The earliest official record of the boom days on the Comstock Lode is found in a dog's-eared memorandum book in the courthouse at Virginia City, Nev., according to Charles E. Van Loan in the *Saturday Evening Post* of July 31, 1915. In this book appears the formal notice of a transfer of one-third of the famous Ophir mine, the consideration being two mules and the labor necessary to construct two arrastres. One traces the hand of Henry Comstock in this trifling avoidance of labor, but the price paid by the original locators for mules will probably stand for all time a world's record. "You don't need to figure the arrastres at all," says the Oldest Inhabitant, interviewed by Mr. Van Loan. "They were just thrown in with the mules, like. And those mules now; maybe they weren't even good ones, but do you know what they cost? The Ophir was the first of the bonanzas, and before they got through with her they took out twenty millions. Roughly speaking, that's three millions a mule. Oh, well, none of the old boys got much of anything out of the camp. It was the men who came along afterward and put in the machinery." This remarkable transaction foreshadows the fate of the original locators on the lode. Their luck began and ended with the tapping of the vein. "There was McLaughlin now," says the Oldest Inhabitant. "He sold out for less than four thousand and had quite a time while the money lasted. The last I heard of him he was cooking for a mine crew. Comstock got ten thousand for his interest and went over to Carson and bought a store, but he trusted everybody and didn't keep any books. They broke him in a couple of years and he went to prospecting again. He shot himself up in Montana somewhere. O'Riley had a little better luck—for a while. He hung on longer than the others, and when he sold out he started a hotel here. He would have made money if he hadn't got to gambling in mining stocks. He walked out of town one day, flat broke, telling everybody that he was going to make a bigger strike than the Comstock ever dared to be. He stuck to that idea until they put him in an asylum over in California. Yes, the old-timers didn't get the millions. They found 'em, that was all."

## PERSONALS

Wilber Judson is at Dolores, Chihuahua, Mex.

John Gross recently returned from Mexico and has opened an office as mining and metallurgical engineer at 523 McPhee Building, Denver, Colorado.

Charles M. Coats, formerly of Taylor, Tex., is now at Collinsville, Okla., where he is employed as a chemist for the Bartlesville Zinc Co.

Frank Bauer announces his retirement from active service on Sept. 1, after many years of continuous service as manager of the Columbia Gold Mining Co. at Sumpter, Oregon.

Robert A. McKean, formerly superintendent of the Keystone works of the Jones & Laughlin Steel Co., Pittsburgh, has been appointed structural engineer to succeed William C. Coffin.

W. McC. Cameron, who has been employed for several years past as consulting engineer to A. Goerz & Co., Ltd., in South Africa, and to several of the Witwatersrand mines, is leaving that country and returning to America early next year.

Dr. J. A. Udden, geologist of the Bureau of Economic Geology in the University of Texas, has been appointed acting director of the bureau, the former director, Dr. Wm. B. Phillips, having resigned to become president of the Colorado School of Mines.

W. R. Farquhar, for many years associated with the United Metals Selling Co., and Russell A. Cowles, vice-president of the Ansonia Copper & Brass Co., have resigned their respective positions to ally themselves with the Metals Trading Corporation, a new concern that is doing an export business.

R. D. Fetherstonhaugh, of Vancouver, B. C., has returned from a visit of several months to the mining districts of the Peace River country in the interests of the Hinterland Resource Co., an Edmonton enterprise, which has taken up several claims on Peace River. He is satisfied as to the occurrence of free milling gold in large quantities.

George T. Holloway, of London, chairman of the Ontario Nickel Commission, has arrived in Toronto, having before leaving England been engaged in collecting data as to the nickel market. He states that one of the first steps of the Commission will be an examination of the Sudbury nickel industry which will be followed by an inspection of the New Jersey refining plants.

R. P. McLaughlin, the California state oil and gas supervisor, has appointed the following deputies: M. J. Kirwan in Fresno and King counties and part of Kern county, stationed at Coalinga; E. B. Latham in Kern, Santa Barbara, and Ventura counties, head-quarters at Santa Barbara; R. B. Moran in Orange, Los Angeles, and Ventura counties, with Los Angeles as lead office; and Chester Naramore in charge of work in Kern and Ventura counties.

Herbert M. Wilson, director of the Department of Inspection and Safety of the Associated Insurance Companies, formerly of the Bureau of Mines, will be in San Francisco, Sept. 16 to 25, participating in the various engineering congresses. He will be actively concerned in the first aid and mine rescue demonstrations and contests of the Board of Managers, of which he is chairman. He is also scheduled to read papers on mine safety and on workmen's compensation before the mining sections of the International Engineering Congress, The American Mining Congress, and the World's Insurance Congress.

## OBITUARY

A. H. Borman died in New York Aug. 20. He was largely interested in Idaho mining property and for a number of years owned the Jay Gould mine, near Bullion.

William Moorehead died Aug. 13 at Angels Camp, Calif. He was in early days foreman of the Sierra Nevada mine at Virginia City, Nev. Later he was manager of the International Hotel at Virginia City during the bonanza days at that camp.

M. D. Howell died at San Francisco, Aug. 16. Mr. Howell went to California from New Jersey by the way of Cape Horn, arriving at San Francisco Oct. 27, 1849. He was one of the original owners of the Plumas-Eureka gold mine, which was

one of the richest ever developed in the state. He was 85 years old.

Benjamin F. Hall died Aug. 25 in Denver, Colo. He was well known among Colorado mining men and had lived in Denver for ten years. He was interested in mining in the Breckenridge and Idaho Springs fields and was commonly understood to be wealthy. He was one of the men primarily responsible for the development of the Breckenridge placer mines, although for the last few years he had not been connected with any of the companies operating there.

## SOCIETIES

**Iron & Steel Institute**—The Autumn meeting will be held in the rooms of the Institution of Civil Engineers in London, England, Sept. 23 and 24. The following is the list of papers that are expected to be submitted for reading and discussion:

1. Wesley Austin: "Influence of oxygen on some properties of pure iron."
2. T. H. Byrom: "Note on the carburization of iron at low temperatures in blast furnace gases."
3. Professor E. D. Campbell: "Influence of heat-treatment on the specific resistance and chemical constitution of carbon steels."
4. Professor C. A. Edwards, and H. Kikkawa: "Effect of chromium and tungsten upon the hardening and tempering of high-speed tool-steel."
5. W. H. Hatfield: "Phosphorus in iron and steel."
6. Professor K. Honda and H. Takagi: "The magnetic transformation of cementite."
7. R. H. Smith: "Sulphur in malleable cast iron."
8. Professor N. Tschioschewski: "Iron and nitrogen."

**Institute of Metals**—The following is a list of the papers that are to be submitted at the meeting of the institute in London, Sept. 17: 1, "The Corrosion of Gun-Metal," by Dr. C. H. Desch; 2, "Metallic Crystal Twinning by Direct Mechanical Strain," by Prof. C. A. Edwards; 3, "Notes on the Copper-Rich Kalchoids," by Professors Brinton and S. L. Hoyt; 4, "The Constitution of Brasses Containing Small Percentages of Tin—A Contribution to the Study of the Ternary System, Copper-Zinc-Tin," by Dr. O. F. Hudson and E. M. Jones; 5, (a) "Structural Changes in Industrial Brasses," (b) "Hardness of Copper-Zinc Alloys," by Dr. D. Meneghini; 6, "Specifications for Alloys for High Speed Superheat Steam Turbine Blading," by W. B. Parker; 7, "The Physical Properties of Metals as Functions of Each Other," by H. H. Stuart; 8, "Detection of Internal Blow-Holes in Metal Castings by Means of X-Rays," by C. H. Tonamy; 9, "A Thermostat for Moderate and High Temperatures," by J. L. Haughton and D. Hanson.

## INDUSTRIAL NEWS

The Canadian Brakeshoe Co., Ltd., of Sherbrooke, Quebec, Canada, has just placed an order for the installation of a Snyder electric furnace to melt steel for the manufacture of 4-in. rounds to be forged into shells for the British Government.

V. A. Stout, Balboa Building, San Francisco, has recently been appointed representative of the Traylor Engineering and Manufacturing Co. for the Pacific Coast States, working under the direction of the western manager, John A. Traylor, of Salt Lake City, Utah.

The Braun laboratory appliances, consisting of crushers, pulverizers, samplers, furnaces, burners and other equipment which are used in all parts of the mining and industrial world, have been awarded a gold medal at the Panama-Pacific International Exposition at San Francisco.

The Mine & Smelter Supply Co. has recently received at its New York office, 42 Broadway, an order from the New Jersey Zinc Co. for 68 Wilfley No. 6 tables; 20 of these tables will be installed at Ogdensburg and 48 at Franklin Furnace, N. J. Supplementing a preliminary order, the Mine & Smelter Supply Co. has shipped to Japan 15 Wilfley No. 10 tables, with special riffing. It has also recently received an order from the Beatson Copper Co. of La Touche Island, Alaska, for one No. 86 Marcy ball mill, 8 ft. in diameter by 6 ft. long. A trial order has also been received for a No. 86 Marcy mill for the Braden Copper Co., Sewell, Chile. The Mine & Smelter Supply Co. has recently shipped to Aguacate Mines, San Mateo, Costa Rica, a 2-stage vertical sinking pump with motor, capacity 350 gal. per min, against 200-ft. head.

## Editorial Correspondence

### SAN FRANCISCO—Sept. 1

**The United States Made the First Payment** of \$500,000 on the purchase of the Alaska Northern R.R. on Aug. 26. The purchase price was \$1,150,000. This action followed the dismissal of the suits brought in Washington and in Alaska, under which the proceedings for purchase had been delayed for the past two months.

**Convention of Mining-Stock Brokers**—The chief object which it is expected will be attained through the first national convention of mining-stock brokers in San Francisco, Sept. 21 and 22, will be the formation of an organization which will provide more adequate protection for the public investing in mining stocks and give a wider market for mining and metal stocks of merit. The latter purpose will be reached through the establishment of a common list of mining stocks to be called and traded in all exchanges which deal in mining stocks.

**The Sale of the Zeila Mine** in Amador County to the Kennedy Mining & Milling Co. has been confirmed by the filing of the deed for record, on Aug. 26, indicating a purchase price of \$35,000. The property consists of three mining claims and a mill site situated on what is known as the East belt of the Mother Lode. At this point the distinction between these two divisions of the Mother Lode region is not clearly marked geographically nor topographically. But the geological line of demarcation is plain and the geologists consider the Zeila on a separate vein series from the Mother Lode proper. The Kennedy mine is situated at about the center line of the Mother Lode, about one-half mile west of the center line of the Zeila. The Zeila is situated about 1½ miles south of the Kennedy. The old hoist is of no value for underground operation and would be useful only for the drawing of water from the mine. The Zeila is completely worked out down to the 450-ft. level and while new orebodies have been disclosed and sampled below the old workings it would be necessary to sink a new shaft and install new equipment in order to operate from the Zeila surface. The grade of the new ore so far has not exceeded an average of \$4 per ton. The property is now in the hands of men who are not likely to make any mistakes in operation and who are so situated as to be able to mine and mill the ore economically and at a profit. The purchase by the Kennedy will mean much for the advancement of the town of Jackson, where the mine is situated and will strengthen the reputation of the Mother Lode mines and influence other probable investors in the region.

### DENVER—Sept. 1

**Mining, Metallurgical and Geological** exhibits will be prominent at the International Farm Congress and Soil Products Exposition to be held in Denver's auditorium two weeks in September and October. The geological surveys of Wyoming and Colorado will have collections of minerals; the U. S. Bureau of Mines will demonstrate safety and first-aid methods and will explain its accomplishments in the metallurgy of radium; the Colorado School of Mines will operate a flotation unit and an assay office; machinery houses will display their latest contrivances; while various mining counties will be represented by collections of representative ores.

**Local Freight Rates on Ores** between points within the Cripple Creek district are unjust. Judge E. A. Colburn, owner of the Ajax mine and mill at Victor, has won his contention before the state public-utilities commission. Freight on ore valued at \$20 or more between local points—i. e., practically switching—has been the same as from points in the district to Colorado City, the cyanidation center. The newly announced rates are 25c. less per ton on local than on outside shipments and this will favor the selling of custom ores to the district's mills such as the Ajax mill. With this point gained, Colburn will remodel his plant for handling custom in addition to his own ores.

**The Mary Murphy Mine** at Romley, Colo., reentered the list of dividend payers last October when, after a lapse of many years, it furnished funds for the distribution of 5c. per share among stockholders. In July, 1915, the profits had been such that a dividend of 7c. was again warranted. Under the management of George E. Collins, of Denver, this mine

of low-grade, complex ore is upon a profitable basis. The production for 1914 was \$397,000. This rate was largely increased during the first half of 1915 when the following sales of mine products were made: Crude ore to smelteries, \$47,032; zinc concentrate, \$135,637; lead concentrate, \$83,807; iron-copper concentrate, \$19,674; total, \$286,150. The profit for this period was approximately \$130,000.

### BUTTE, MONT.—Sept. 2

**A Union Organizer in Butte** is trying to induce miners holding cards in the United Mine Workers of America to join the Western Federation of Miners. This organizer was sent to Butte by the United Mine Workers executive board which has recognized the federation local in Butte as the union affiliated with the American Federation of Labor. The results of the organizer's efforts in bringing about a revival of unionism among Butte miners are not known. It is doubtful, however, whether in the face of past experience any Butte miner now at work will ever join a union again.

**The Payrolls of the Butte District** at present are the largest in the history of the companies. The Anaconda company alone is employing approximately 10,000 men, in addition to the several thousand employed in Anaconda and Great Falls. The wage scale for miners continues at an average of \$4 per day, the monthly disbursement of the Anaconda company in Butte alone being very close to \$1,000,000 for labor. The Butte & Superior employs about 1,200 men, the East Butte 600, the Elm Orlu 250, and other smaller operating companies an additional 500. The daily wage paid to miners in Butte is therefore between \$46,000 and \$50,000. All of the old companies are operating now practically at capacity, though the total copper production is not yet so high as it was a few years ago.

**Unwatering the Lexington and Nettle Mines** is being pushed by the Anaconda company but it will still be some weeks before all the water is out and the underground workings put in condition for development work. As soon as the Alice properties have been resold on Sept. 10, under the decree of the courts, the Anaconda company, which will no doubt be the successful bidder at the sale, will take up the work of unwatering and developing that property again. At the approaching sale the Anaconda company will be required to pay cash, the previous consideration paid having been in Anaconda stock. The new work in improvements at the Washoe and Great Falls smelteries, on which several million dollars will be spent, is being rushed, and President John D. Ryan, who just completed an inspection of all the properties in the state, expressed himself well satisfied with the progress and the results already achieved by some of the new features in the plants.

### SALT LAKE CITY—Sept. 2

**A Topographic Survey** of a portion of the Oquirrh range is being made by the U. S. Geological Survey. This will include the camps of Stockton, Ophir, and as far as Mercur. Geologic work is to be done later, and has been assigned to B. S. Butler, who worked out the geology and ore deposits of the San Francisco and adjacent districts in Beaver County, published in Professional Paper No. 80.

**The Flotation Section of the Utah Apex Mill** at Bingham is operating and making a good saving. Magma machines, obtained from the Utah Copper Co., are used. These are 12-compartment machines of which the last four are cleaners. By running the machines in series it has been possible to dispense with the last four sections. The tailings run 0.2 to 0.3% lead. Flotation costs are about 15c. a ton. During July the mine produced 5738 tons of shipping ore and 9270 tons of milling ore. From the latter 2375 tons of concentrates were obtained. The operating profit was \$17,620 for the month.

### SEATTLE, WASH.—Sept. 1

**Four Ships Unloading Copper Ore from Alaska** at one time was a spectacle offered at the ore bunkers of the Tacoma smeltery of the American Smelters Securities Co. recently. The four ships had 7100 tons of copper ore from the Ellamar, Latouche and Kennecott mines. So heavy are the shipments of copper from the North that announcements have been made that the plans have been approved and considerable of the equipment has been ordered for the doubling of the capacity of the smelting and refining plant.



**Broad Pass May Be a Grave Disappointment**, according to Stephen Birch, president of the Kennecott Copper Corporation, who is credited with the following statement in an interview by local reporters on his return from Alaska recently: "We had an expedition in the Broad Pass region all winter and the properties we had under option failed to stand up under investigation. The members of the expedition did not find enough shipping ore to load a packhorse. There may be some tonnage in that country, but the members of our expedition failed to discover it." This statement coming from the head of the Guggenheim syndicate in the North is regarded as counteracting the effect of the original story published about the time of Mr. Birch's return from Alaska last season. Whatever the reason for the latest announcement, Alaskans generally are inclined to take it with a grain of salt. Nevertheless it has caused considerable speculation and some uneasiness in the cities of the Alaskan coast that expect to profit by development of the district.

#### WALLACE, IDAHO—Sept. 1

**The First "First-Aid" Contest in the Coeur d'Alenes** will be held at Wallace, Sept. 12, under the direction of Supt. J. L. Boardman of Mine Safety Car No. 5 of the U. S. Bureau of Mines. The committee in charge of the contest consists of J. H. McCarthy, E. P. Smith, W. E. Greenough, Charles McKinnis, P. J. Gearon, J. L. Boardman, and Stanly A. Easton. It is expected that at least 15 teams will be entered.

**Antimony Properties in the Coeur d'Alenes** are active. A boiler and hoist have been purchased by the Coeur d'Alene Antimony Co. for unwatering the 170-ft. inclined shaft of the old antimony mine on lower Pine Creek. Ore averaging 40 to 70% antimony has been shipped in past. Brown & Finnel are pushing development work on their antimony prospect, which lies southwest of Sunrise. The crosscut is in 80 ft. and has 50 ft. to go to reach the vein, which shows a foot of high-grade stibnite near the surface. Charles Pederson has a promising antimony prospect in Ross Gulch, on the west fork of Pine Creek; ore of good grade is exposed for 200 ft. at surface and driving is under way to cut the vein at greater depth. Recent test shipment of two tons to Salt Lake gave returns of 60% antimony.

#### GOLCONDA, NEV.—Sept. 1

**In the Divide District** there are now 100 or more men. Between Humboldt and Owyhee Rivers, nine miles west of Tuscarora, a discovery of silver ore was made a year ago in prominent croppings that looked so barren no one had before thought to break them. Several groups of lessees are at work, but almost everyone is awaiting the driving of the crosscut tunnel of Storey & Campbell, which is expected to cut the vein at a depth of 100 ft. Strikes have also been made two to three miles farther west, one having been reported as showing more gold and much less silver than in the Divide ores proper. So far the Divide vein has been opened in places to a width of 14 to 15 ft. The miners at Golconda and Midas who have been to the "new strike" talk conservatively about it, but concede that if Storey & Campbell cut the vein and it shows as well as in other places, prospects will be considerably enhanced.

#### MAGDALENA, N. M.—Sept. 2

**Mining is Active in Socorro County.** At Magdalena the older mines are running full force, and there is considerable activity among new properties. A test shipment of mine-run ore was recently made to the El Paso Smelting Works by the Hop Cañon Mining & Smelting Co., with smelter returns of 12.9 oz. silver and 7.02% copper. The company is completing a 1,509-ft. tunnel, and expects to make regular shipments soon. The Wheel of Fortune mine, adjoining on the south, has lately developed a 5-ft. vein of high-grade copper ore. The Black Cloud mine, recently purchased by Wolf & Moore, is shipping 120 tons of zinc sulphide weekly; new hoist and other machinery is being installed. The Calumet-New Mexico Mining Co. and others are pushing developments with a view of early shipments of copper-silver ores.

#### IOLA, KAN.—Aug. 30

**The Zinc-Smelting Business in Kansas and Oklahoma** is extraordinarily active. A great deal of common spelter is being redistilled, especially at Caney, Kan., and at some of the works in Oklahoma. Other smelters will probably go in for this also. There is much talk about the proposed plant of the U. S. Steel Corporation at Gary, Ind., which is still "in the air," but the belief is that it will be built sooner or later. Manufacturers of smelting machinery are receiving many inquiries for equipment from England. The ore supply of the Kansas and Oklahoma smelters is bountiful, and ore is being offered from Spain, Australia and Alaska. The chances are that the price for natural gas will be raised

this winter. However, the smelters who are using fuel oil have long contracts for it at low prices. This fuel does finely for firing roasting furnaces and boilers, but is not so good nor so cheap as gas when all things are taken into consideration. All of the smelters in this region have added to their capacity and building is going on constantly.

#### HOUGHTON, MICH.—Sept. 4

**Actual Tonnages of Refined Copper** from the mines of the Lake Superior district have been generally overestimated so far this year. It is extremely doubtful if this copper district will produce 300,000,000 lb. of copper during 1915, although there is no doubt at all that the rock tonnages handled in the mills of this district will be higher than ever before. With the exception of one stamp mill, the Trimountain mill of the Copper Range Consolidated, every other stamp head in the district is operating to capacity, some of them working three shifts a day and some working on Sundays. The estimates of refined copper output have been ranging from 20,000,000 to 26,000,000 lb. each month. The Calumet & Hecla figures, in particular have been generally overestimated. Some estimates for August for instance run over 7,000,000 lb. As a matter of fact the Calumet & Hecla has not as yet produced 6,500,000 lb. of refined copper during any month this year and the average has been nearer to 6,000,000 than 7,000,000. There is but one way to increase greatly the output and that is to increase the rock tonnage from the conglomerate lode which is running about 30 lb. to the ton. From a mining standpoint that is impracticable. So the increase in the Calumet & Hecla rock tonnage has been coming from the amygdaloid mine and that is not averaging much over 15 lb. to the ton. At the present price of the metal this low grade rock can be mined and milled at a handsome profit. It is doubtful if the mines will show great increase in the percentage of copper return from the rock tonnage mined this year. A noted exception to this is the Copper Range Consolidated; at all three of its mines, the Champion in particular, the grade of rock is higher than at any time in their history. The picking system, in vogue at these mines, is working out satisfactorily, as is the sand-filling system. Champion rock frequently goes over 50 lb. to the ton and 30 lb. is not an unfair average for the Baltic and Trimountain mines. Of the two Stanton mines, the Mohawk is breaking its copper-output record and is raising the percentage of copper in the rock. Practically all the other mines of the district are willing to take a lower grade of rock which they formerly discarded and are now sending it to the mill and making a profit on it at present unusual metal prices.

#### CHISHOLM, MINN.—Sept. 3

**Conditions in the Chisholm District**—The Glen stockpile, an accumulation of four years' standing, has all been shipped. The Duluth, Missabe & Northern Ry. has completed trackage into the Oliver property now opening in Sec. 27, connecting with the line to the Monroe mine. The Duncan has completed its allotment, and will stockpile for remainder of the season, although underground operations will proceed as heretofore. The Leonard-Burt has been working a double shift on one shovel loading ore, and on one shovel loading rock and lean material, the latter being transported to the Sec. 27 property for a stockpile bottom. No shipments made thus far from the Myers or Clark stockpiles and only a nominal tonnage from the Chisholm stockpile, although all ore hoisted from these properties is being shipped.

#### BRAINERD, MINN.—Sept. 4

**Stripping on the Cuyuna Range**, according to mine inspector's figures for the year ended June 30, 1915, was as follows: Thompson, 60,000 cu.yd.; Armour No. 1, 610,960; Rowe, 2,000,000; Pennington, 115,832; Hill Crest, 161,000; Mahnomen, 49,558; total, 2,997,350 cu.yd. The average number of men employed on the range were: Underground, 540; surface, 344; stripping, 287.

#### TORONTO—Sept. 4

**Another Gold Discovery**, near Kowkash, has added to the excitement over the rich strike of gold in Munro Township. Kowkash is about 300 miles west of Cochrane on the Transcontinental Railway. A number of rich samples have been brought to Cochrane resulting in an old-time gold rush. A west-bound train on Sept. 2 carried 200 prospectors, and since then a number of miners have left Toronto for the new field. The first find was made Aug. 21 by E. W. King Dodds who staked three claims. The discovery was made close to the Kowawkagashama, or Kowkash, River about 20 miles from Kowkash station. The county rock is diabase with basalt dikes occurring as intrusives and a broad belt of porphyry parallels the vein system the samples from which are wonderfully rich.

# The Mining News

## ALASKA

**GRANITE (Port Wells)**—July cleanup at this new quartz mine was \$25,000, the largest since starting about a year ago. W. R. Millard is superintendent.

**ELLAMAR (Ellamar)**—This copper-gold property working full time and shipping on nearly every boat. L. L. Middlecamp is superintendent.

**INDEPENDENT (Willow Creek)**—Working 20 men. Four stamps and two concentrating tables are running, and the tailings are impounded for cyaniding later. L. S. Robe, manager.

**ALASKA GOLD BULLION (Willow Creek)**—Manager Donald Harris has 60 men working in the mine and 7-stamp mill and small cyanide plant. Plant will be increased next season.

**TAKU-ALASKA GOLD MINING CO. (Juneau)**—Charles Goldstein, F. B. Hyder, J. T. Welch and A. D. Nash have formed company to develop the Taku claims. F. B. Hyder is geologist for the Alaska Gold Mines Co.

**FUNTER BAY MINE (Juneau)**—W. S. Pekovich is working this property, originally opened by William Hunter and the Uncle Sam claims near Icy Straits. Equipment consists of air compressor, drills and 10-stamp mill. Sinking started on new shaft.

**ALASKA FREE GOLD (Willow Creek)**—At this quartz property, beyond Knik in the Willow Creek district, 60 men are employed at the mine and a cyanide plant is in operation. Will install water-power plant for next year's run. W. H. Martin in charge.

**ALASKA GOLD BELT (Juneau)**—First unit of mill planned is to handle 8000 tons. First tunnel, 3000 ft. long to cut the upper part of the orebodies, is in about 1000 ft. and a lower tunnel 9000 ft. long at sealevel will be started later. Company expects to install 1400-hp. hydro-electric plant. A. B. Dodd, in charge.

## ARIZONA

### Mohave County

**ORION (Oatman)**—The shaft has been unwatered and active operations begun in the mine.

**UNION BASIN (Mineral)**—This company, owning the Goldonda mine, has entered the dividend-paying class.

**CROWN CITY (Oatman)**—The Tom Reed company recently purchased the controlling interest in this property.

**CARTER (Oatman)**—On the 150-ft. level a shoot of ore has been opened just east of the shaft. Drifting continues on the 250-ft. level.

**JEROME-OATMAN (Oatman)**—Company recently installed a hoist, compressor, drill sharpener and other equipment. Shaft sinking in progress.

**GOLD REED (Oatman)**—On the 350-ft. level 3½ ft. of good ore was recently opened. Drifts are being driven east and west from the 375-ft. level.

**UNITED EASTERN (Oatman)**—Twenty tons of ore, derived from development on the 460-ft. and 565-ft. levels, are being shipped daily to the Gold Road mill. West drift on the 565-ft. level carries highest-grade ore yet encountered in the mine.

### Pima County

**LAS GUIGAS (Tucson)**—Regular shipments of tungsten ores are being made and a large force is employed at the mine.

**GOLD BULLION (Tucson)**—A small concentrating plant has been installed to treat the molybdenum ores from the Last Chance shaft.

### Pinai County

**NEW KEYSTONE**—Stockholders at special meeting, by a vote of 277,884 shares out of 358,174 outstanding, voted to decrease capital stock from \$3,000,000 to \$39,797, new shares to have a par value of \$1. Property recently sold to Inspiration Consolidated Copper Co., which gave in exchange therefor 39,797 Inspiration shares. New Keystone shareholders will be offered one share of new stock for every nine shares now held. Suit recently brought by Carl H. Pforzheimer, to prevent the sale of the property, has been withdrawn.

### Yavapai County

**TREADWELL and BROOKSHIRE (Jerome)**—These holdings, comprising 77 claims, may be developed, deeds having been deposited in escrow in Prescott National Bank preparatory to exploratory campaign by a new corporation.

## CALIFORNIA

### Elderado County

**STILLWAGON (Placerville)**—Property, two miles south of Henry siding on Diamond Springs R.R., is to be reopened. Was worked in the early '60s having a production of \$250,000. Development to vertical depth of 400 ft. by tunnel 790 ft. long. Equipped with 5-stamp mill driven by water power, concentrator, electric plant, electric power for drills. George Willis is superintendent.

### Kern County

**ANTIMONY ORE** discovered on Indian Creek in Amalie district by Charles Hart, J. W. Wells and H. S. Phillips. Supplies have been taken in and development started.

**BLACK HAWK (Randsburg)**—Recent cleanup by D. A. Blue of 7½ tons of ore yielded \$2274. Property includes both placer and quartz ground in seven claims situated on east

side of Stringer district. This extraction occupied time of two men for 7 weeks. Several hundred dollars was recovered by hand mortaring. This sort of activity has been beginning of much development in this region which has resulted in making producing mines.

### Lassen County

**COPPER CROPPINGS** reported upon property owned by H. Day of Susanville. Ledge has been known for several years and assays of ore have shown high-grade copper and some silver and gold. Distance from railroad has probably caused investors to give it but little attention.

### Mendocino County

**WILD DEVIL (Redwood)**—This manganese property owned by J. A. Weldteufel has been leased to E. A. Wiltsee, of San Francisco and Fred Grotefend, of Redding. Development will begin immediately. Reported that lease requires extraction of a minimum of 10,000 tons of ore per annum and that the royalty is \$1.50 per ton. Term of lease 15 years.

### Nevada County

**HAWKE DREDGE (Nevada City)**—New dredge recently installed has been put in commission. Capacity estimated at 500 cu.yd. per day.

**SIGNAL (Grass Valley)**—Shaft has reached 100-ft. point and disclosed 14-ft. lode. Mine is situated on Slate Creek and owned by E. M. Taylor of San Francisco.

**YOU BET (Dutch Flat)**—Fong Tai, who recently leased this property from owners, is reported to have taken leases on adjoining properties. Indications are that drift mining will be conducted on large scale.

**EAGLE BIRD (Washington)**—Installing 10-stamp mill under supervision of C. J. Klinker. Additional 10 stamps contemplated. Mine has been unwatered and it is expected to have stamps dropping within 60 days.

**NORAMBAGUA (Grass Valley)**—Reported that company to be organized in Grass Valley has examined mine with purpose of taking purchase option. Mine is developed by 190-ft. tunnel and 400 ft. of winzes and 200 ft. drift.

### Pumas County

**DREDGE INSTALLATION** is contemplated at English Bar on middle Feather River above Nelson by J. W. Larson. This bar was in early days a good producer of placer gold.

**WALKER COPPER CO. (Portola)**—Reported that new concentrating plant will be installed with capacity of 100 tons. Flotation process will be used. Thirty men are employed.

### Shasta County

**BALAKLALA (Coram)**—Reported that 10-year contract has been made with Mammoth Copper Mining Co. for shipment of minimum 200 tons of ore per day to smeltery at Kennett.

**STOWELL (Kennett)**—Fire on morning of Aug. 19 destroyed change house, compressor building with compressor and motor, and blacksmith shop. Origin of fire unknown. Pumps, being operated by air, were stopped by fire, and mine is filling with water; pumps have been pulled.

**FRIDAY-LOWDEN (Kennett)**—Road to this mine from Mammoth company's head-house is nearing completion. Will be used for transportation of supplies and shipping-grade ore. Property purchased by Mammoth company eight months ago; force of men employed preparing for campaign of extensive development.

### Trinity County

**VALDOR (Junction City)**—Marysville Gold Dredging Co. has two Keystone drills prospecting this property of Valdor Gold Mining Co. on Trinity River. Expected to install a small dredge.

## COLORADO

### Boulder County

**WISCONSIN MINING & LEASING CO. (Sugar Loaf)**—Shaft is 246 ft. deep and company contemplates sinking another 100 ft.

**PRUSSIAN-SLIDE (Boulder)**—H. J. Sisty has secured control of this property and plans to drive the crosscut tunnel several hundred feet to cut the Slide vein. The Prussian mill is to be placed in operating condition and cyanide equipment will be added.

**BOULDER TUNGSTEN CO. (Boulder)**—Arrangements made for crosscut tunnel for drainage and transportation. Grading now for portal and necessary mine buildings. Tunnel will cut veins at depths ranging from 400 to 700 ft. Power plant and drilling equipment will be installed. Recent exploration in Forest Home property disclosed rich ore.

### Clear Creek County

**CONCRETE (Idaho Springs)**—Lease granted to Denver men. A drift will be driven on the vein west from the Newhouse tunnel. James T. Stewart in charge.

**EDGAR (Idaho Springs)**—Boston Mine Leasing Co. has been incorporated to operate this old property of the Big Five Mining Co. Following Boston, Mass., men are officers: William P. Brennan, president; Horace H. Bradley, secretary; Leonard Williams, treasurer.

**Gilpin County**

**BATES** (Black Hawk)—Leasing company has retimbered main shaft and resumed usual mining operations. A 22-ton lot of screenings assayed 0.88 oz. gold, 6.80 oz. silver. An 18-ton lot ran 1.72 oz. gold, 25 oz. silver and 2.22% copper.

**Teller County**

**PORTLAND** (Victor)—Altice lease, 200 level, is shipping 2-oz. gold ore regularly.

**CRESSON** (Cripple Creek)—Another rich pocket has been opened; this one is on the 1300 level or below that struck last winter; ore is of similar character.

**AJAX** (Victor)—Mackay lease, 400 level, continues to develop strong shoot of \$30 ore and is shipping regularly. Ore is 4 to 7 ft. thick and exposed 700 ft. along drift.

**ANNIE D.** (Cripple Creek)—This property, which is located near Ella W. on Tenderfoot Hill, where rich ore was recently found near surface, is now controlled by F. S. Cropper and J. A. Smith of Lead, S. D., who will commence active development work in near future.

**SPECIMEN** (Victor)—Chellon and associates, operating under lease on 200 level of this Bull Hill property, have opened vein of high-grade ore from 2 to 5 ft. wide, assaying several ounces gold a ton. Bateman-Kelly lease is carrying on development on 400 level and opening ore worth \$40 a ton.

**IDAHO****Elmore County**

**MONARCH** (Atlanta)—Running 5 Huntington mills two shifts on old dumps. Amalgamation followed by concentration, and roasting and cyaniding of concentrates.

**BOISE-ROCHESTER MINING CO.** (Atlanta)—This new company has acquired old Bagdad-Chase property, including Old Chunk and Webfoot claims and 40-stamp mill. Vein in Old Chunk opened for 400 ft. Operating 15 stamps two shifts until new Bleichert tram, capacity 100 tons in 10 hr., is installed. H. D. Richardson, superintendent.

**Shoshone County**

**GIANT LEDGE** (Murray)—This company has let contract for 215-ft. raise from lower to upper workings.

**SILVER CABLE** (Mullan)—Raise connecting upper and intermediate workings completed and company will commence ore shipments soon.

**HERCULES** (Wallace)—After a shutdown of several months on account of smelting difficulties, the mine has resumed work with a full crew of about 400 men.

**POLARIS** (Kellogg)—Company has given W. E. Mann, of Spokane, five-year lease on property for reported consideration of \$20,000. Consists of three patented claims adjoining Yankee Boy on Big Creek. Previous development work, consisting of shafts, drifts, and crosscuts, cost about \$35,000.

**REX CONSOLIDATED** (Wallace and 52 Broadway, New York)—This new company has bonded the Rex mine for \$200,000 if paid within five years and \$150,000 if paid within one year. Fire in August destroyed compressor house. The company lately acquired control of the Black Bear mine, comprising about 70 acres lying between the Frisco and Mace mines of the Federal company. In the lower tunnel, the vein is 5.7 ft. wide averaging 2.2 oz. silver, 7.76% lead and 16.57% zinc.

**YANKEE BOY** (Kellogg)—Four sets of lessees are working on Yankee Boy. Big Creek Leasing Co. sinking winze to determine course of vein and govern driving of new cross-cut to tap vein at depth of 600 ft. Promising strike made in winze is said to show 16 in. of ore from which have been obtained assays of 30% lead and 900 oz. silver. First ore found by lessees in March, 1914, after 800 ft. of work had been accomplished, and shipments during rest of that year totalled 353 tons, valued at \$38,000.

**MICHIGAN****Copper**

**COPPER RANGE** (Painesdale)—Capital to be increased to \$10,000,000, to absorb subsidiaries, thus making savings in federal corporate tax.

**CALUMET & HECLA** (Calumet)—All regrinders, including those handling sands from lake, again operating, after partial shutdown owing to damage to turbine.

**WHITE PINE** (Calumet)—This Calumet & Hecla subsidiary has No. 4 shaft down 930 ft. Will pay back to parent company preliminary outlay in product, this year.

**Iron**

**BALKAN** (Alpha)—The first shipment of ore consisted of 51 cars. This was taken out of the pit by the drag lines. More ore is to be loaded before navigation closes, while some will be stocked.

**IRON MOUNTAIN LAKE** (Ishpeming)—Boilers are being prepared and it is believed sinking of shaft will be resumed shortly. It is also quite likely that another shaft will have to be put down. Considerable ore was developed by drills. Work was stopped last fall when shaft filled with water, which pumps could not handle.

**NEWPORT** (Iron Mountain)—This company has taken options on Secs. 33 and 34 and one-half of Sec. 28 and will start exploring within 30 days. The lands are one mile north of Quinnesec and a short distance east of Iron Mountain. The field is considered promising. This company has no mines on the Menominee range at present. It has several large properties on the Gogebic.

**MINNESOTA****Cuyuna Range**

**CROFT** (Crosby)—Steel headframe being erected.

**ROWE** (Riverton)—Concentrator operating 24 hours daily. Two shovels also at work.

**CUYUNA-SULTANA** (Ironton)—Mining and stockpiling about two cars daily. Output will be treated in concentrator which will be completed about Sept. 1.

**BREITUNG** (Negaunee, Mich.)—Option has been secured on two forties on Cuyuna Range near Brainerd. Work has started on exploratory shaft. Captain George Jewell, of Negaunee, is in charge. Ore was found by drills but Breitung interests want further information before taking lease.

**Mesabi Range**

**HOLMAN** (Taconite)—One additional shovel started Aug. 20, making three shovels working day and one night.

**CALUMET** (Calumet)—This Hill Annex property fast being stripped. One shovel uncovered ore a few days ago. However, there is still a lot of overburden to be removed. Stripping contract was largest ever let on the Mesabi.

**TROUT LAKE** (Taconite)—Washing plant started to work night shifts in two units, Aug. 27, and expects to have five units working in a few days. The D. M. & N. Ry. is now running one ore train each hour from washing plant.

**GENOA** (Eveleth)—Two gasoline trammers installed here. Standard equipment removed from the pit, which is one of deepest on range. All ore will be mined by hand and trammed to surface for loading on cars. Orders have been received to ship as much ore as possible.

**FAYAL** (Eveleth)—Stripping operations were begun at south side of mine this week. About 90,000 tons of dirt and rock will have to be moved to get at 500,000 tons of ore lying underneath. One shovel is stripping. Several are loading ore from other end of pit. Fifty more men have been given work. The 1915 production will slightly exceed that of 1914, which was 1,500,000 tons.

**MISSOURI-KANSAS-OKLAHOMA**

**ANCHOR** (Miami, Okla.)—New concentrating plant being erected on the Buck land will be ready in about 30 days. Frank Stansbury, superintendent, Joplin, Mo.

**W. D. LYERLE** (Galena, Kan.)—Sludge mill nearly ready for operation on the Weymann land in the Short Creek bottoms. Will handle the sand from the creek bed. The sand will be brought in by means of a cableway.

**BERTHA A.** (Webb City, Mo.)—Will install two new sludge tables; have 12 already in operation. Another improvement is the installation of a 2250-cu.ft., direct-driven compressor, operated by a 350-hp. motor. This is the first direct-driven compressor of this size to be used in the district.

**MONTANA****Fallon County**

**NATURAL-GAS FLOW** was opened at Baker at a depth of about 1000 ft., Sept. 1. Much excitement prevails.

**Jefferson County**

**COMET MINES CO.**—This company has recently been organized, M. K. Rodgers, of Los Angeles, president, to lease the old Comet mine in the Basin district. Old mill has been repaired and tailings are being treated.

**Madison County**

**AMERICAN MINE** (Iron Rod District)—Five hundred dollars in gold taken from this mine by two men in six hours' time is record of Charles and Eugene Dahler who have extracted this amount from the American recently. Bar of gold was brought to Twin Bridges and weighed trifle less than 30 oz., or approximately \$500. After hauling 13 sacks of ore to mill it took two hours to run it through and an hour more to retort amalgam. Tailings will bring about \$100 more.

**Missoula County**

**INTERMOUNTAIN COPPER** (Iron Mountain)—Company is at present engaged in work preliminary to developing Amador mine near Iron Mountain, recently taken over from the Amador Gold & Copper Mining Co. Water was turned through new flume Aug. 1, providing electric power for pump which is now at work lowering water in mine. Is now below 400 level and is expected to be all out by Sept. 1. Frame for new concentrator is up and mill machinery is expected on ground within two weeks, 200-ton ore bins are finished and development work will commence within few days on levels, including and above 400. Two-mile flume provides water for mill and power plant. With completion of improvements property will be capable of producing in excess of 100 tons of ore per day.

**Silver Bow County**

**RAINBOW DEVELOPMENT** (Butte)—Unwatering of Rainbow shaft which was begun some days ago, proceeding rapidly; water now down to point below 1000 level, where Poser fault crosses shaft. Present depth of shaft is 1300 ft. and as soon as unwatering is finished, work of sinking to 1500 level will begin.

**ANACONDA COPPER** (Butte)—Mining operations have been resumed at Tropic mine of this company where force of men has been started taking out ore from upper levels. Tropic shaft is down 900 ft. Development work was in progress when war caused curtailment of production by 50% in company's mines as well as stopping development work in many of properties. Company has also resumed work of unwatering Nettle mine in western district of Butte camp, which was discontinued when war started. Large amount of work must be done over on account of water filling up some of the levels and part of shaft since. Pumping is still going on at company's Lexington mine and there are several hundred feet of water in shaft to be removed. Good progress is being made, however; mine will soon be in readiness for operating.

## NEVADA

## Humboldt County

ROCHESTER MINES (Rochester)—Has purchased Big Bore lease on Block 1 of Crown Point claim.

## Nye County

QUIGLEY REDUCTION CO. (Bonnie Clare)—This recently organized Los Angeles company has taken three-year lease on 20-stamp mill and properties of Bonnie Clare Mining & Milling Co.

LITIGATION HILL PROPERTIES (Manhattan)—Negotiations are under way toward a combination of three properties on Litigation Hill, the Manhattan Amalgamated, Earl and Litigation Hill Merger companies; the new company is also to control the mill of Manhattan Milling & Ore Co.

MANHATTAN DEXTER (Manhattan)—After several months idleness, leasers are now starting operations on both ends of the Union Nine claim. The large gloryhole covering the site of the Briggs-Evans lease shows considerable tonnage of medium-grade ore, and Mushett and Wittenberg have taken a lease on these blocks and are installing machinery to drive in from the south under the gloryhole and extract the ore at a minimum of cost. The 10-stamp mill and cyanide plant of the Manhattan Milling & Ore Co. will handle the ore from this lease.

## Storey County

UNION CONSOLIDATED (Virginia City)—Saved 10 cars ore averaging \$34.72 per ton. Union in southwest drift on 2500 level from Sierra Nevada incline saved 23 tons averaging \$10 per ton.

MEXICAN (Virginia City)—West crosscut on 2700 level and south drift No. 3 on 2500 level in porphyry and quartz of low assay value. Mill crushed 144 tons low-grade ore and shipped three bars of bullion to smeltery.

JACKET-CROWN POINT-BELCHER (Gold Hill)—In old Belcher ground, 99 ft. below 1500 station, water reached and being easily handled. Saved 56 cars mill ore from 1300 Belcher raise and 27 cars from 1300 Crown Point northeast crosscut.

## NEW MEXICO

## Bernalillo County

GOLD STAR MINING & MILLING CO. (Albuquerque)—Company has filed articles of incorporation. Joe Delfrate, Old Albuquerque, N. M., is agent.

## Dona Ana County

TORPEDO (Organ)—Claims and equipment in Organ Mountains has been purchased by J. I. McCulloch, L. M. Stiles and others of El Paso, Tex. Consideration said to be \$350,000. Property has been one of camp's best producers but has been in litigation for many years.

## UTAH

## Beaver County

UTAH LEASING (Newhouse)—This company is building a plant to treat the tailings from the Cactus mill of the South Utah Mines & Smelters. Flotation will be used and the capacity will be 500 tons. Kirk & Leavell have designed the plant and will use the Minerals Separation process. The tailings carry 13.5 to 14 lb. copper to the ton with some gold and silver. The Utah Leasing Co. formerly worked a cyanide plant at the Old Telegraph mine in Bingham. The tailings will be moved by hand at the beginning, and a drag line will probably be used later. A 10-year lease has been obtained and plant should be ready in 60 days.

## Juab County

TINTIC SHIPMENTS for the week ended Aug. 27 amounted to 142 cars.

KNIGHT-DERN MILL (Silver City)—About seventy men are employed on the concrete work, etc., now in progress.

CHIEF CONSOLIDATED (Eureka)—A portable compressor has been sent to the Scotia mine in West Tintic, and will be used in developing water near this property.

VICTORIA (Eureka)—Ore is being mined from the 1200 level, by the Eagle & Blue Bell which recently acquired control; four cars were shipped during the last week of August.

YANKEE CONSOLIDATED (Eureka)—Shaft on new strike down 40 ft. in good ore. Raising being done to reach ore bed from a tunnel 200 ft. lower; air line has been put in and drills are being used.

UTAH MINERALS CONCENTRATING (Eureka)—About 1000 tons of ore from the Chief Consolidated have been treated at this company's mill. Concentrates carrying 61% lead and 13 oz. silver were shipped week ended Aug. 27. Isbell vanners are used.

UTAH ORE SAMPLING (Silver City)—It has been necessary to work the mill here overtime, to take care of the increased tonnage from Tintic mines; 400 tons a day are being sampled and 10 to 12 cars of ore a week of Horn Silver ore, from Frisco, consigned to the United States smeltery at Midvale.

VICTOR CONSOLIDATED (Mammoth)—The hoisting plant was destroyed by fire Aug. 26. Fire started on 300 level where lessees are working, and burned shaft timbers, buildings, etc. Lessees escaped to surface through workings of the Carisa. Damage placed at about \$15,000. A. W. McCune, of Salt Lake, owns control.

## Salt Lake County

ALTA-GLADSTONE (Alta)—Molybdenite and wulfenite are being mined and sorted at this property, under lease to Fred Redmond. Vein is about a foot wide.

NEW UTAH BINGHAM (Bingham)—Company reports following assay for ore recently cut in drift from Giant Chief shaft: Copper 5.63%, lead 1.3, silver 32.4 oz., gold \$2.80.

CARDIFF (Salt Lake)—Production has been increased to 125 tons daily. Utah Power and Light Co.'s line has reached the mine. As soon as transformers are installed, electric power will be used.

SECRET MINING (Alta)—Work of driving main tunnel for quartzite limestone contact is in progress. Face is in quartzite and several hundred feet more work necessary. Two shifts being worked. Property adjoins South Hecla and Albion. Wm. H. Minor is president.

EMMA COPPER (Alta)—Stringers and streaks of ore are being followed in two places, and 50 tons have been accumulated for shipment. Chas. S. Herzig, mining engineer, has been elected director of this company, and is directing development work. Ground lies west of old Emma mine.

SOUTH HECLA (Alta)—The Griffith-Field lease on the Quincy tunnel level is opening up well, and will begin shipments at once. A lease has been taken by the Bamberger Exploration Co., on a block of ground west of the Griffith-Field lease. The South Hecla company is shipping 40 tons of ore a day from the 250 level.

## Summit County

PARK CITY SHIPMENTS for week ended Aug. 20, amounted to 3,364,140 lb. by 5 shippers; for the week ended Aug. 27, 3,562,320 lb.

SILVER KING COALITION (Park City)—New orebodies have been opened recently on and below the 1300 level, in the southwestern part of the property; also below the Alliance tunnel from the new shaft. In both places the percentage of sulphides are increasing. The machinery is being installed in the flotation section of the mill.

## Utah County

BAY STATE (American Fork)—This property has been inspected by J. H. Wootton and Salt Lake mining men. Further development is to be done.

MILLER HILL (American Fork)—Ore showing galena has been opened in the Rock tunnel by the Williams lease.

TEXAN (American Fork)—Arrangements have been made by Charles Tyng, T. W. Boyer and W. H. Child, to work this property which adjoins the old Miller Hill. The tunnel now in 840 ft. is being extended.

PACIFIC (American Fork)—Ore carrying galena has been encountered in the 1000-ft. lower tunnel, which was being driven to cut the vein. The tunnel had passed the point where the vein was expected, and a raise was put up reaching ore a short distance above tunnel. Five feet of milling ore with streaks and branches of galena have been opened. Connections will be made with upper workings for better ventilation. Strike thought to be important in proving ore extends to depth. Additional men will be worked. Ore of a gross value of \$25,000 has been shipped during a period of several years.

## Washington County

A DAILY STAGE LINE has been started between Modena and Goldstrike. Stage leaves Modena 7:30 a.m., and arrives Goldstrike 4 p.m. Fare is \$5 each way.

GOLDSTRIKE BONANZA (Modena)—New directors were elected at special meeting Aug. 24, as follows: G. E. Hale, I. Pett, A. E. Rykert, T. Marioneau and D. B. Shields.

## VIRGINIA

## Norfolk County

VIRGINIA SMELTING WORKS (West Norfolk)—Is reported to be contemplating construction of plant for manufacture of byproducts from smelting fumes.

## WISCONSIN

## Zinc-Lead District

THE WISCONSIN ZINC DISTRICT is making the largest output in its history under the stimulus of the very high prices now ruling, yet there is a larger tonnage of ore in the bins than before of medium to low-grade ores, which latter the buyers are not taking at present. This is causing the erection of several new separating plants that will take out the iron and raise a 25 to 45% concentrate up to 58 to 62% zinc.

## CANADA

## Ontario

GOLD REEF (Porcupine)—Leasers of this property are taking out good ore, which is treated in two-stamp mill realizing about \$500 per week.

PIKE LAKE (Porcupine)—Two shafts are being sunk and are down 40 and 25 ft. respectively. A large porphyry dike crossing one of the claims is being stripped.

UNITED STATES (Cobalt)—Property has been taken over on a six year lease by Genessee Mining Co. recently organized by Rochester capitalists. Shaft now about 60 ft. in depth will be put down to contact expected to be reached at depth of 400 ft.

GIOVINAZZO CLAIMS (Boston Creek)—These three claims are under option to Stewart Thorn and associates. Body of quartz 20 ft. wide by 30 ft. long has been stripped. Gives low assays of gold.

## MEXICO

## Sonora

CANANEA CONSOLIDATED (Cananea)—Copper production slightly exceeds 3,000,000 lb. monthly. Flotation is being introduced at this works.

## AUSTRALIA

## South Australia

AUSTRALIAN MANGANESE CO. (Broken Hill, N. S. W.)—This company has opened a high-grade manganese deposit at Pernatty Lake, in South Australia, about 74 mi. from Port Augusta. Property is 4½ mi. from the East-West Ry. and shipments have been made to Broken Hill Proprietary Co., Newcastle.

# The Market Report

## Metal Markets

### NEW YORK—Sept. 8

During the last week all of the principal metals were dull and uninteresting, and there was but little change in prices.

### Copper, Tin, Lead and Zinc

**Copper**—Owing to the holiday, which extended practically from Friday to Tuesday, there was relatively little attention paid to the copper market. There was neither any particular demand nor any pressure to sell. Copper for domestic delivery was freely offered at 17½@17¾c., regular terms, or about 17.20@17.30c., cash, New York, and some small transactions were reported around those figures. All of the principal producers, including those who are standing out for 18c., regular terms, for domestic deliveries, appear to be courting business abroad and quite willing to meet Australian and Japanese competition. Some considerable business was taken at 18½@86, several large sales at the latter figure being reported on Sept. 7 and 8. With the existing situation in sterling exchange, of course nobody can tell what these sales are going to net until settlements are finally made.

An improved sentiment among the principal sellers of copper may be discerned. Certain houses that heretofore have been rather bearish appear recently to have changed their opinion.

**Copper Sheets** are quoted about 23c. per lb. for hot rolled and 24c. for cold rolled, with usual extras. Wire prices are unsettled; quotations may be put at 19@19¼c. per lb. at mill. The chief maker does not quote base price.

**Imports of Copper** for the week ended Aug. 21 are reported by the Department of Commerce as follows: Metal, 3,559,405 lb.; in ore and matte, 485,880; total, 4,045,285 lb. Exports for the week were 9,566,132 lb., the larger items being 6,770,690 lb. to France and 1,413,524 lb. to England.

**Visible Stocks of Copper** in Europe on Aug. 31 are reported as follows: Great Britain, 24,389; France, 5,554; afloat from Chile, 2,650; afloat from Australia, 4,000; total, 36,593 long tons, or 81,968,320 lb.; an increase of 2,479 tons over the Aug. 15 report.

**Tin**—This market was without special feature. A fair business was done from day to day, but the aggregate volume was light.

**Visible Stocks of Tin** on Aug. 31, including tin afloat: London, 6,404; Holland, 26; United States excluding Pacific ports, 8,697; total, 15,127 long tons, a decrease of 954 tons during August.

**Lead**—A few good orders were taken at material concessions in price. The price of the A. S. and R. Co. remains 4.90c., New York, but about all of the independent producers have been selling at concessions of \$1.50@2 per ton, and lead is freely obtainable from them.

**Spelter**—The market has been steady, there having been neither any special buying demand nor selling pressure. Spelter for September delivery appears to be in fairly liberal supply, but there are not yet any signs of unsold stocks accumulating. September spelter is easily to be had at 14c., October at 13½c., and November-December at 13c. Sales of brass special were made at 15c.

**Zinc Sheets**—Business has been on a considerable scale. The base price for carload lots is unchanged at \$16 per 100 lb. f.o.b. Peru, Ill., less 8% discount.

### NEW CALEDONIA

Exports from New Caledonia for May and the five months ended May 31 are reported by the "Bulletin du Commerce" of Noumea as follows, in metric tons:

	May	Five Months
Nickel ore .....	2600	34,228
Chrome ore .....	.....	8,541
Nickel matte .....	500	609

The matte reported in May was all consigned to New York.

**Spanish Metal and Mineral Exports** five months ended May 30 are reported as follows, by "Revista Minera" in metric tons:

	Metals		Ores, etc.	
	1914	1915	1914	1915
Iron.....	6,915	57,514	3,218,872	1,787,947
Copper.....	8,660	6,072	62,941	21,152
Copper precipitate.....	4,757	4,355	.....	.....
Lead.....	68,406	60,424	1,260	294
Zinc.....	962	1,459	39,790	9,371
Quicksilver.....	827	699	.....	.....
Manganese.....	.....	.....	6,449	2,327
Pyrites.....	.....	.....	1,354,582	628,460
Salt.....	.....	.....	288,955	206,116

Imports of coal for the five months were 594,901 tons, a decrease of 538,220 tons from 1914; imports of coke, 80,573 tons, a decrease of 80,545 tons.

### DAILY PRICES OF METALS IN NEW YORK

Sept.	Sterling Exchange	Silver, Cts. per Oz.	Copper	Tin	Lead		Zinc
			Electrolytic, Cts. per Lb.	Spot, Cts. per Lb.	New York, Cts. per Lb.	St. Louis, Cts. per Lb.	St. Louis, Cts. per Lb.
2	4.5800	47½	@ 17½	33½	4.85	4.70	13.50
3	4.6500	48½	@ 17½	33½	@ 4.90	@ 4.75	@ 14.50
4	4.6700	48½	@ 17½	33½	4.85	4.70	13.25
6	.....	.....	@ 17½	33½	@ 4.90	@ 4.75	@ 14.25
7	4.6600	48½	@ 17½	33½	4.85	4.70	13.00
8	4.6225	48½	@ 17½	33½	@ 4.85	@ 4.70	@ 14.00

The quotations herein are our appraisal of the average markets for copper, lead, spelter and tin based on wholesale contracts for the ordinary deliveries of the trade as made by producers and agencies; and represent, to the best of our judgment, the prevailing values of the metals, 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 0.17c. apart.

The quotations for electrolytic copper are for cakes, ingots and wirebars. Electrolytic copper is commonly sold at prices including delivery to the consumers and is subject to discounts, etc. The price quoted for copper on "regular terms" is the gross price including freight to the buyer's works and is subject to a discount for cash. The difference between the price delivered and the New York cash equivalent is at present about 0.20c. on domestic business. The price of electrolytic cathodes is 0.05 to 0.10c. below that of electrolytic. Quotations for lead represent wholesale transactions in the open market for good ordinary brands. Quotations for spelter are for ordinary Prime Western brands. Only the St. Louis price is herein quoted, St. Louis being the basing market. We quote the New York price at 17c. per 100 lb. above the St. Louis price.

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, 17c.; St. Louis-Chicago, 6.3c.; St. Louis-Pittsburgh, 13.1c.

### LONDON

Sept.	Copper				Tin		Lead		Zinc		
	Silver	Standard		Electrolytic	Spot	3 Mos.	£ per Ton	Cts. per Lb.	£ per Ton	Cts. per Lb.	
		Spot	3 Mos.	£ per Ton							
2	23 1/8	68 1/2	69 1/2	84 1/2	17.44	153 1/2	155	22 1/2	4.63	72	15.71
3	23 1/8	67 1/2	68 1/2	84 1/2	17.44	154 1/2	155 1/2	23 1/8	4.78	72	15.94
4	23 1/2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
6	23 1/2	66	67 1/2	82 1/2	17.03	154	154	22 1/2	4.76	72	16.01
7	23 1/2	66 1/2	67 1/2	82 1/2	17.03	52 1/2	154	22 1/2	4.76	72	15.98
8	23 1/2	67 1/2	68 1/2	82 1/2	17.03	52 1/2	154	22 1/2	4.75	72	15.85

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 electrolytic, 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, reckoning exchange at 4.80. £ 15 = 3.21c.; £ 20 = 4.29c.; £ 30 = 6.43c.; £ 40 = 8.57c.; £ 60 = 12.85c. Variations, £ 1 = 0.21½c.

## NEW YORK—Sept. 8

**Aluminum**—Demand continues good. The stocks of foreign metal here have been drawn down pretty low, and prices are advancing. Quotations are 45@50c. per lb. for No. 1 ingots, New York.

Recent London quotations are £180@190 per long ton of No. 1 ingots—equal to 40.2c. per lb.—a price double that of a year ago.

London reports that, by a recent Government order, the exportation of aluminum salts from Norway has been prohibited.

**Antimony**—The market has been quiet, with only small transactions. Sales of ordinary brands have been made, mostly in small lots, at 28@29c. per lb.; while 44@46c. per lb. is asked for Cookson's.

**Nickel**—Quotations for ordinary forms are 45@50c. per lb., according to size and terms of order. A premium of 3c. per lb. is charged for electrolytic nickel.

A late London quotation is £225 per ton, equal to 48.8c. per lb., for metal 98% pure.

**Quicksilver**—The market has been rather quiet. New York quotations are \$89 per flask of 75 lb. for large lots and \$90 for smaller orders. San Francisco price is telegraphed at \$87.50@90, with market quiet. London price is lower at £17 per flask, with the same figure quoted from second hands.

**Minor Metals**—Current sales of **Bismuth** are at \$2.75@3 per lb., New York.—**Cadmium** is quoted at 6s., or \$1.44 per lb. in London; \$1.25 per lb. New York.—**Tellurium** is quoted at 80s., or \$19.20 per lb. in London.—**Selenium** is quoted at \$2@3 per lb. New York for larger quantities; \$4.50 @ 5 for retail lots.

## Gold, Silver and Platinum

## NEW YORK—Sept. 8

**Gold and Silver Movement** in the United States seven months ended July 31 as reported by the Department of Commerce:

	Gold		Silver	
	1914	1915	1914	1915
Exports.....	\$117,643,959	\$9,774,262	\$29,463,126	\$28,814,816
Imports.....	34,135,137	162,187,374	13,830,568	18,744,541
Excess.....	E.\$83,508,822	E.\$152,413,112	E.\$15,632,558	E.\$10,070,275

Exports of merchandise for the seven months in 1915 are valued at \$1,969,787,495; imports, \$1,008,909,441; excess of exports, \$960,878,054. Adding the gold and silver gives \$818,535,217 as the net export balance.

Another large shipment of gold from London was received at New York last week, coming by way of Halifax.

Sales of gold from the New York Assay Office in July were \$1,987,000. For the seven months ended July 31 sales were \$19,087,928 in 1914, and \$16,060,360 in 1915; a decrease of \$3,027,568 this year.

**Platinum**—There has been a sharp advance due to short supplies. Refined platinum, which sold early in the week at \$42, is now quoted at \$48@50 per oz. The advance is considered temporary, and the arrival of any new supplies would be followed by a fall.

**Silver** has ruled steady for the past week owing to better demand both in foreign and domestic markets, closing steady at 23½d. in London.

A shipment of \$400,000 Mexican silver dollars was received in New York, Sept. 7, from Spain. This is an unusual course for such a shipment.

## Zinc and Lead Ore Markets

## JOPLIN, MO.—Sept. 4

Blende, high price, \$89; base per ton, 60% zinc, premium ore, \$86; medium, \$85@81; lower grades, \$80@75; calamine, base per ton, 40% zinc, \$78@50; average, all grades of zinc, \$81.40 per ton. Lead, high price, \$52; base price, \$50 per ton of 80% metal content; average, all grades of lead, \$49.97 per ton.

## SHIPMENTS, WEEK ENDED SEPT. 4

	Blende	Calamine	Lead	Values
Totals this week	10,924,130	871,230	1,252,060	\$511,350
Totals this year	385,716,410	31,092,810	59,468,720	16,888,660
Blende value, the week,	\$451,360;	36 weeks,	\$14,629,230.	
Calamine value, the week,	\$28,710;	36 weeks,	\$689,300.	
Lead value, the week,	\$31,280;	36 weeks,	\$1,570,130.	

A very weak mid-week market closed strong, with buyers in the market for an increased tonnage. Of the week-end purchases but few carloads were shipped. One company picked up from 2,000 to 2,500 tons the last two days, and others had increased purchasing orders. Moyer, of the Western Federation is in the field endeavoring to strengthen the local

miners' union and establish an affiliation, promising unlimited support in case of another strike. On the agreement to base the wage scale on average ore prices of preceding month a reduction in the wage scale of 50c. per day was common today. Some fear a strike, and are prepared to meet it as before by making no endeavor to operate.

## PLATTEVILLE, WIS.—Sept. 4

The base price paid this week for 60% zinc ore was \$85 down to \$80 per ton at the week end; medium grades sold from \$80 down to \$70 base. No sales of lead ore were reported.

## SHIPMENTS, WEEK ENDED SEPT. 4

	Zinc Ore, Lb.	Lead Ore, Lb.	Sulphur Ore, Lb.
Week .....	4,027,000	.....	420,900
Year .....	129,303,440	4,463,160	18,728,710

Shipped during week to separating plants, 4,892,210 lb. zinc ore.

## OTHER ORES

**Molybdenum**—Reports apparently well authenticated say that \$1.25 per lb. has been paid in New York for concentrates carrying 80% MoS<sub>2</sub>. Heretofore 90% has been the usual standard. Recent London quotations are 117s.@120s. per unit for molybdenite carrying 90% MoS<sub>2</sub> or over.—**Tungsten** ore has again advanced. Recent London quotations are 55s. per unit for Wolframite, 70% WO<sub>3</sub>; the same price for scheelite of the same grade. In New York \$28 per unit has been paid for concentrates carrying 55% WO<sub>3</sub>, for immediate delivery. It is understood that buyers are no longer insisting on material free from copper. These prices work out nearly on a parity.

## Iron Trade Review

## NEW YORK—Sept. 8

The iron and steel trades continue extremely active, and demand for various products is on the increase. How much of this is domestic business and how much is war order or munition business for export is rather hard to determine. Concerns receiving foreign orders are rather reticent about them and details are not to be had in most cases.

There is no doubt, however, that domestic buying is improving and that there is more demand on several lines, notably in structural steel, bars and plates.

Pig iron continues to show strength and there is an increasing call for steel making irons, some large contracts having been placed for basic. Foundry demand is also on the increase.

Some of the speculative iron—chiefly Southern—bought at low prices a few months ago is now coming out at the higher levels which have been reached.

Exports from Baltimore for the week included 3,557,400 lb. wire rods and steel billets to Liverpool; 453,600 lb. pig iron to Rotterdam.

## FERRO-ALLOYS

**Ferrosilicon**—London quotations range from £10 10s. up to £14 10s., according to percentage of carbon.—**Ferrotungsten** is quoted at 6s. 6d.@7s. per lb., for alloys 75 to 85% tungsten and not over 1% carbon.—**Ferrochrome** is £25 10s. up to £30 per ton, the high price being for 4-6% carbon.—**Ferromolybdenum** is 18s.—\$4.50—per lb. for metal 70 to 80% pure.

Pittsburgh quotations for **Ferrosilicon**, 50%, are \$73 per ton at furnace.—**Ferrochrome** 4-6% carbon, 20c. per lb.—**Ferrotitanium**, 8@12½c. per lb., according to grade.—**Ferrotungsten**, \$3@3.50 per lb. of contained alloy.—**Ferrovandium**, \$2.25@2.30 per lb. of contained alloy.—**Ferromolybdenum**, nominal, none to be had. All prices are for large lots.

## PITTSBURGH—Sept. 7

A very interesting news item just being given out is that the Jones & Laughlin Steel Co. is about to build at once a pipe department at its Aliquippa works. This will round out the Aliquippa works as originally projected, the tinplate and wire departments having been in operation for several years. The new department will contain a skelp mill, with two butt-weld and two lap-weld furnaces.

The steel market is firm and active, but has shown no material improvement over conditions existing in August. As that month is usually dull, with September showing an improvement, the general expectation is for increased activity as September wears along. Steel prices are firm and show an advancing tendency, though there have been no clear-cut advances in the past week. The 1.35c. price is being very firmly maintained on bars, while shapes are firmer at that figure and plates are approaching the level, there being few plate quotations at under 1.30c. Wire products are very strong, with the usual fall demand in the domestic trade coming on top of an already heavy export demand, and a definite shortage in barb wire is expected. Blue annealed sheets are

very firm at 1.50c., showing an advance of \$3 a ton within three weeks, black sheets being firm at 1.90c., an advance of \$2 a ton in the same time, while openhearth are quoted at 1.95c. Galvanized sheets are stiffer with the recent spelter advance, but demand continues very light.

It is reported that railroads are very seriously considering their steel needs for next year, as with so much export steel already contracted for extended deliveries there are distinct possibilities of a decided shortage in steel. Even rails, which for years have always been obtainable in any tonnage and for any delivery desired, may be scarce on account of so many rail mills being engaged in rolling large rounds for shrapnel and other shells.

The steel trade has not been seriously concerned over the recent sharp declines in sterling exchange. By far the major part of the steel sold for export has been in dollars and not in pounds sterling. Even in sales for London settlement the profits have been such that the fluctuations in exchange do not mean as much as might be supposed. The steel trade regards the steel it has been selling for export as so necessary that it expects exchange matters to be so adjusted that the business can be continued without any interruption whatever.

**Pig Iron**—The market has been rather quiet the past week. Sellers are rather reserved and there is not much inquiry. Bessemer advanced 25c. on a 3,000-ton sale for export, at \$15.75, Valley, while some small lots have gone at \$16. Some sellers have advanced their quotation on basic to \$15, but there are still sellers at \$14.50, and some off basic has been sold at such low prices as to make the \$14.50 quotation on standard look otherwise than absolutely secure. Furnaces are quoting foundry iron at \$14.50, furnace, for this year and \$15 for the first half of next year, but odd lots can sometimes be picked up at slight concessions. W. P. Snyder & Co. announce the average realized prices on bessemer and basic iron in August, in lots of 1,000 tons and over, at \$15.064 for bessemer, an increase over the July average of \$1.073, and \$14.364 for basic, an increase of \$1.405. The market is quotable as follows: Bessemer, \$15.75@16; basic, malleable and No. 2 foundry, \$14.50@15; gray forge, \$14.25@14.75, f.o.b. Valley furnaces, 95c. higher delivered Pittsburgh.

**Ferromanganese**—The steel trade does not seem to be particularly uneasy about its future ferromanganese supplies, and appears to have fair stocks. It is claimed in some quarters that some material being sent to this country is being sold in prompt lots at ruling prices instead of being applied as deliveries on low-priced contracts. The prompt market is \$100@110, fluctuating almost from day to day, while the contract market is nominally \$100, Baltimore.

**Steel**—Still more fancy prices are being paid for openhearth billets, ranging between \$25 and \$26, Youngstown, equivalent to about \$1 more delivered Pittsburgh. There is scarcely any demand for bessemer billets, which are nominally quotable at slightly less than openhearth, while there is no inquiry for sheet bars, which are unquotable, as mills would hardly sell sheet bars at less than billets, while on the other hand sheet and tinplate prices realized are such that mills could not afford to buy sheet bars at anything like the prices being paid for openhearth billets. Rods are scarce and quoted \$28@30, Pittsburgh.

**SAULT STE. MARIE CANALS**

The total tonnage passing through the Sault Ste. Marie canals in July was 9,719,237 short tons. For the season to Aug. 1 the total tonnage was: Eastbound, 20,472,730 tons; westbound, 6,390,641; total, 26,863,371 tons, an increase of 1,182,398 tons over last year. The mineral freights included in the totals were, in short tons except salt, which is in barrels:

	1914	1915	Changes
Anthracite.....	1,133,532	994,226	D. 133,306
Bituminous coal.....	5,906,840	4,781,615	D. 1,125,225
Iron ore.....	14,739,927	18,097,753	I. 3,357,831
Pig and m'fd iron.....	142,116	95,595	D. 46,521
Copper.....	30,087	63,290	I. 33,203
Salt, bbl.....	403,331	297,406	D. 105,925

Iron ore this year was 67.4% and coal 21.5% of the totals. The number of vessel passages was 8547, showing an average cargo of 3144 tons.

**IRON ORE**

It is stated that contracts for Lake Superior ore have been placed with eastern Pennsylvania furnaces to a total of about 500,000 tons. The ores bought were chiefly Mesabi nonbessemers, and the price figures at about 8c. per unit of iron, delivered to furnaces.

Imports at Baltimore for the week included 24,450 tons manganese ore from Brazil.

Exports of manganese ore from India in May were 21,953 tons, against 71,849 tons in May of last year.

Shipments of Lake Superior iron ore in August were 8,081,117 long tons, an increase of 2,211,640 tons over August, 1914. The total shipments to Sept. 1 were 26,806,420 tons, an increase of 5,528,313 tons, or 26%, over last year.

**British Imports of Iron Ore**, six months ended June 30, were 3,060,639 long tons in 1914, and 3,063,515 tons in 1915; an increase of 2876 tons this year. Imports of manganese ore were 244,465 tons in 1914, and 134,526 in 1915; a decrease of 109,939 tons this year.

**COKE**

Coke production in the Connellsville region for the week is reported by the "Courier" at 391,310 short tons; shipments, 388,107 tons. The production of the Greensburg and Upper Connellsville districts was 42,905 tons.

The Lackawanna Iron & Steel Co. is installing a plant for the recovery of benzol at its byproduct coke ovens at Lebanon, Penn., with an output of about 1600 gal. a day. The plant will be ready for operation in November.

The coal report of the Geological Survey gives the total production in the United States for two years past as follows, in short tons:

	1913	1914	Changes
Anthracite.....	91,524,922	90,821,507	D. 703,415
Bituminous.....	478,435,297	422,703,970	D. 55,731,327
Total.....	569,960,219	513,525,477	D. 56,434,742

The decrease in the production of bituminous coal was generally distributed over the country, but there were seven states in which the production in 1914 was greater than in 1913—North Dakota, South Dakota, New Mexico, West Virginia, Kentucky, Michigan and Oregon.

**Exports and Imports of Fuel** in the United States in the fiscal year ended June 30 are reported by the Department of Commerce as below, in long tons:

	Exports		Imports	
	1913-14	1914-15	1913-14	1914-15
Anthracite.....	3,959,114	3,682,188	8,124	12,358
Bituminous.....	15,794,966	14,412,995	1,358,002	1,429,608
Coke.....	72,476	602,473	112,541	88,865
Bunker coal.....	7,811,913	7,062,653	.....	.....
Totals.....	28,218,469	25,760,309	1,478,667	1,530,771

The bunker coal, or coal furnished to steamships in foreign trade is practically all bituminous. The larger part of the trade, both exports and imports, is with Canada.

**Chemicals**

**NEW YORK—Sept. 8**

Conditions in the general market have not changed in any noteworthy degree since last week.

**Arsenic**—Business is not on a large scale, but the market is inclined to be firm. Prices are about \$3.50 per 100 lb. for large lots, up to \$4 per 100 lb. for small orders.

**Copper Sulphate**—On a steady market there has been fair sales. Quotations are \$7.25 per 100 lb. for carload lots and \$7.50 per 100 lb. for smaller parcels.

**Nitrate of Soda**—The market is inclined to be strong, and no change in prices is reported. September deliveries are quoted at 2.42½c. per lb., while 2.45c. is named for futures.

**PETROLEUM**

New oil wells completed in August are noted as follows in the monthly statement of the "Oil City Derrick": Pennsylvania grade, 376; Central Ohio, 74; Lima-Indiana, 34; Kentucky, 4; Illinois, 71; Mid-Continent, 363; Texas-Louisiana, 154. In all 1,076 wells were completed in the fields covered by the review. The new production credited to the completions was 97,850. The figures give an increase of 94 in the wells as compared with July, and a decrease of 35,923 in new production. Among the completions were 248 dry holes and 155 gas wells. At the close of August there were 438 rigs up and 1,554 wells drilling.

Recent "Commerce Reports" state that the Standard Oil Co. of New York is about to open up in business on the east coast of Sumatra. Sites for large godowns have been selected at Belawan, Loebong, Pakam, Tebing Tinggi, Perbangan, Bangan Poerba, Sinantar, Tandjong Balei, and even at Langsar and Kota Radja. The construction work will be undertaken by the West Java Engineering Co., and will be completed by the end of 1916. The headquarters of administration in the Dutch East Indies will be at Batavia. The Standard Oil Co. is contemplating developments in Sumatra on a large scale.

Assessments table with columns: Company, Delinqe, Sale, Amt. Lists various mining companies and their assessment details.

There were no sales at auction reported in either New York, Boston or Philadelphia during the week ended Sept. 8.

Stock Quotations table with columns: Name of Comp., Bld., Name of Comp., Bld. Lists prices for Colorado Springs and Salt Lake.

TORONTO Sept. 7 table with columns: Name of Comp., Bld., Name of Comp., Bld. Lists prices for Toronto stocks.

SAN FRANCISCO Sept. 7 table with columns: Name of Comp., Bld., Name of Comp., Bld. Lists prices for San Francisco stocks.

N. Y. EXCH. Sept. 7 and BOSTON EXCH Sept. 7 tables listing various commodities and their prices.

N. Y. CURB Sept. 7 table listing various commodities and their prices.

BOSTON CURB Sept. 7 table listing various commodities and their prices.

Monthly Average Prices of Metals SILVER

Table showing monthly average prices of silver from 1913 to 1915 for New York and London.

COPPER table showing monthly prices for New York and London, categorized by Electrolytic, Standard, and Best Selected.

TIN table showing monthly prices for New York and London.

LEAD table showing monthly prices for New York, St. Louis, and London.

SPELTER table showing monthly prices for New York, St. Louis, and London.

New York and St. Louis quotations cents per pound. London, pounds sterling per long ton. \* Not reported, † London Exchange closed.

PIG IRON IN PITTSBURGH table showing monthly prices for Bessemer, Basic, and No. 2 Foundry.