



# Mining Journal



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## The Grong' Copper and Pyrites Mines of Norway

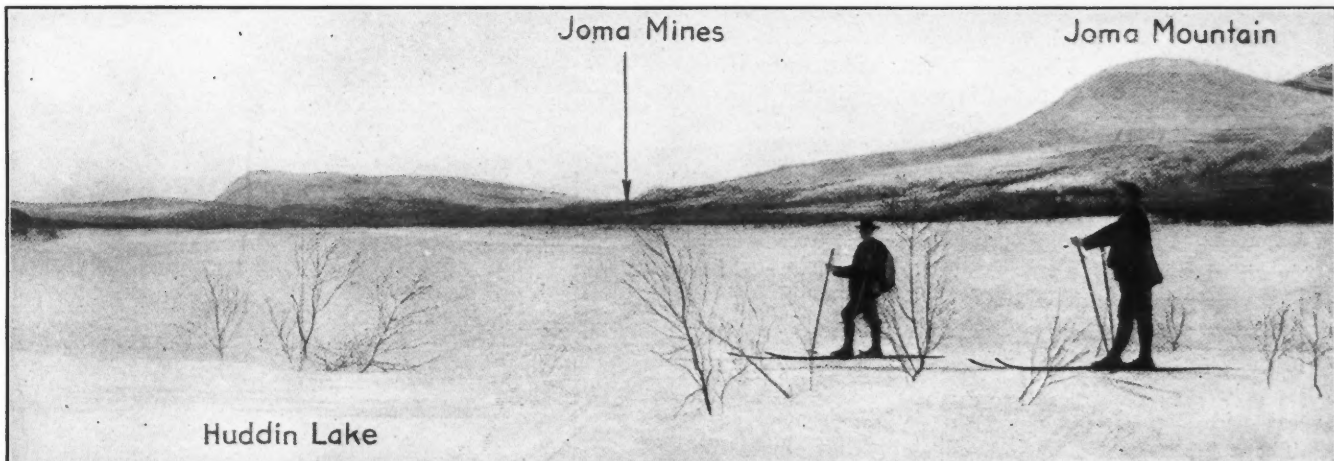
By ANDREAS DAHL UDHANY\*

*SYNOPSIS—Explorations in northern Norway have shown the existence of important pyrites properties in the parish of Grong, a few degrees south of the Arctic Circle. Some of the ore is copper-bearing, while other lenses are free from copper and average as high as 50% sulphur. The mines are about 80 km. from the coast and there are as yet no railroads to transport the ore.*

The Grong district now gives promise of becoming one of the most important mining districts of Norway, although in 1909 Prof. Amund Helland wrote that "no

the Norwegian Co. for Electrochemical Industry, he caused the deposits to be examined in 1911-12. These examinations gave such favorable results that the company, after having secured the mining rights, took up the matter with French financiers and formed a new company in December, 1912, under the name of the Aktieselskabet Grong Gruber, with a capital of \$1,725,000.

The Grong district embraces three main deposits, of which two, Gjersvik and Joma, belong to the above-mentioned company, while the third, Skorovas, is owned by the Norwegian Co. for Electrochemical Industry. From a short description of these three deposits it will be seen



IN GRONG PARISH, NORTHERN NORWAY, LOOKING TOWARD THE JOMA MINES

deposits of ore or useful minerals are known to exist in the large parish of Grong."

The Grong mines are situated in the northern and narrow part of Norway to the north of Trondhjem and a few degrees south of the Polar Circle. The distance from the sea or the nearest port is not great, only about 80 km., but owing to the lack of railroads the transport of the ore will not be easy at first and, in fact, will be altogether impracticable without a considerable expenditure of capital.

The credit for having brought these large mineral deposits to public knowledge is due to the well-known engineer and financier, Samuel Eyde, who is one of the inventors of the Birkeland-Eyde process and the creator and leading spirit of the Norwegian nitrate industry.

In his capacity as director for the promoting company,

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of what great importance they may become, and if Norway is not now the largest producer of pyrites in Europe it certainly has some prospect of becoming so when the Grong mines are put in full operation. Most of the data here given are taken from the report of Prof. J. H. L. Vogt, who examined the deposits on behalf of the Norwegian Geological Survey.

### THE GJERSVIK DEPOSITS

The Gjersvik deposits are situated on the western embankment of the large lake, Limingen, which stretches in a southeasterly direction toward the Swedish frontier. The presence of ore has been known for a long time, as there are a number of outcroppings of iron ore on the surface formed by the oxidation of the pyrite. No mining work had been done before 1911, when the deposits were systematically examined by a number of trenches and shafts. During the winter of 1911-12 the

surveying work was continued by the aid of diamond drilling, and it was possible in the spring to form a good judgment of the magnitude of the deposits. As regards the quality of the ore, this had been determined by about 200 analyses of ore from the drill holes and elsewhere.

The ore is in the form of an oblong-shaped vessel or folding, widest at the bottom and with a gradient of  $19^\circ$ . The mines will supply chiefly lump ore, although there are some fines, for the treatment of which it is intended to build a washing plant. The quality of the ore is similar to that in a number of other pyrites mines in Norway. It carries from 2 to 2.2% of copper and about 43% of sulphur. There have also been discovered chalcopyrite lodes estimated to contain about 200,000 tons of ore, for the treatment of which it is intended to erect a smelting works on the spot.

The Gjersvik mines are the smallest of the three deposits, but, on the other hand, the ore is more valuable on account of the high content of copper. The quantity of cupreous pyrites present is estimated at about one million tons, besides the above-mentioned 200,000 tons of chalcopyrite ore, and when the mines are put into operation the annual output will be brought up to 60,000 tons.

#### THE JOMA DEPOSITS

The Joma deposits are situated about 21 km. east of the Gjersvik mines and about 4 km. from the Swedish frontier. The claims were taken up in 1911, when a pyrite lode, 50 m. long and 10 m. wide, was discovered in a river bed. The deposits were subjected to a provisional examination during the summer of 1912, and afterward a number of diamond-drill borings were made. At the end of 1913 it was possible to pass a reliable judgment on the deposits in regard to their extent and value. They consist of a number of separate orebodies, in the form of lenses, as at Gjersvik. The gradient of the axes, however, is steeper, about  $45^\circ$ . The horizontal mineral area measures about 20,000 m. square, and there can be extracted about three tons of export ore from every cubic meter of the crude mass. The greatest width of the orebodies measured is nearly 50 m. These figures are sufficient to show that the Joma deposits are the largest known pyrites deposits in Norway.

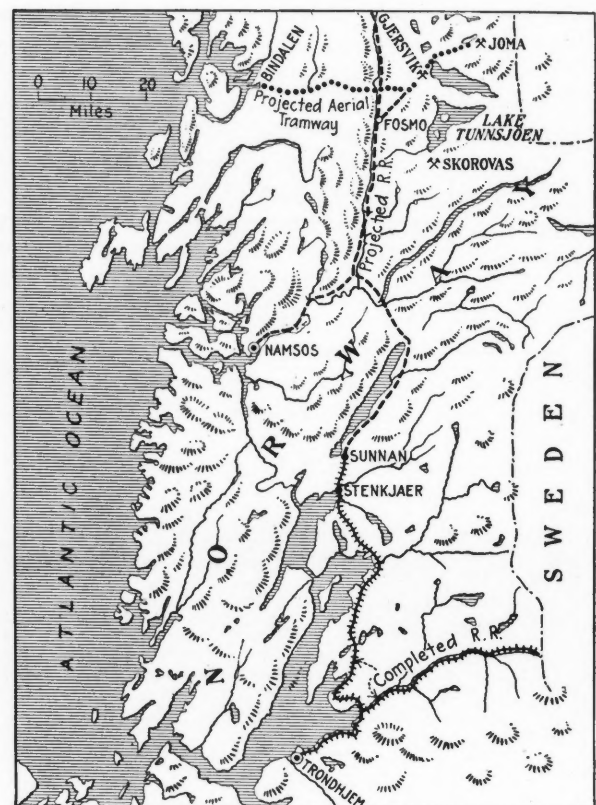
As regards the quantity of ore present, Professor Vogt has based his calculations on the quantity of ore which is lying above the projected ground-level in a height of 90 m. The minimum quantity to be extracted here he has estimated at 3,500,000 tons, but under normal conditions there should be at least 4,200,000 tons, and he says that it is quite possible that this figure may be too low. The tonnages cited in the foregoing do not represent the quantity of ore present but the marketable quantity, deductions having been made for loss in mining.

Below the above-mentioned level Professor Vogt has estimated that there can be extracted at least 30,000 tons per m. of depth; but it is more probable that this quantity may be brought up to 40,000 or 45,000 tons. Borings have been made to a depth of 170 m. vertically, and there is no reason to presume that the ore should not continue to a considerably greater depth.

The Joma deposits should be able to produce 6,000,000 tons at least, although 8,000,000 would possibly come nearer the total, and there is, of course, a possibility of

the quantity being brought up to 10,000,000 tons, as a depth of 170 m. is not prohibitive to economical exploitation. The mining expenses will be low at Joma on account of the magnitude of the orebodies. An additional advantage is that the ore as a rule occurs nearly pure.

About one-sixth of the deposits contains a cupreous pyrites, with 2% of copper and 43 to 44% of sulphur. The ore in the remaining parts of the field consists of nearly pure pyrites with little copper, the tenor of sulphur varying between 40 and 50% and averaging about 44%. The cupriferous deposits can be worked independently to a certain degree, and during the first years the total output of ore will comprise a rather large percentage of cupreous pyrites. But the noncupreous mineral is, of course, the chief thing, and with this in view



SKETCH MAP SHOWING SITUATION OF PYRITES DEPOSITS IN NORTHERN NORWAY

the work will have to be carried out on a large scale so as to make it possible to reduce the cost of mining and transport to a minimum. Nearly all the Joma ore will be lump ore, the amount of fines being so small that the erection of a special plant for them is not considered.

#### THE SKOROVAS DEPOSITS

The Skorovas mines are situated at the southwestern end of Lake Tunnsjöen, and are perhaps the most interesting of these three deposits, although as yet they have not been so thoroughly examined as the two other deposits. The most interesting point is the purity of the ore, which is nearly free of copper; but, on the other hand, it is exceptionally rich in sulphur, averaging as high as 50%. A similar ore may be found in the Joma mines, but in Skorovas this grade represents the average



and it is easy to conceive that a high-grade ore of this kind will have no difficulty in finding a ready market at a good price.

From a geological point of view the Skorovas deposits are of interest because of their great "iron hat," which exceeds anything known in this country. The "iron hat" is regarded as proof of the existence of a large amount of ore below, but there is also a drawback combined with it. Covering nearly the whole of the deposits with a thick layer, it is making all kinds of surface examination difficult.

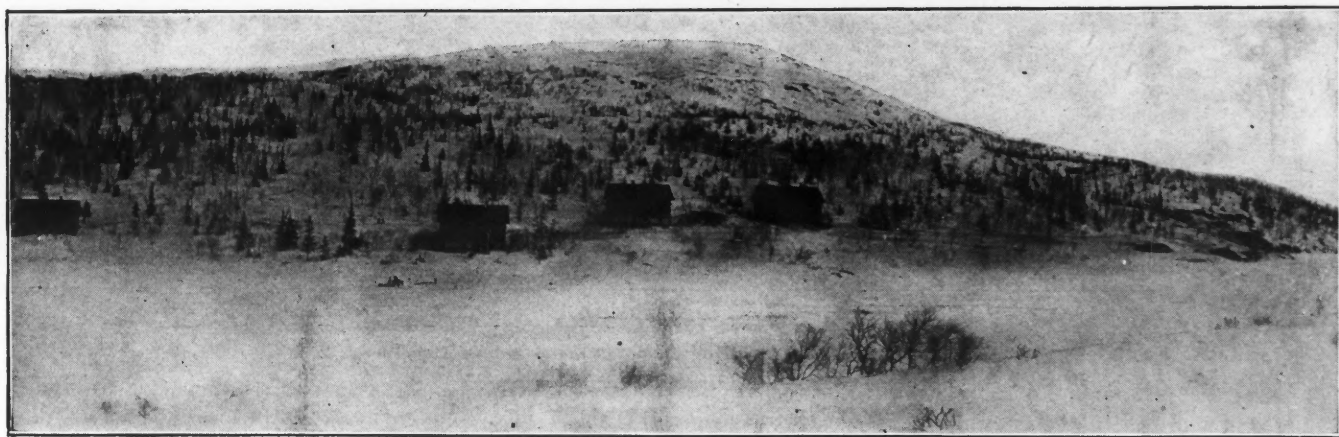
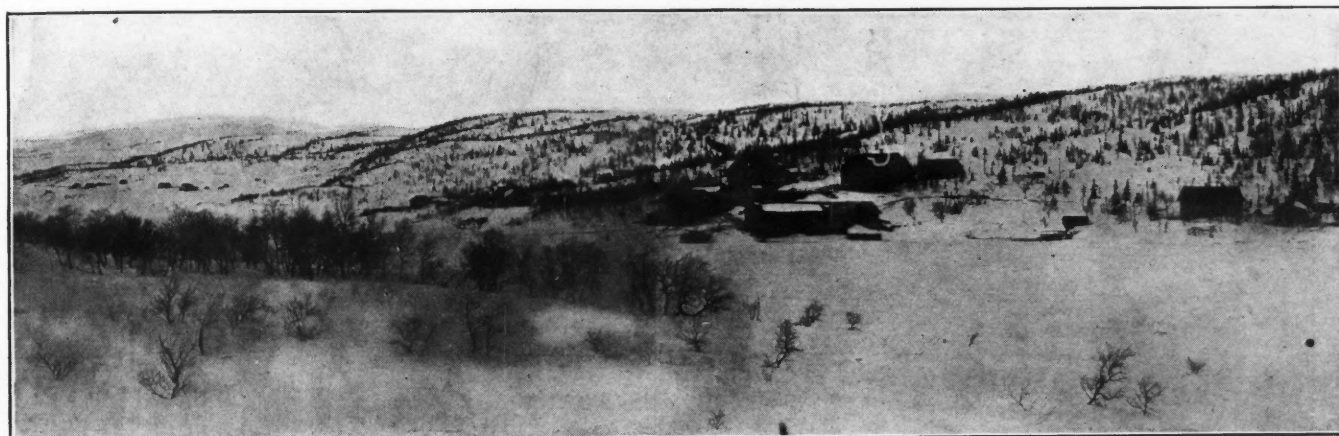
The work of surveying the field was started in the autumn of 1913, but the subsequent diamond drilling was not in full operation before June of last year. Unfortunately, the work was brought to a standstill when the war broke out. But from what has been done

the beginning, as several hundred thousand tons, possibly even as much as half a million tons, can be extracted by means of quarrying.

If a calculation is made of the total quantity of ore in the Gjersvik, Joma and Skorovas deposits, the same may safely be estimated at 8,000,000 tons of ore, but more probably at 10,000,000 tons. These figures do not include the ore which may be extracted from greater depths at Joma and from prospective orebodies in the interior of the mountain at Skorovas.

#### TRANSPORT

The lack of railroads and roads has made it difficult to carry out any work on these deposits. First of all, the Grong Mines Co. is obliged to build a private road 26 km. in length for immediate requirements. As regards the



VIEW OF THE GJERSVIK PYRITES PROPERTIES OF THE AKTIESELSKABET GRONG GRUBER

The two illustrations form a continuous panorama

it has become possible to make a provisional estimate of 1,000,000 tons of ore that may be regarded as proved. In certain orebodies this calculation has included only the quantity of ore that lies above the bottom of a small valley in the vicinity, and for other orebodies the calculation has included the ore to a depth of about 20 m. The above-mentioned figure is thus in a certain sense misleading, because it refers only to the part of the deposits that has been examined. It would consequently be more just to say that the quantity of ore present amounts to 1,000,000 tons, plus much more, which words may easily express an additional quantity of several million tons. The width of the largest orebodies runs up to 10 m. The cost of mining will be low, especially in

transport of the ore from Gjersvik and Joma, it was first intended to build an aërial tramway to the nearest seaport, Bindalen, and the idea has not yet been entirely abandoned. The distance between Joma and Bindalen is 78 km., and this aërial tramway would thus be the longest in the world.

It has, however, long been under discussion to continue the present railway from Trondhjem to Sunnan as far as the town of Bodö, north of the Arctic Circle. In case this project can be realized immediately, the company has agreed to abandon the above-mentioned plan and instead to let the railway transport the ore to the port of Namsos, to which town a side line will have to be built. In this case there are two projects

under consideration for the transport of the ore to Fosmo on the main line. In the one it is proposed to build an aerial tramway from Fosmo to Gjersvik and further to Joma, the total distance being 43 km. Another line will then have to be built to Skorovas, a distance of 22 km. In the second project it is proposed to connect the main line with the mines by means of a private railway which will go from a station south of Fosmo to Skorovas (23 km.) and then further to Gjersvik (30 km.), from which place it will proceed to Joma (23 km.). The main line would reach Namsos in a distance of 86 km., and the total distance by rail between this place and the three mines would thus be 109, 145 and 170 km. respectively.

In regard to tonnages, the Grong company has guaranteed as a minimum 200,000 tons per year, which rep-

created for such purpose, consisting of the governor, attorney general, secretary of state, state treasurer and state auditor, or other officers which may be empowered by law to grant such permission." Violation of the law is punishable by a fine of not more than \$10,000, or by imprisonment in the state prison for five years, or both such fine and imprisonment.

### Waste-Heat Boilers at Chrome, N. J.

BY CLARENCE L. BROWER\*

In 1901 and 1902 when the copper refinery of the United States Metals Refining Co., at Chrome, N. J., was built, two 250-hp. vertical Cahall boilers were installed on two 75-ton reverberatory refining furnaces, as shown in Fig. 1,



VIEW OF FURNACE BUILDING AT U. S. METALS REFINING CO.'S PLANT, CHROME, N. J.

Note absence of large stacks for individual furnaces

resents the estimated annual output from the Gjersvik and Joma mines in the beginning. When in operation, the two mines will require about 1000 men. At Gjersvik the water system and the electric plant have already been completed and the erection of small towns for the accommodation of workmen and their families has been begun.

### Mining under Public Waters in Minnesota

BY A. L. H. STREET\*

By a law which took effect Apr. 6, 1915, in Minnesota, it is made unlawful for any person, firm or corporation "to mine any mineral below the low-water mark of any public lake or river without first having obtained authority from the state"; or "to drain any meandered public lake for the purpose of mining of minerals without first having received the consent of a board hereby

\*Attorney, St. Paul, Minn.

p. 893. The results of a test on them are presented in Table I. The installation was a failure; the boilers did not produce enough steam to pay for their maintenance. The

TABLE I—EVAPORATION TEST ON CAHALL 250-HP. WASTE-HEAT BOILER

(For Arrangement of Boiler see Fig. 1)

Date of trial.....	Apr. 17 and 18, 1903
Duration, hours.....	25.2
Kind of coal.....	(soft coal) P. P. & K.
Average steam pressure (gage).....	154
Average temperature of feed water entering boiler, deg. F.....	145
Total wet coal fired, pounds.....	25,800
Moisture in coal, per cent.....	2.25
Total dry coal fired, pounds.....	25,200
Weight of ash, pounds.....	4,042
Total water evaporated, pounds.....	67,500
Factor of evaporation.....	1.1155
Actual water per pound wet coal.....	2.6163
Equivalent evaporation per pound of wet coal.....	2.9185
Equivalent evaporation per pound of dry coal.....	2.9855
Boiler horsepower developed.....	86.607
Percentage of builder's rating.....	34.643
Ash in coal (by analysis).....	8.05
Carbon in ash (by analysis).....	49.9

furnace operation was also unsatisfactory on account of draft conditions caused by the boilers.

\*Chief engineer, United States Metals Refining Co., Chrome, N. J.



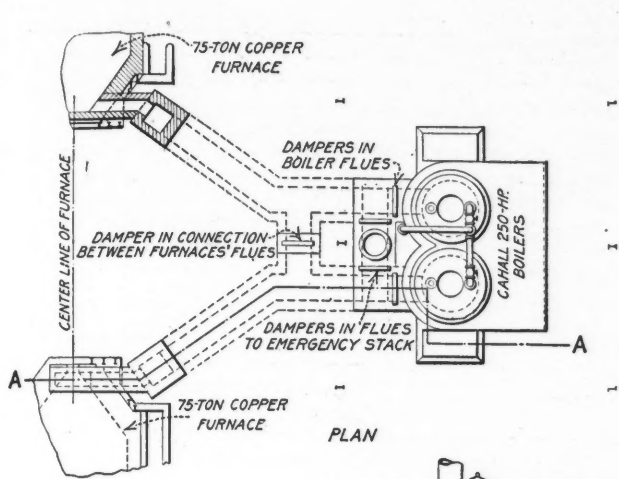


FIG. 1. FIRST WASTE-HEAT BOILERS AT CHROME, N.J. (1901)

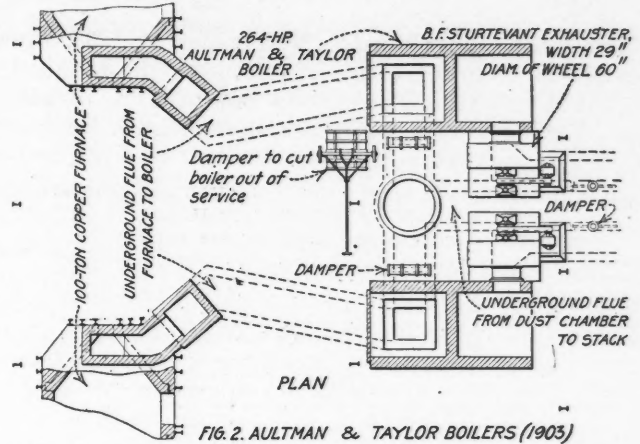
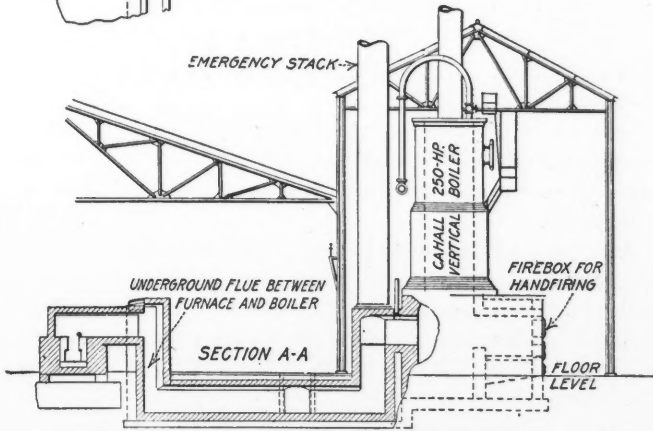


FIG. 2. AULTMAN & TAYLOR BOILERS (1903)

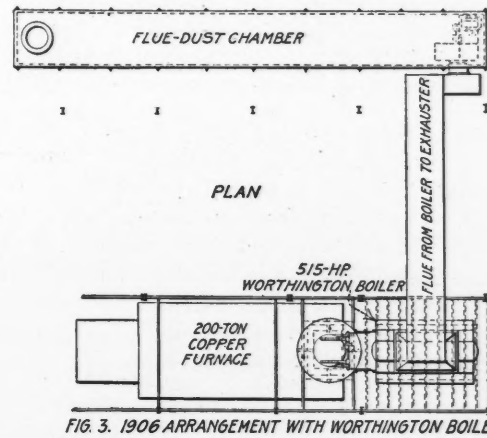


FIG. 3. 1906 ARRANGEMENT WITH WORTHINGTON BOILER

UNPROFITABLE WASTE-HEAT INSTALLATIONS

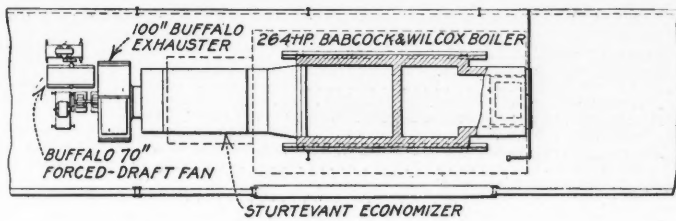


FIG. 4. 1912 ARRANGEMENT OF BABCOCK & WILCOX BOILER

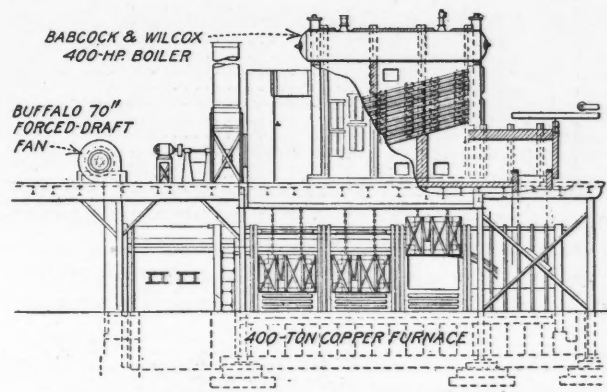
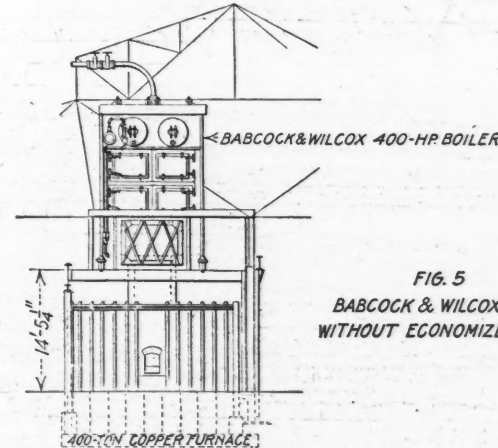
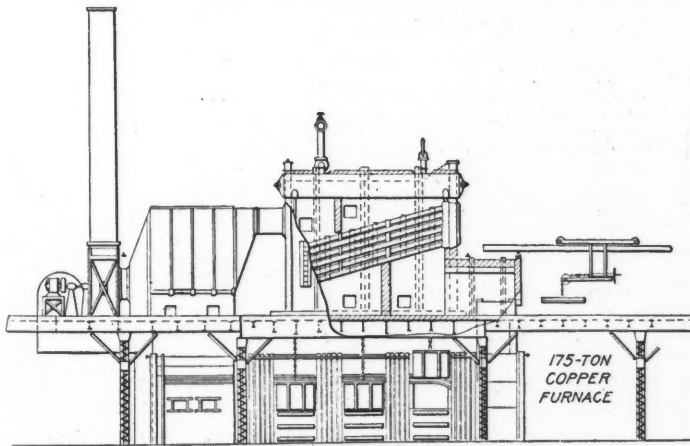


FIG. 5  
BABCOCK & WILCOX BOILER  
WITHOUT ECONOMIZER (1914)



SUCCESSFUL WASTE-HEAT BOILERS AT CHROME, N. J.

These boilers absorb more heat units than do the refining furnaces to which they are attached

Two more copper furnaces were added in 1903, with two 264-hp. Aultman & Taylor horizontal water-tube boilers, shown in plan in Fig. 2. The results of this installation (Table II) were practically the same as in the case of the first installation.

TABLE II—EVAPORATION TEST ON AULTMAN & TAYLOR 264-HP. WASTE-HEAT BOILER (For Arrangement of Boiler see Fig. 2)

Date of trial.....	Apr. 12 and 13, 1905
Duration, hours.....	25.7
Kind of coal.....	(Soft coal) P. & K.
Average steam pressure (gage).....	149.0
Average temperature of feed water, deg. F.....	123.0
Average temperature of flue gases leaving boiler, deg. F.....	540.0
Draft at outlet of boiler, inches of water.....	0.83
Total wet coal fired, pounds.....	23,200
Moisture in coal, per cent.....	1.50
Total dry coal fired, pounds.....	22,900
Weight of ash, pounds.....	4,561
Total water evaporated, pounds.....	58,000
Factor of evaporation.....	1.1376
Actual water per pound of coal.....	2.5000
Equivalent evaporation per pound of wet coal.....	2.8441
Equivalent evaporation per pound of dry coal.....	2.8815
Boiler horsepower developed.....	74.42
Percentage of builder's rating.....	28.2
Ash in coal (by analysis).....	13.95
Carbon in ash (by analysis).....	29.90

In 1906 two 300-ton refining furnaces were added to the Chrome plant. A 525-hp. Worthington water-tube boiler was installed on one of these furnaces, as shown in plan in Fig. 3. The results from the installation are presented in Table III and were not much superior to those of the first two installations, the boiler producing merely enough steam to pay for its maintenance.

TABLE III—EVAPORATION TEST ON WORTHINGTON 515-HP. WASTE-HEAT BOILER (For Arrangement of Boiler see Fig. 3)

Date of trial.....	Nov. 18 and 19, 1907
Duration, hours.....	24
Kind of coal.....	Soft coal
Average steam pressure (gage).....	148
Average temperature of feed water, deg. F.....	73.6
Average temperature of flue gases entering boiler, deg. F.....	1303.7
Average temperature of flue gases leaving boiler, deg. F.....	517.3
Average draft at inlet to boiler, inches of water.....	1.2
Total wet coal fired, pounds.....	37,500
Total water evaporated, pounds.....	113,772
Factor of evaporation.....	1.1883
Actual water per pound of coal.....	3.0339
Equivalent evaporation per pound of coal.....	3.6051
Boiler horsepower developed.....	163.27
Percentage of builder's rating.....	31.70
Average percentage of CO <sub>2</sub> in flue gases.....	4.2

These three installations are of interest in this connection to show what not to do in waste-heat-boiler installations on copper-refining furnaces.

In 1912 it was decided to install charging cranes the full length of the furnace building, which made it neces-

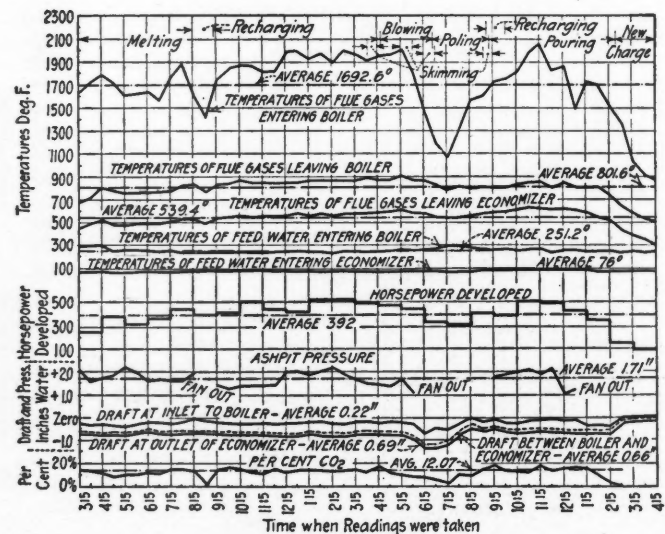


DIAGRAM OF TEST ON NO. 4 WASTE-HEAT BOILER EQUIPPED WITH ECONOMIZER

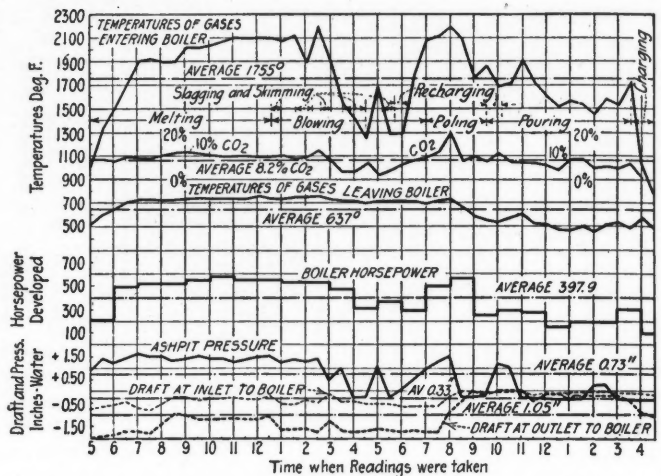


DIAGRAM OF TEST ON NO. 5 WASTE-HEAT BOILER

sary to move the waste-heat boilers shown in Fig. 2, and the question arose whether we should throw these boilers out and consider waste-heat boilers a failure or to rearrange them.

After careful consideration of what had been done and the results, I became convinced that waste-heat boilers could be made to pay on reverberatory copper-refining furnaces with a proper installation, the important factor being to get the boiler as close to the furnace as possible, eliminating all long and crooked flues, also to discard the

TABLE IV—EVAPORATION TEST ON WASTE-HEAT BOILER EQUIPPED WITH ECONOMIZER

This test started at 3:15 p.m. July 30, 1914, just after charging of furnace was finished, and continued for a period of 25 hr., until the furnace was charged again. The gas samples were taken in the flue between the boiler and the economizer. The boiler had been in service eight days since last cleaned. Average ashpit pressures were taken during the periods the fan was running. Readings were taken every half-hour.

Date of trial.....	July 30 and 31, 1914
Duration, hours.....	25
Kind of coal.....	Soft coal
Average steam pressure (gage).....	150.7
Average temperature of feed water entering economizer, deg. F.....	76.0
Average temperature of feed water entering boiler, deg. F.....	251.2
Average temperature of flue gases entering boiler, deg. F.....	1692.6
Average temperature of flue gases entering economizer, deg. F.....	801.6
Average temperature of flue gases leaving economizer, deg. F.....	539.4
Average ashpit pressure, inches of water.....	1.71
Average draft at inlet to boiler, inches of water.....	0.22
Average draft between boiler and economizer, inches of water.....	0.66
Average draft at outlet of economizer, inches of water.....	0.69
Total wet coal fired, pounds.....	50,900
Moisture in coal, per cent.....	2.94
Weight of dry coal fired, pounds.....	49,403
Weight of ash, pounds.....	4,884
Total water evaporated, pounds.....	285,053
Factor of evaporation.....	1.1861
Actual water per pound of coal.....	5.6002
Equivalent evaporation per pound wet coal.....	6.6425
Equivalent evaporation per pound of dry coal.....	6.8438
Boiler horsepower developed.....	392.0
Percentage of builder's rating.....	148.48
Analysis of coal {	
Volatile matter, per cent.....	24.94
Fixed carbon, per cent.....	67.99
Ash, per cent.....	7.07
Analysis of ash {	
Volatile matter, per cent.....	0.46
Fixed carbon, per cent.....	12.51
Ash, per cent.....	87.03
Analysis of flue gas {	
Carbon dioxide, per cent.....	12.07
Carbon monoxide, per cent.....	Trace
Oxygen, per cent.....	7.49

emergency stack, thus doing away with dampers that were practically impossible to keep tight. The design shown in Fig. 4 was adopted and the boilers shown in Fig. 2 were moved to this new arrangement with the result given in Table IV. One remarkable thing about this installation is that the boiler absorbs more heat units than the furnace does.



The results of this test were so good that all furnaces have since been equipped with waste-heat boilers shown in Fig. 5; the results of operation being shown in Table V and in an accompanying diagram. An individual B. F.

TABLE V—EVAPORATION TEST ON NO. 5 WASTE-HEAT BOILER

This test started at 5 p.m. May 27, 1914, just after charging the furnace, and continued for a period of 23½ hr., until the furnace was charged again. The gas samples were taken in the induced-draft flue. The boiler had been in service 233 hr. when the test was started.

Date of trial.....	May 27 and 28, 1914	
Duration, hours.....	23.5	
Kind of coal.....	Soft coal	
Steam pressure.....	145.6	
Temperature of feed water, deg. F.....	76.0	
Temperature of gases entering boiler, deg. F.....	1755.0	
Temperature of gases leaving boiler, deg. F.....	637.0	
Draft at inlet to boiler, inches of water.....	0.318	
Draft at outlet to boiler, inches of water.....	1.051	
Ashpit pressure, inches of water.....	0.73	
Total wet coal fired, pounds.....	52,000	
Moisture in coal, per cent.....	1.79	
Weight of dry coal fired, pounds.....	51,069	
Weight of ash, pounds.....	5,943	
Total water evaporated, pounds.....	272,133	
Factor of evaporation.....	1.1855	
Actual water per pound of wet coal.....	5.2334	
Equivalent evaporation per pound of wet coal.....	6.2046	
Equivalent evaporation per pound of dry coal.....	5.3177	
Boiler horsepower developed.....	397.9	
Percentage of builder's rating.....	99.47	
Percentage of CO <sub>2</sub> in flue gases.....	8.84	
Analysis of coal	Volatile matter and fixed carbon, per cent.....	92.85
	Ash, per cent.....	7.15
Analysis of ash	Volatile matter and fixed carbon, per cent.....	12.75
	Ash, per cent.....	87.25

Sturtevant economizer has been installed on one of these boilers with excellent results, and it is the intention at this time to install individual economizers on all the waste-heat boilers.

The appearance of the outside of the furnace building is interesting from the entire absence of large stacks, as shown in the view on p. 892.

### New Weights and Measures in China

United States Minister Paul S. Reinsch writes from Peking:

The recently promulgated weights and measures law of China establishes a double system, one being the standard metric unit, the other based on the Ying Tsao chih (builder's foot) for length and the Kuping tael (or liang) for weight. The law contains provisions for the inspection of weights and measures used, imposes fines for the use of untested or fraudulent measures, and sanctions the establishment of a special plant for the manufacture of instruments of weight and measure in order to secure absolute uniformity. Those who wish to make the manufacture or the sale and repair of weight and measure instruments their profession must apply to the Ministry of Agriculture and Commerce for special permission.

The units for length, area, capacity and weight, with their metric and American equivalents, are: Length: Chih = 0.32 m. = 1.049867 ft. Surface: Mou (6000 square chih) = 0.06144 hectare = 0.15182 acre. Capacity: Sheng = 10.354688 liters = 10.9416 liquid quarts or 2.7354 gal. Weight: Liang = 37.301 gm. = 1.31561 avoirdupois ounces. The term "li" is used to express (a) 0.001 chih (also 1800 chih), (b) 0.01 mou, and (c) 0.001 liang.

The Phosphate Rock marketed by the United States in 1914 was 2,734,043 long tons, of which Florida marketed 2,138,891; Tennessee, 483,203; South Carolina, 106,919; and the Western States, 5030, according to the U. S. Geological Survey. The Survey calls the quantity marketed "the production," as distinguished from the quantity mined, 2,649,174 tons. The logic is obvious.

### New Mining Activities in the Southern Appalachians

SPECIAL CORRESPONDENCE

A number of new mining undertakings are under way in the region comprising southwestern Virginia, eastern Tennessee and western North Carolina. One of the most interesting projects is controlled by F. R. Walton and associates, of Philadelphia. Under the name of the Minerals Refining Co., title has been acquired to the mineral rights of more than 12,000 acres, mostly in western North Carolina, on which are deposits of mica, asbestos, barite, chromite, excellent clay, feldspar and other minerals. The properties have been examined by John H. Banks, of New York, and are now being developed. It is proposed to install a plant at Johnson City to produce a variety of products, including ground mica, potash from feldspar, various barite preparation and washed clays.

The John T. Williams barite plant at Bristol is being overhauled and is expected to operate again soon. It is reported that a new use for barite as a plant spray will create a demand for the barite found in the vicinity of Bristol, in Tennessee, and western North Carolina. The demand for other barite products for paint has been increased by the curtailment of imports. A plant to make peroxide of hydrogen has been established at Charleston, W. Va., which will also require barite.

#### ACTIVE EXPLORATION FOR ZINC GOING ON

Exploration of the widely scattered zinc deposits of the southwestern Virginia district has been started at Ivanhoe on the Carolina branch of the Norfolk & Western from Pulaski. S. L. Boggs is developing the John Jackson tract adjoining the Austinville property of the New Jersey Zinc Co. A Pittsburgh syndicate has an option on the Wissler tract, also at Ivanhoe, and the property was recently examined by Dr. Richard R. Hice, state geologist of Pennsylvania, and by Kirby Thomas, of New York. Local interests are prospecting the extensive deposits of zinc-iron sulphide at Allisonia between Ivanhoe and Pulaski. George Carter of Pittsburgh, owner of the Ivanhoe furnace and iron mines, has developed two deposits of zinc on the property and has been shipping carbonates for several months. He is building a 100-ton concentrator to treat the sulphides opened in the old iron mine near Ivanhoe. Resumption of explorations on the Lobdell mine in Rye Valley about 20 miles west of Ivanhoe is also being considered. This was drilled and explored by the American Zinc, Lead & Smelting Co. last year, but the option was not exercised. This is the company which has successfully developed the Mascot zinc mine near Knoxville, Tenn.

In Rye Valley, Philadelphia people are operating the old Umbager mine for manganese. About a thousand tons of manganese ore have been shipped to the Pulaski furnaces and several carloads of manganese ore to Pittsburgh. H. H. Greene, who formerly developed the Columbia lead mine near Sugar Grove in the same valley, is in charge. A small plant is being installed to wash the ore, and it is expected to ship a large amount during the coming season. The narrow-gage road has been extended from Sugar Grove to the mine. A plan is being considered to extend the broad-gage road from Speedwell to Rye Valley, thus giving the iron, manganese and zinc mines an outlet in that direction instead of by the switchback road to Marion.

In East Tennessee E. R. Eaton is in charge of several explorations for local interests. The old Haysville iron mine, about 12 miles southwest of Greeneville, is being reopened for zinc, indications of which are found on the old dumps. A new manganese deposit near the dam on the Nolichucky River is being opened, and several cars of high-grade ore are ready for shipment. The Fall Creek zinc mine northeast of Greeneville is under negotiation. This has been closed for several years by litigation. It is equipped with a mill. The Embreeville zinc mines have installed electric power, and it is reported that they have more than five years' supply of ore from the old iron pits. The ore is mostly carbonate, and is washed and sorted. Explorations are being made to find the sulphides. The Johnson City iron furnaces are taking all of the ore from the Cranberry mines and are seeking other supplies, as these mines are not yielding as formerly as to grade or cost conditions. This furnace makes a low-phosphorus iron which is in good demand.

### Recent Improvements in the Metallurgy of Zinc

George F. Brooks, of the New Jersey Zinc Co., has patented (U. S. pat. 1,137,835, May 4, 1915) a briquette for charging zinc retorts, consisting of four parts by weight of zinc ore crushed to the usual degree of fineness; one part of more finely powdered ore, or in lieu thereof one part of commercial zinc oxide; one and a half parts of coal of the usual degree of fineness; and a sufficient quantity of common salt dissolved in water to form a thick plastic mixture of the several ingredients, the amount of salt solution being approximately 1½% in weight of the amount of ore in the mixture. [We fancy that this refers to the percentage of salt, not the percentage of salt solution.—EDITOR.] This mixture is formed into briquettes approximately 7½ in. in diameter and 7 in. in length by a pressure of approximately 90 lb. per sq.in. The molded briquette then is dried for about 24 hr. at about 220° F. The result of the drying is to bring the salt out to the surface of the briquette, where it forms a hard, inclosing crust. This crust strengthens the briquette mechanically and, furthermore, forms a filter of material high in salt, through which the fumes distilled from the ore are compelled to pass, which results in an increased production of spelter from a given quantity of ore and a correspondingly reduced production of blue powder. A further advantage is the ability to charge 15 to 20% more ore into a retort than in the ordinary way. Allowing for this and the smaller quantity of blue powder to be recharged for redistillation, the capacity of a given furnace is increased approximately 50%.

The inventor in his specification states that he is aware of the previous practice of adding a small percentage of salt to the charge for zinc distillation. His claim for novelty rests upon the special way described herein.

Dr. Max Engels, of Westend, near Berlin, Germany, has patented (U. S. pat. 1,136,519, Apr. 20, 1915) the use of zirconia in the batch for making zinc retorts. He states that good results have been obtained with retorts, consisting of about 33 parts in weight of clay, 62 parts fireclay and 5 parts of zirconia. Such retorts are remarkably more durable than the usual ones, consisting of about 33 parts of clay and 67 parts of fireclay. The increase in durability is obtained only when the proportion

of zirconia is relatively small, not to exceed 10%. With the use of a larger proportion, the increase in durability ceases and deterioration sets in. However, it is not necessary to adhere strictly to a proportion of 5% zirconia. Good results are obtained with a smaller proportion, and it has been found that even 1% of zirconia gives a preceptible improvement of the retort.

### Reduction of Rand Costs

A noteworthy feature of the annual reports of Witwatersrand gold mining companies which have made their appearance during the last few weeks is that in nearly all cases a reduction in working costs has been recorded, says the *London Financial Times*, of Apr. 26, 1915. This has not been the outcome of a general large increase in the quantity of ore milled; as a matter of fact, in some instances the expense ratio has been brought down notwithstanding a decline in the tonnage treated. The reduction in working costs is all the more satisfactory in view of the fact that the native-labor requirements of the mines were not fully met during the last year, a fact which encourages the hope of further reductions, given more regular and adequate labor supplies, such as most of the gold mines have been enjoying during the last few months, partly, if not largely, in consequence of the suspension of production at the diamond mines.

In the appended table are given the official figures for the last two years of 25 Rand companies whose reports have recently been issued:

Mine	1913		1914		Reduction	
	s.	d.	s.	d.	s.	d.
Aurora West.....	20	0	19	11	0	1
Bantjes Consolidated.....	22	8	22	1	0	7
Brakpan.....	18	9	18	6	0	3
City Deep.....	25	7	22	5	3	2
Consolidated Langlaagte.....	17.6		14.7		2.9	
Crown Mines.....	16	5	15	7	0	10
Durban Roodepoort Dp.....	24	5	23	5	1	0
Goldenhuis Deep.....	24	4	22	10	1	6
Ginsberg.....	19.6		17.9		1.7	
Glencairn.....	13	0	11.7		1.3	
Knight Central.....	20	3	19	2	1	1
Meyer and Charlton.....	18	3	17	6	0	9
Modderfontein B.....	16	4	15	7	0	9
New Goch.....	16	3	14	5	1	10
New Primrose.....	13.6		12.7		0.9	
New Rietfontein.....	19.9		18	0	1.9	
New Unified.....	17.6		13.8		3.8	
Robinson.....	14	1	14	3	2d inc.	
Roodepoort United.....	18	0	16	11	1	1
Rose Deep.....	16	7	16	7		
Van Ryn Deep.....	19.9		16.5		3.4	
Village Deep.....	20	7	17	8	2	11
West Rand Consolidated.....	22	9	19	11	2	10
Witwatersrand Deep.....	17	3	16	5	0	10
Witwatersrand (Knights).....	14.7		13.4		1.3	

It will be seen that expenses have been reduced in all but two cases, those of the Rose Deep having averaged the same amount in both years, while those of the Robinson were a couple of pence per ton higher last year than in the preceding period. The declines range from 1d. per ton in the case of the Aurora West up to as much as 3.8s. per ton in the case of the New Unified. In a few of the technical reports references have been made to the labor efficiency on the Rand having been improved. This factor no doubt accounts in some measure for the satisfactory showing made by the above cited figures as a whole.

**Gaseous Alloys** are in general stable only at low temperatures and pressures. This is shown, according to H. von Wartenberg (*Journ. Soc. Chem. Ind.*, Nov. 16, 1914), by a consideration of Nernst's heat theorem and Trouton's rule. A determination of its heat of formation showed that MgZn<sub>2</sub> exists at 600° C., and vapor density determinations that it is dissociated at 1300° C. The vapor tensions of sodium and of Na<sub>2</sub>Hg were measured at 444° C., and the stability of Na<sub>2</sub>Hg at 380° and 444° C. demonstrated by distillation.



# Apex Litigation at Tonopah

*SYNOPSIS—Court decides that a vein dipping north on one side and south on the other side can have extra lateral rights in both directions and that they hold despite a broken end-line.*

In the JOURNAL of Apr. 10 were published the contentions of the two parties to the apex suit of the Jim Butler vs. the West End, together with a map and sketches. On Apr. 30 the court handed down a decision in favor of the West End, and inasmuch as some novel points were involved in the suit, the decision is briefly quoted from herewith.

Early in the opinion the court makes this interesting comment:

During the taking of evidence and in the argument a tendency was occasionally vocally manifested by experts and counsel to view the situation from the standpoint of the miner. Nothing in the law or elsewhere demands of a skilled geologist or lawyer that he view anything as a prospector might or he who wields a shovel, but this tendency had at least the value of preventing these learned gentlemen from wandering too deeply into the often uncertain realms of speculative geology.

One important contention of the plaintiff was that the vein in question was in the form of an anticline and that an anticline did not give extralateral right under the apex law. The defendant contended that the vein was not an anticline, but two separate veins coming together at a point like a wedge, and the point being on their ground gave them extralateral right in the direction of the dip of each vein. The court says:

The . . . contention of fact is whether the body of quartz, ore, etc., . . . in controversy constitutes one vein or two. The evidence easily preponderates that it, or they, form but one vein. . . . But, though thus found to be one vein, this conclusion is not at all what might be called an absolute one, but is qualified, as will further appear in this discussion.

The plaintiff company rests its case to a great extent upon its claim that the vein is an anticline. That the vein is an anticline, using the word broadly and generally, is true; but strictly speaking, it is not true either geometrically or geologically. The difference, however, is merely one of wording of definitions, and is not important. The word "anticline" will serve as a name for the vein-form if properly limited and if no conclusion is drawn from the use of the word that is not justified by its application here. The word "anticline," geometrically speaking, implies the existence of one or two "synclines" or "troughs" lying laterally with it and having the same direction. Nothing of this kind is shown by the evidence in this case; no synclines accompany the anticline.

Whether the word "anticline" is applicable here or not, the word "anticlinal" has a broader meaning and is more applicable. It is defined: "Inclining or dipping in opposite directions." "Anticlinal axis" is defined: "A line from which strata dip in opposite directions, as from the ridge of a roof." The MacNamara-West End vein is anticlinal, using the word liberally; and, if so, it has presumably an anticlinal axis. As a proposition of law the plaintiff company holds that if this is true, there can be no extralateral rights, because there is no true apex, as the existence of an apex involves the existence of a terminal edge; that there can be no terminal edge if the vein goes up one slope, turns over and goes down the other. This feature of the case is so momentous that it must be decided as a question of fact first to what extent an anticlinal axis actually exists.

The defendant company claims two apices along the anticlinal axis, one for the north-dipping vein and one for the south-dipping vein. The latter vein, according to this theory, apexes along the line where it abuts against the north-dipping

vein, while the latter apexes along an irregular line above the other vein as indicated by the quartz exposures in the "A Raises." The finding has already been made that there is but one vein, which, having disposed of the two-vein theory, now requires a consideration of what the "A Raises" do show. The plaintiff's witnesses admit the presence of bodies of quartz in these raises, some of the bodies of good size and considerable length; but they include them in the "Stringer Zone" of the vein, or its "Halo." Some of these are large, from 3 to 5 ft. in thickness, which, were it not for inescapable comparison with the immense quartz bodies in the MacNamara-West End vein itself, would never be termed "stringers." The larger ones are probably not stringers, geologically or otherwise; they are not part of the "Stringer Zone," but are part of the "Halo," the distinction being readily grasped; that is to say, they constitute an upward extension of the main vein toward the surface.

They follow to some extent, though not very closely, a gouge hanging wall, which the West End people assert is the hanging wall of the north-dipping vein, but which the Butler people ascribe to the Siebert fault.

If the halo is to be included in the vein, and geologically it should be, this vein reaches now and did reach all the surfaces to which the apical facts are referable. It has, therefore, along its crest and extending above the anticlinal axis of the united main quartz bodies, a condition of things that may well serve as a terminal edge under the many peculiar circumstances and facts of the case.

It was very strongly urged on behalf of the plaintiff company that this vein has a rolling habit. . . . The vein is irregular in size and much distorted and broken, but it is almost free of rolls, having only two worthy of notice, one easily accounted for as a phenomenon of junction with the Fraction vein and the other as a result of a number of small faults lying close together.

Much time and attention were given to the question of strike. As a matter of common sense rather than technical mathematics the strike of the vein as a whole is easterly and westerly, and the strike of its two slopes, assumed for the purpose to be separate veins, is as claimed by the West End.

Now the questions of law. Can a vein have extralateral rights in two opposite directions? Or to express it more carefully, can extralateral rights extend downward from an anticlinal axis or common apex of a vein in a given claim beyond both side-lines of the claim? The answer depends upon the peculiar facts of the case; and in this instance, because of those peculiar facts, the vein, though one, being practically more two than one, they can; or, treating it as one vein for both theoretical and practical purposes, a condition exists along its crest or axis which gives to the vein, considered broadly and as a whole, a terminal edge at the summit or highest point or line of highest points where the vein reaches most closely to the surface, making that line of highest points a true apex for the whole vein, from which apex the vein can be followed downward both northerly and southerly.

Can a secondary vein have a southerly extending extralateral right, if the primary vein, or discovery vein, has its extralateral right extending northerly? Counsel for the Butler company holds that, under the two-vein theory of this case, no extralateral right to the south can be exercised, because the extralateral right predicated on the discovery vein flows to the north. This contention is fully and conclusively answered by counsel for the West End.

Is the West End claim entitled to any extralateral rights, its west end-line being a broken line? The rule probably is that for extralateral rights to flow from a mining claim it must have unbroken and parallel end-lines, if the vein crosses the end-lines; or it must have unbroken and parallel side-lines if the vein crosses its side-lines. In this case the vein passes through the east end-line, which is unbroken, and passes out through the north side-line, having its length in the claim along and gradually approaching the side-line, which eliminates the side-line as a bounding line from which a limiting vertical plane might be dropped. The end-line being unquestionably the line from which the easterly limiting plane should be dropped and being unbroken, and the opposite limiting plane being necessarily parallel to it and fixed by the vein-crossing point on the side-line, it seems as though practically the west end-line has nothing to do with any extralateral right that may flow from the claim. However, the locator's contract with the Government includes four covenants on the

part of the locator, that he make a discovery of mineral in place, that he give notice of his claim, that he define his boundaries, and that his boundary lines conform to the requirements of the law, that is, they must be parallel and unbroken. If he observes these, the Government not only gives him the land inclosed in his lines, but the extralateral right. A strict application of this idea would bar the West End claim from any extralateral right; but the law as applied by the courts is not so strict. Treating a part of the westerly end-line as converging, it has no application to the present facts of the case, as it passes west of all orebodies in dispute.

If the conclusion reached herein seems revolutionary, that from the apex or apices of one vein extralateral rights flow downward across both of its side-lines, attention should be given to the words of former Chief Justice Beatty, of Nevada:

We are willing to admit that cases may arise to which it will be difficult to apply the law; but this only proves that such cases escaped the foresight of Congress, or that, although they foresaw the possibility of such cases occurring, they considered the possibility so remote as not to afford a reason for departing from the simplicity of the plan they chose to adopt.

It is easy to realize that the condition described in this opinion is one that escaped the foresight of Congress and is also exceedingly remote from the simplicity of the plan they chose to adopt; yet the law must be applied to it, the law in which Congress used the expression "exclusive right of possession and enjoyment . . . of all veins, lodes and ledges throughout their entire depth, the top or apex of which lies inside of such surface lines extended downward vertically, although such veins, lodes or ledges may so far depart from the perpendicular in their course downward as to extend outside the vertical side-lines. . . ." Note the plural of the word "side-lines."

This branch of the case is decided in favor of the defendant corporation. That is to say, the West End Consolidated Mining Co. is the owner of the orebodies in dispute.

The court also said:

The testimony in the case is voluminous, occupying 1130 pages of transcript, yet it is plain to be seen that it could have been much more extensive. All this is mentioned here as cautionary and as indicating how helpless we are in facing great geological problems.

After reviewing an abstract of the decision, President Clyde A. Heller of the Jim Butler company gave out the following official statement:

The contention of the Jim Butler company was that there was but one vein, having an anticlinal roll and known in the camp for years past as the West End-MacNamara vein. The West End company endeavored to prove that there were two veins, one dipping north and the other south, and that each vein apexed in their claim, giving them extralateral rights both north and south.

Our local counsel at Tonopah telegraphs that Judge Averill in his decision upholds our contention as to fact and holds that there is only one vein. He awards extralateral rights both on the north slope and on the south slope of said vein. Our counsel regards this as a reversible error of law. The Federal Court's decision in the Leadville cases holds that an anticlinal roll in one vein does not constitute an apex and, therefore, there can be no extralateral rights in any direction.

Judge Averill also holds that the broken end-line of the West End claim does not defeat extralateral rights. Our counsel informs us that the Supreme Court of the United States has decided that there can be no extralateral rights where both end-lines are not parallel. I think there is no doubt that the case will be appealed and it will be reversed by the Supreme Court.

## Bolivia to Build Railroads

The government of Bolivia has announced its intention of beginning at once the construction of a railway line from Tupiza, in the southern part of Bolivia, to La Quiaca, in the northern part of Argentina. La Quiaca lies practically on the boundary line between Bolivia and Argentina and is the northern terminus of one of the great Argentine lines. Tupiza lies on the Bolivian railway system and is connected with the Pacific Coast by three lines touching the coast in southern Peru and northern Chile, and the connection of these two lines, now proposed by the Bolivian government, will give an-

other transcontinental railway line to South America. The Bolivian railway system consists chiefly of a north-and-south trunk line through the great elevated region in the vicinity of Lake Titicaca, which line is connected with the Pacific Coast by three distinct lines running to Antofagasta and Arica, Chile, and Mollendo, Peru.

## Steam-Electric-Driven Dredge for the Philippines

The Mambulao Placer Co. has ordered from the New York Engineering Co. an 8-cu.ft. gold dredge embodying a number of interesting features. The dredge will operate in salt water in the bay of Mambulao, on the north shore of the Province of Ambos Camarines, Island of Luzon. The hull will be built more on the lines of a ship than the usual dredge hull. The dredge is provided with a clay chute placed directly over the screen, so that barren material overlying the gold-bearing gravel may be bypassed instead of going over the gold-saving tables.

### ELECTRIC POWER GENERATED ON DREDGE

The most noteworthy feature of this dredge, perhaps, is the fact that the machinery will be electrically driven, the electric power being generated on the dredge by a steam turbo-generator. This arrangement permits more elastic and economical driving of the dredge machinery and eliminates the uneconomical individual engines usually employed on steam-driven dredges. While the application of electric power generated from a steam plant on the dredge is an innovation on gold dredges, it is simply a new adaptation of a practice already established in an allied field, as there are a number of harbor dredges operating this sort of equipment with entire satisfaction.

The Mambulao Placer Co. is a close corporation organized by Joaquin Casanovas, who is the principal stockholder and an old-time resident of the Philippines. The property controlled by the Mambulao company consists of about 800 acres near the town of Mambulao, which is but a short distance from the Paracale district, where the Gumaos, Philippine Dredges, Maximelo and Malaguit companies are operating. A portion of the property owned by the Mambulao company has been drilled by William Kane, who tested the Gumaos company's ground. Most of the gold is found in a layer of gravel from 6 to 8 ft. thick at the bottom. This is overlain by 40 to 45 ft. of barren sand and clay.

The dredge is designed to dig 55 ft. below water line and to stack 35 ft. above the water line. The dredge hull is 136 ft. long, 10 ft. deep and has a beam of 47 ft., with an overhang of 3 ft. on each side. The dredge will have a wooden hull, as it is to operate in salt water. A steel hull would require frequent docking and painting, which is impractical in this instance, and the first cost is higher. The wood hull will be protected by a special ship-sheathing felt to prevent injury by boring mollusca. The sheathing consists of a specially prepared hair felt, which is dipped in preserving materials and then rolled or pressed into sheets of about 1/4-in. thickness. This material is applied outside the regular 4-in. planking of the hull, and then a plank covering, 1 1/2 in. thick, is put on for general protection.

### VENTILATION OF HULL

The ventilation of the hull, essential in the tropics, is accomplished through the ventilating apparatus of the

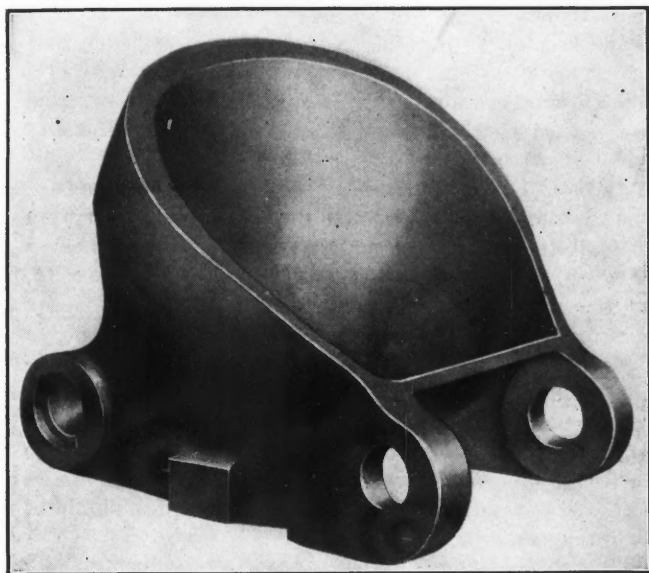


turbo-generator. The air for ventilating the armature will be taken from the hull, and it is calculated to cause a change of air in the hull every 10 minutes.

As the dredge operates in the open sea, all of the hull fittings are galvanized to avoid corrosion from the salt water, and a special arrangement has been provided on the spuds for taking care of inequalities due to the tide, which amount to about 6 ft. in this latitude. This involves paying out the spud lines automatically as the tide rises and taking care of the slack when the tide is falling.

The digging ladder is of the solid plate-girder type, 110 ft. long by 9 ft. at its deepest part. The ladder has a separate set of blocks and ropes for each side. The forward suspension bars will be 5½ in. in diameter and the rear suspension bars will be flat, 7 in. wide by 2 in. thick, all of forged steel, without welds.

A new feature on this dredge is the equalizing sheave placed on top of the main gantry. The ladder-hoist ropes on each side of the ladder have been joined, or rather a single continuous rope has been used for this purpose and



ONE-PIECE BUCKET FOR MAMBULOA DREDGE

This 8-cu.ft. bucket is made entirely of manganese steel and is provided with a thickened lip which is expected to last as long as the rest of the bucket.

passes over the equalizing sheave, thereby equalizing any stretching or inequalities of either side. A similar equalizing arrangement is applied to the hanging of the stacker, which instead of being supported at two points has three suspensions, the rope being reeved through equalizing blocks at the three points.

#### ONE-PIECE MANGANES-STEEL BUCKETS

The buckets for the Mambuloa dredge are of one piece of manganese steel, the lip being cast integral with the rest of the bucket and designed to wear as long as the back and hood. This is considered feasible in the sort of ground this dredge will dig.

The main winch is equipped with nine drums, as in the case of the Gumaos dredge built by the same manufacturers for use in the Philippines. This gives spare drums for any extra requirements around the dredge.

The main dump hopper has a manganese-steel bottom placed on an angle. This is capable of being removed, leaving the regular gravel cushion, if desired. The

manganese-steel bottom was adopted to reduce the amount of spill into the well.

The revolving screen is 40 ft. long and 78 in. in diameter, with tires of 12-in. face. The screen is supported by a cast-steel trunnion ring at each end; driving is accomplished by a center-roll drive placed directly below the lower trunnion ring, the screen being maintained in position by small side idlers.

#### CLAY CHUTE FOR BARREN OVERBURDEN

The clay chute to bypass barren material is placed directly over the screen, running aft to the stern, where it divides into two branches, each extending over the stern about 30 ft. The clay chute is semicircular in section, to secure the largest carrying capacity with the least amount of water. The upper part of the chute where the buckets dump will be of manganese steel, and this part will be so hinged that it can be readily raised when auriferous gravel is being dug, permitting the buckets to dump in the hopper in the usual manner and the material to pass through the screen.

The high-pressure pump will furnish water at the head of the clay chute for washing, the water being introduced across the entire width of the sluice and in the same direction in which the sand and clay are traveling. The 12-in. high-pressure pump will be driven by a 125-hp. motor direct-connected, and the 14-in. low-pressure pump will be operated by a direct-connected 75-hp. motor. Besides these, there will be fire pumps and the usual accessory pumps for the power plant.

A traveling crane, separate stacker hoist and other modern equipment will be provided. Cast steel is used in nearly all the dredge parts, even for some of the bearings. All gears throughout the dredge have machine-cut teeth, insuring smooth running and minimum breakage of teeth.

The boiler is of the water-tube type, especially arranged for using wood fuel. It will have straight tubes accessible at each end for cleaning. The boiler will furnish steam at 150-lb. pressure to a horizontal 625-kv.-a Curtis turbo-generator which will run condensing. The condenser will be of the vertical type with 1-in. brass tubes. Wash water on its way to the screen will be passed through the condenser for cooling purposes.

It is interesting to note that in alternate bids for a steam-electric-driven and for a steam-driven dredge the boiler equipment in the first instance was a 330-hp. boiler, whereas in the regular steam-driven dredge equipped with individual engines for driving the different machinery a 500-hp. boiler was specified. The former bid was accepted. Wood costs about \$5 per cord delivered on the dredge, so that the daily saving in fuel will be important. The total cost of the dredge when erected will be about \$250,000. While the steam-electric-driven dredge is expensive in first cost of the machinery required, as compared with the ordinary electric-driven dredge, it should be noted that for the latter the purchase of power from an outside company obviates the investment for a power plant.

The operating cost of the Mambuloa dredge is expected to be lower than that of the ordinary steam-driven dredge, inasmuch as the driving units are more economical. The oil and supplies required for each engine on the steam-driven dredge and the wear and tear on these engines are greater than that of the steam-electric-driven dredge;

also, the reciprocating engines of the steam-driven dredge have a tendency to cause more racking of the hull than in the case of the turbo-generator and motor-driven units.

When a second dredge is installed by the Mambuloa company, the power plant will be taken off this dredge and put on shore, as it is considered that it will then be more economical to operate the dredges by electricity from a single power plant. This is the reason for the installation at this time of a 625-kv.-a. turbo-generator.

Besides the dredge itself, the contractors will supply a gasoline-driven tender 40 ft. long, having a 10-ft. beam. This will be used for the purpose of conveying passengers and workmen from the town to the dredge, and also for towing and handling scows laden with fuel. These scows, of which three will be built, will be 40 ft. long, 15 ft. wide and 5 ft. deep. A small machine-shop equipment is also being furnished, as well as material for two houses for administration and residential purposes.

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### Business in Mexico

Business continues to be carried on in Mexico. Among the lower classes of natives particularly there has been less disturbance than one might imagine. To those unacquainted with that country it is marvelous that local business survives the shocks and strains of depreciated currency, suspension of export, removal of banks, absence of salaries, abandonment of large properties, loss of farms and animals, cessation of freight traffic, and withdrawal of liquid capital by natives and foreigners. In commenting upon this state of affairs in the *Daily Consular and Trade Reports*, Apr. 30, 1915, Consul Wilbert L. Bonney, of San Luis Potosi, calls attention to these facts and shows the reasons for their existence.

The explanation lies partly in the fact that a large proportion of the Mexican people have always been and are now outside of all these conditions. Their communities are largely isolated, requiring little and being nearly sufficient unto themselves. Exporting, importing and financing have been carried on over their heads, and the complete failure of the structure would scarcely affect the average Mexican. Those thrown out of employment in the mines and industries have found employment in the army. The exporting business has, in the past, furnished employment, but aside from that has not affected the business with communities. Government expenditures have made money plentiful among the lower classes, and the depreciation of the money has forced its quick circulation. Lack of production of staples has been somewhat compensated for by bringing to market the stores from country warehouses, which are commonly held for high prices. However, this source of supply may soon be exhausted. Paper money is fairly plentiful, but wholesale and importing lines are crippled. Large producers will not resume operations until conditions become sound. The class of people who buy imported goods has always been limited. Retail business in native goods is fairly active, and the paper money is accepted and rapidly passed from hand to hand. There are no banks operating in this district.

The loss of import trade, so far as it affects the vast majority of the people, may be compared with the loss of the Pullman service on the National Railways of Mexico. As nine-tenths of the people never enter a sleeping car, the loss of this service is entirely unheeded by them.

The same is true with respect to the paper money. The quality of money is tested only when one desires to purchase a foreign draft. The greater number of Mexicans never have occasion to inquire the price of foreign drafts, and the value of the money does not affect them seriously.

Credits have been completely upset, but again this does not directly affect the vast majority who never enter a bank and who have never had any credit. Central Mexico has undoubtedly been living upon its capital for a long time, and an end must come to this condition. As to the land, if the old system of cultivation is changed and the large properties are broken up, the jobbers and importers of machinery, tools and supplies will be quick to see that the land when divided will require many more industrial outfits for its operation. The old system under which one owner sometimes bought 500 American plows may not survive, but a number of smaller farms may supply a great demand for imported machinery and accessories. The first demand will be for supplies for plants resuming operations after a long suspension. New organizations will undoubtedly be instituted to take care of labor conditions. If employees are to receive higher wages they must be selected with greater care, and it is probable that the piecework system, with maximum use of machinery, will be depended upon wherever possible, in order to make wages accord with the energy and efficiency of the employee.

A state decree in September prohibited the shipment of foodstuffs out of the state, and the sugar producers were prevented from shipping to the United States just at a time when the market was most favorable. On Sept. 16, 1914, a minimum wage decree was promulgated, placing the minimum wage at 75c. on the farms and \$1.25 in mines, and limiting the working day to 9 hr.; also canceling debts of laborers to their employers and requiring wage payment in cash. The result has been an attempt to introduce piecework wherever possible. The same decree reduced the landlord's share of produce to one-fourth, and if followed out will retire from the market a large amount of country property.

✽

### Duty to Provide Safe Place of Work

BY A. L. H. STREET\*

The rule of law that an employer is under no legal obligation to provide his employees with a safe place to work, when the perils to the working place result from the progress of the work in which they are engaged, has no application to miners engaged in drilling holes preparatory to blasting, and injured through explosion of a missed shot in a hole partly drilled by the preceding shift, according to the holding of the United States Circuit Court of Appeals in the late case of *Reardon vs. Balaklala Consolidated Copper Co.*, 220 *Federal Reporter* 584. This decision proceeds upon the theory that there will be no peril of this kind if proper inspection to discover missed shots be maintained by the operator, especially where the operator undertakes to make such inspection.

✽

**California Has 276 Oil-Producing** companies; 72,535 acres of oil-producing land; 6183 wells yielding 657,051,458 barrels, an average of 9050 barrels per acre, according to the annual report of the State Mineralogist for 1913 just issued.

\*Attorney, St. Paul, Minn.



# Geology of Juneau District

*SYNOPSIS—A review of the general geologic structure of the Juneau gold belt, together with a discussion of some of the local factors affecting ore deposition.*

It is a privilege to live in a mining district of the proved magnitude of the "Juneau Gold Belt" in that stage of its development when interesting problems involving every branch of engineering are being encountered. The solution of the problems of economic geology at this stage is of the greatest importance to the district. The studies of Dawson, Kinzie, Becker, Wright, Spencer and Knopf have given considerable knowledge of the general structure of the region, the character of the ore deposits and the nature of the processes by which they were formed. They have shown that the region has a banded structure parallel to the coast which is observable in all the important geologic features.

## GENERAL STRUCTURE OF REGION

The great diorite batholith, 40 to 70 miles wide, forming the core of the Coast Range, lies in general a few miles inland. Between it and the coast and on the islands of Alexander Archipelago are parallel belts of schists, slates and volcanic rocks, which within 15 miles or so of the diorite dip steeply inland. These are believed to form a close-folded synclinorium of which the tops of the anticlines have been completely eroded.

Of these beds the schists are merely those which, by their proximity to the intrusive diorite batholith, were subjected to the greater metamorphism, and may in any particular case be either of sedimentary, clastic or igneous origin. The slates, graywackes and limestones are, of course, of sedimentary origin. The volcanic greenstones are probably in part intrusive, but largely extrusive, lavas, tuffs and breccias.

The Coast Range diorite was intruded after these strata were laid down and folded in much their present position, as the stratification has determined largely the outline of the diorite. This batholith is quite likely composed of several successive intrusions, and isolated massive intrusions of the same rock occur erratically in the other belts. Some of these, as the Jualin mass, have been shown to be intruded later than the batholith.

Occurring erratically in all the belts of stratified rocks are dikes of perhaps three distinct types—diorite, metagabbro and basalt. Of these the basalt dikes are youngest and apparently have had no influence on the ore deposits.

The Treadwell series of dikes, various dikes near Gastineau Channel and the albite-mica schist of the mainland are examples of mineralization of dikes originating from a dioritic magma. These vary in texture from granular to porphyritic, and even felsitic.

The metagabbro, called also in the less carbonated form amphibolite, or green diorite, when on or near the contact of the main slate and greenstone belts, is usually ore bearing. Wide zones in the adjacent slates are of still greater importance, their width and persistence, both laterally and with depth having been sufficiently proved.

Note—Excerpts from a paper read Apr. 17, 1915, by Frederick B. Hyder, geologist, Alaska-Gastineau Mining Co., Juneau, Alaska, before the Mining and Engineering Society of Alaska.

The mineral deposits of the region are believed to have been formed under conditions of high temperature and pressure by hot solutions containing soda, potash, phosphoric acid, metallic sulphides and gold. The solutions were probably emitted during the congelation of the diorite batholith. The characteristic ore minerals of these deposits are pyrrhotite and biotite, both characteristic of deep-seated origin. Albitization is characteristic of the region and is found where the rock originally contained no albite, as well as in those in which it was a large primary constituent. Several thousand feet of the rocks have therefore been removed by erosion above the outcrops of the present time.

## GLACIAL ACTION THE CHIEF EROSION FACTOR

One of the greatest factors in this erosion has been glaciation. There are indications that in recent geological times an immense ice sheet, with its apex or origin in British Columbia, covered southeastern Alaska to a thickness of from 2500 to 3500 ft. above sea level, having a total thickness of perhaps 5000 ft. The canals of today were the principal streams in this sheet. These and most of the other topographic features were originally determined along large lines by two factors, the schistosity of the region and the large faults. Gastineau Channel is an example of the dominant influence of the first; Lynn Channel and Chatham Strait, two parts of the same waterway which extends for 250 miles from the open ocean in a straight channel 3 to 6 miles wide and from 1000 to 2500 ft. deep, have been determined by a great fault, the displacement along which has been slightly rotary, being greater at the south end than at the north, where it splits into two or three branches. It runs about N 10° W, cutting the schistosity at an angle of about 30°. As an example nearer Juneau may be mentioned Icy Gulch and Gold Creek, which from their junction to Gastineau Channel are determined by the Silver Bow fault, the largest in the vicinity.

The deeply incised drainage system was submerged in the Quaternary. Evidence has been found near Controller Bay of a submergence of 1000 ft. in the late Quaternary, which supports this theory. Subsequent elevation of 200 ft. has also been observed in this region.

## ORE OCCURS CHIEFLY IN METAMORPHOSED SEDIMENTARIES

The ore deposits appear to be of the same age as the Mother Lode of California with which they are closely related, the metasomatic processes apparently being closely parallel, although not identical. The Mother Lode, however, was probably mineralized at less depth, temperature and pressure.

With a few exceptions occurring in the more recent isolated intrusions of diorite, no ore deposits have been found in that rock. In its immediate vicinity, however, in the Ketchikan district, contact metamorphic deposits are found carrying gold and copper.

Most of the ore deposits occur in metamorphosed sedimentaries at a considerable distance from the diorite—in fact, beyond the marginal zone of schists. In general it may be said that black slate beds in contact with more compact graywacke beds, or with igneous rocks as greenstones, particularly in close association with metagabbro

dikes and dikes containing albite as an important constituent, are the favorable associations. Which of these combinations is most favorable and which has influenced or had the dominating influence in determining ore deposition in localities where all are present is one of the open questions.

In this vicinity there appears to be only one fault of importance—the Silver Bow fault outcropping in Quartz and Snowslide Gulches. This fault appears to have a strike of N 76° E and a dip of about 72° E. Considerable difference of opinion appears to exist as to the extent and nature of the displacement along this fault—in fact, as to whether most of the apparent offset is not in the nature of a sharp fold culminating in a fault displacement of possibly less extent.

Numerous transverse faults of less displacement are found throughout the ore zone. These, with possibly one exception, are certainly later than the completion of the ore deposition. Their strikes and the displacements along them, it is believed, connect them with the Silver Bow fault, indicating all to be due to the same forces. The Silver Bow fault and others as yet little known may contain the key to knowledge of great economic importance.

The ore deposits of the island and mainland are closely related. Knowledge of one will aid in the study of the other. Each may have its distinctive features—the rocks may differ, even the genetic processes may vary, but the parallelism is perhaps closer than present knowledge is able to prove. The recent determination of albite as the characteristic mineral in an ore-bearing rock on the mainland and the persistent association of the gold with that rock over a wide area emphasize that probability.

### ⌘ Pig-Iron Production in Great Britain

The British Iron Trade Association reports that the production of pig iron in Great Britain, which was 4,507,984 long tons in the first half of 1914, was nearly the same—4,497,914 tons—in the second half. This makes the total for the year 9,005,898 tons, which was 1,476,019 tons, or 14.1% less than in 1913. Production began to fall off early in 1914 on account of the industrial depression then existing, which was felt in Europe as well as in this country. It was not seriously affected by the breaking out of the war, as is shown by the close correspondence between the two periods of the year.

The production divided by classes of iron made has been as follows for three years, in long tons:

	1912 Tons	1913 Tons	1914 Tons
Forge and foundry.....	3,431,727	3,943,139	3,430,448
Bessemer and hematite...	3,408,386	4,057,700	3,235,403
Basic .....	1,771,771	2,125,689	2,003,693
Spiegel, ferro, etc.....	277,240	355,389	336,354
Total .....	8,889,124	10,481,917	9,005,898

By districts, Scotland, the Northeast Coast, Cumberland and South Wales made all the low-phosphorus iron—bessemer and hematite. The Northeast Coast (Middlesboro) and Lancashire were the larger makers of basic pig. Middlesboro, Cumberland and North Wales made the ferromanganese and spiegeleisen.

The production of pig iron for 10 years past has been as follows (in long tons):

1905 .....	9,592,737	1910 .....	10,217,022
1906 .....	10,149,388	1911 .....	9,718,638
1907 .....	9,923,856	1912 .....	8,889,124
1908 .....	9,289,840	1913 .....	10,481,917
1909 .....	9,664,287	1914 .....	9,005,898

The make of pig iron in 1914 was the smallest of any year in the ten except 1912. It follows the year of largest production. The average for the ten years was 9,693,265 tons; six of the years reported over that tonnage and four fell below it. The figures do not indicate any large prospective increase.

### ⌘ Antimony in Mexico

United States Consul W. L. Bonney writes from San Luis Potosi, Mexico, that "an antimony smelter is in course of erection in the city of San Luis Potosi and will be ready to start operation when mining and transportation conditions permit the ore supply to be shipped and the product exported. The machinery, which is American, is now ready for installation. It is expected that the plant will employ 150 men and the capacity is to be 3000 tons per annum of refined antimony. The product will be shipped to the United States. This will be the first and only smelter in Mexico producing refined antimony for the market. It is owned by American capital and will draw ores from its own properties in San Luis Potosi and Queretaro.

"The only antimony smelter heretofore operating in Mexico is located at Wadley, a small station on the National Ry., 102 miles north of San Luis Potosi. The Wadley smelter is not equipped for finishing the product, and has exported its product to England for further refining. The Wadley plant was erected about 14 years ago, and has drawn a large part of its ore from the Catorce district.

"Antimony has been found in many places in Mexico, especially in Durango, Sonora, and Oaxaca, and relatively small amounts of ore have been shipped to the United States for smelting; however, the Catorce deposits have been the best producers for the last 20 years."

### ⌘ Utah Copper Co.

The report of the Utah Copper Co. for the first quarter of 1915 shows a production of 26,415,995 lb.—8,009,646 in January, 8,202,467 in February and 10,203,882 in March. The total amount of ore treated was 1,396,341 tons, averaging 1.4393% copper. Average extraction was 65.72%. After making allowances for smeltery deductions, but without crediting miscellaneous income, the average cost of net copper was 8.188c. per lb. If all miscellaneous earnings were credited, including those from the Bingham & Garfield Ry., the net cost would be reduced to 7.289c. per lb. Increase in cost was due to winter-weather conditions.

The total net profit, including income from Bingham & Garfield Ry. and from Nevada Consolidated dividends, amounted to \$2,167,415. Dividends of \$1,218,367 were paid, leaving a net surplus of \$949,048 for the quarter. Earnings are based on a price of 14.93c. per lb. for copper. All copper unsold and in transit is carried at 13.5c. per lb.

Only the Magna plant was operated at full capacity until the end of January, after which business conditions improved and a partial operation of the Arthur plant was resumed. Thereafter both plants operated at about two-thirds normal capacity until the third week in March, when an increase was made reaching 75% capacity, and on Mar. 27 full capacity work was resumed.

The business of the Bingham & Garfield Ry. was satisfactory, an average of 10,978 tons of ore and 2134 tons of other freight being handled per day.



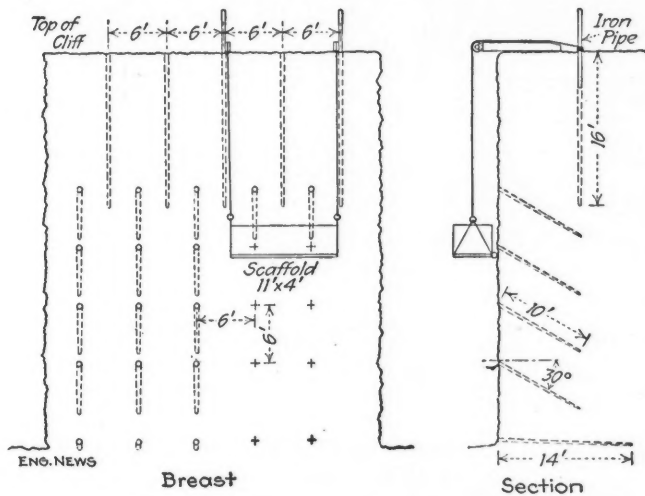
# Details of Practical Mining

## Quarrying with Air Hammer Drills on Scaffolds

New methods of ledge and cliff excavation have been developed since the advent of self-rotating hammer hand drills which would have been impractical with previous types of drills, according to Charles C. Phelps\* in *Engineering News*.

Formerly the familiar bench method was usual, the rock being removed in steps whose depth and width depended upon the size of mounted drills employed. Frequently deep holes were cut from the top of the cliff by churn drills and drill wagons.

In the new method, a support for the workmen is lowered over the edge of the cliff. There being no drill mounting to adjust, the time consumed in setting up and in changing steels is practically eliminated.



SKETCH OF BREAST DRILLING AT CAMPBELL & DEANE QUARRY, STRAW PLAINS, TENN.

In the figure is shown the scheme now employed at the Campbell & Deane Co. quarry, Straw Plains, Tenn. The rock is a hard blue limestone. Formerly, mounted piston drills (3 1/2 x 6-in. cylinders) were employed to remove the rock in benches. These were capable of drilling holes up to about 2 3/4 in. starting diameter, and a maximum depth of about 16 ft.

Under present procedure a row of vertical holes, 16 ft. deep, and spaced 6 ft. apart, is put in parallel with the face of the cliff by the tripod drills. Two lengths of gaspipe are inserted in the proper holes and ropes are fastened to them so that a scaffold can be lowered over the face of the cliff. It is fitted with winding drums so that the drillers can raise or lower it after it has been slung over the cliff. The hand-drill holes are spaced 6 ft. apart, vertically and horizontally, and are 10 ft. deep. At this depth, the steels cut to about 1 3/8-in. bottom diameter. The holes are inclined downward at an angle of about 30° from the horizontal. Un-

\*Ingersoll-Rand Co., 11 Broadway, New York City.

der present conditions one man with a hand-drill sinks about 80 to 100 ft. of hole per 10-hr. shift.

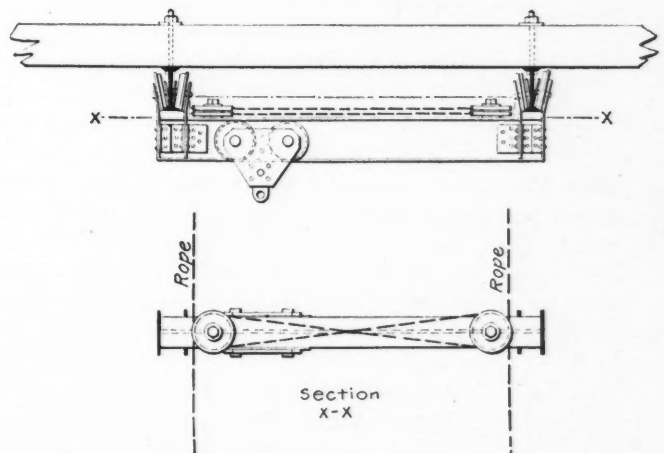
After the 10-ft. holes have been drilled from the top of the cliff to near the bottom, tripod drills are again put into use for drilling a line of horizontal holes on the very bottom of the cliff, these holes being 14 ft. in depth and looking down slightly from the horizontal. The holes in the side of the cliff are loaded each with 12 sticks of 60% dynamite and those at the bottom with 18 sticks. All the holes are shot simultaneously by battery. The cost of powder per cubic yard of broken stone is about 3 1/2c. with this system, whereas last year, when only tripod drills were used, the cost was 5 1/2c.

## Home-Made Traveling Crane

BY M. W. SHERWOOD\*

I notice in the JOURNAL of Apr. 10, 1915, an article by Percy E. Barbour describing a home-made traveling crane. I herewith suggest an improvement, which I believe will add materially to its efficiency. The expense of applying it is very small as compared to the cost of the rest of the construction.

I inclose rough sketches showing the arrangement of compelling the crane to move always parallel, even though



A HOME-MADE TRAVELING CRANE

in pushing the load the operator may apply the force only at one end. Two portions of light flexible wire rope—about 1/4 in. is heavy enough—extend from one end of the crane runway to the other, being made fast at each end. Each cable passes around sheaves on the crane as shown. It is apparent that both ends of the crane must advance at the same rate. A force applied at one end will be transmitted through the cable arrangement so as to be applied also at the opposite end. This is more readily comprehended if one cable shown in the sketch is considered as absent and the forces in one cable only analyzed at a time.

\*Franklin, Penn.

Without some such arrangement there will be a tendency for the crane to bind by becoming canted if the force applied to move the crane is not exactly in the center.

### Derrick Dangers

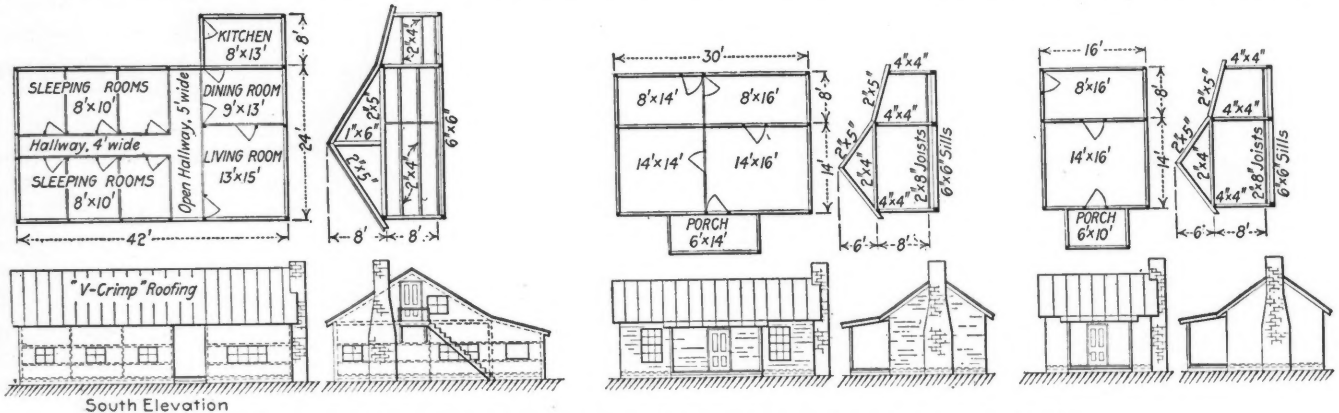
Some of the dangerous practices in the use of derricks are treated in a recent number of the *Travelers Standard*. It is absolutely essential that all the accessory hoisting apparatus be frequently examined. Much has been written regarding the desirability of frequent inspections of slings, wire ropes, chains, pulleys, hooks, and sheaves. This cannot be too strongly impressed on those in charge of derricks, for a great number of accidents are caused by the failure of one or more of these parts. A point not so often mentioned, but none the less equally as important as the others, is the condition of the gears. Gears with stripped teeth, or with teeth that are cracked or otherwise weakened, are apt to drop the load at a critical moment, and the sudden shock due to the quick stoppage of the load

in derrick operation, and particularly is this the case when a wide range of material, both as to weight and bulk, is being handled. In the handling of a miscellaneous class of material it is very easy for the uninitiated to underestimate the weight of a load, and by so doing greatly increase the chance of an accident. Likewise, experience is required in the proper adjustment of the slings for unwieldy masses and objects of unusual shapes, so that there will be no slipping or an unbalanced stress on one sling.

### Miners' Dwellings

By P. E. BARBOUR

One boarding house, two four-room houses and three two-room houses, in accordance with the accompanying drawings, were built complete at the Montgomery mine, Candor, N. C., for the sum of \$1223. The buildings were of plain boards, battened up and down, and the rooms inside were finished overhead only. The sills were 6x6 in. and the corner posts 4x4 in. All roofs were covered with



TYPES OF MINE DWELLINGS AT THE MONTGOMERY MINE, CANDOR, N. C.

Boarding house—Sills, 6x6 in.; corner posts, 4x4 in.; studding, 2x4 in.; girts, 2x4 in.; floor joists, 2x8 in.; sheathing, 1-in. boards, vertical, with 3-in. battens. Roofing 28-gage V-crimp. Ceiled inside overhead only, walls left rough. Sash made to slide, no weights or cords used.

Four-room house—Sash, 6-light, 10 x12 in. Doors, 2 ft. 6 in. by 6 ft. 6 in. Chimney, 4 ft. Roofing, 28 gage V-crimp. Shiplap or Germah siding. Interior ceiled overhead only. Inside walls left rough.

Two-room house—Sash, 4 singles. Doors, 2 ft. 6 in. by 6 ft. 6 in. Chimney, 4 ft. Roofing, 28 gage V-crimp. Siding, shiplap or rough boards with battens. Ceiled overhead only.

when the remaining good teeth become engaged is apt to strain the entire derrick structure beyond the breaking point. The gears, therefore, should be examined daily, and should be replaced by new ones before the work is allowed to proceed, if any excessively worn or weakened teeth are discovered.

When wire rope is used on a derrick, the blocks and sheaves are of considerably smaller diameter than is generally used for a given size of rope under other conditions. A sheave 40 times the diameter of the rope would be cumbersome and obstructive. A smaller sheave of adequate strength serves just as well, but because of the excessive bending stresses in the rope passing over the sheave a shorter useful rope life is to be expected. This is one of the details that must be considered if the safe operation of the derrick is to be maintained.

If a sheave is used near the hook, it should have a guard to prevent the workman's fingers being caught on the inrunning side. This guard would also afford a convenient and conspicuous place to state the safe carrying load. The boom should also have marked on it the carrying capacity, and should be provided with a graduated scale showing the safe working load for different positions of the boom.

A thoroughly reliable and competent man is a necessity

28-gage, V-crimped roofing and painted. Lumber cost \$12 to \$15 per M and labor, from \$1.25 to \$3 per day. The two-room houses were for negro laborers; the other dwellings were for whites. Rent at the rate of 50c. per room per month was charged for all company dwellings, being \$1 for the negroes and \$2 for the whites per month. These dwellings were good enough for the climate and were considered desirable by the dwellers.

### Surveyor's Duplex Slide Rule

The fact that all astronomical data essential to surveying, such as azimuth, time, latitude, etc., can be ascertained by means of the usual type of transit with vertical circle, but without solar attachment, while generally known, is rather seldom utilized in this country. The main reason for this surprising condition is the difficulty of computing in the field, by spherical trigonometry, the results of the observations.

To render these data more easy of calculation the Keuffel & Esser Co., New York, has introduced a surveyor's slide rule, of accuracy commensurate with the ordinary transit reading to 1 min. of arc, which enables the quick and accurate solution of the following problems: (1) Determining the sun's bearing or azimuth,



having the latitude, the declination of the sun and the sun's altitude; (2) stadia reductions—obtaining the horizontal and vertical distances, having the rod reading and the vertical angle; (3) computing the latitudes and departures of the courses, having the length of the course and the bearing; (4) finding the meridian by elongation of Polaris or some other circumpolar star, having the declination of the Polaris (or the other star) and the latitude; (5) determining the hour angle (time) by measuring the sun's altitude, having the latitude, the declination of the sun and the sun's altitude; (6) all general numerical calculating.

### Water-Tank Controlling Device

The device illustrated herewith (*Power*, May 18, 1915) to stop a pump when the tank is filled and to start it when the level of the water has fallen to a predetermined point.

The apparatus (Fig. 1) consists of a brass pipe, its

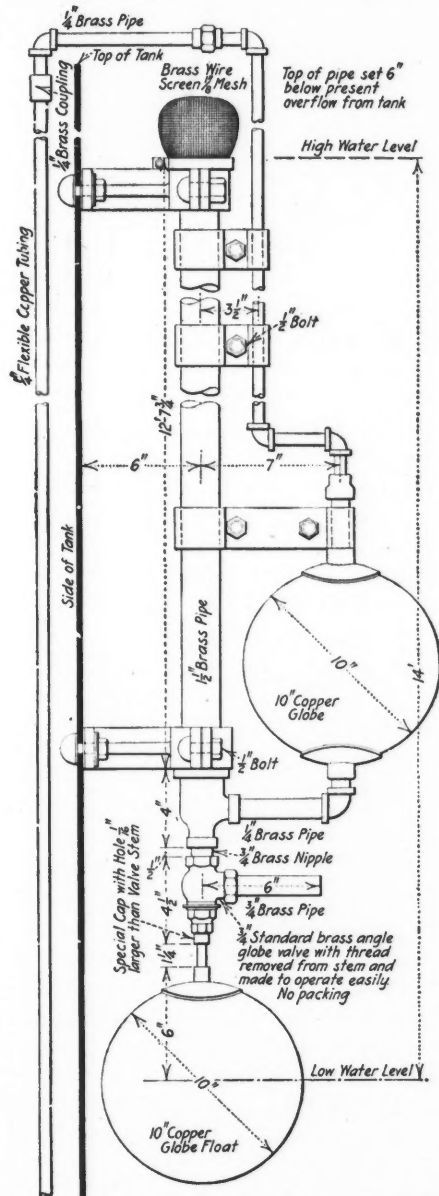


FIG. 1. CONTROLLING APPARATUS IN DETAIL

length being the distance between high level and low level of the water in the tank. The upper end of this pipe is supplied with a strainer, and a valve and copper float are attached to the lower end. Near the lower end

a fitting is provided to which an air reservoir is attached. From the top of this reservoir a pipe is carried to the top of the tank and thence by a flexible copper tube to a damper regulator located near the supply pump. The damper regulator is used to actuate a balanced valve or other device for starting and stopping the supply pump.

The mechanism operates as follows: The water rising in the tank to the top of the pipe overflows into it and compresses the air in the air reservoir. The pressure due to

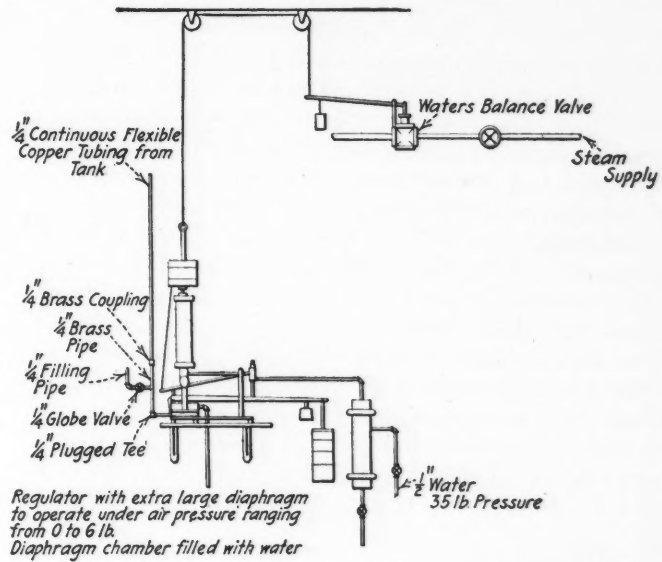


FIG. 2. REGULATOR CONNECTIONS

the height of the water in the pipe is transferred through the flexible copper tube to the damper regulator, and it actuates the pump-controlling mechanism and stops the pump. This pressure is held constant until the water in the tank falls to the bottom of the pipe, when the float valve opens and allows the water to escape, relieving the air pressure; and the damper regulator starts the pump. The apparatus was designed and installed by the Samuel M. Green Co., Springfield, Mass.

### Tamping and Stemming

Some confusion exists as to the meaning of the words tamping and stemming as used in mining literature, especially that of the U. S. Bureau of Mines and of some sources in England.

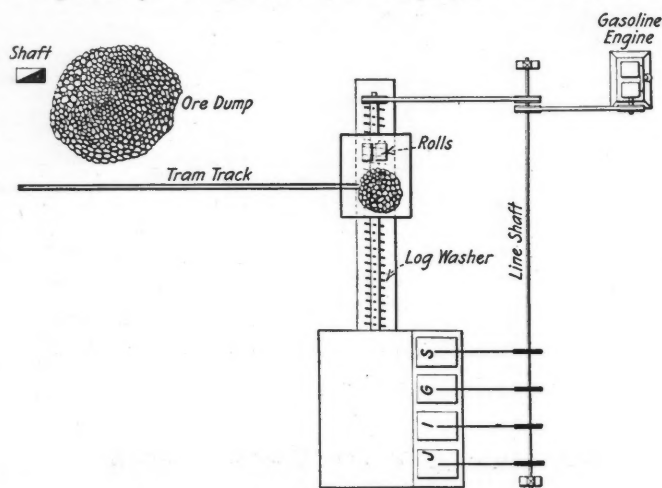
Originally tamping meant the compressing of a charge of black powder in the bottom of a borehole. The term "tamping" was later expanded to include the inert material which confines the explosive in the hole so that it would not be blown out. When dynamite came into common use it was quickly recognized that tamping it into the bottom of a hole with the force used on black powder would be extremely dangerous. Confining the charge, however, with inert material placed in the upper portion of the borehole is, with few exceptions, considered advisable, if not necessary. In common mining parlance, tamping is now, and for a long time has been, used to designate both this inert material and the operation of compressing it into place. In the literature above mentioned, however, the word stemming designates the inert material, either in the case of dynamite or any other kind of blasting powder, while tamping is reserved to indicate only the process of compressing the stemming in place.

## Details of Milling and Smelting

### Cleaning Carbonate Ores at Highland, Wis.

BY W. F. BOERICKE\*

Much of the carbonate ore in the Highland, Wis., zinc district is mined by leasers. These are often men of limited capital and not prepared to make any considerable investment in milling equipment even if the "diggings" warrant it. In many cases, however, the material to be cleaned up consists of only a few hundred tons of ore, and anything but the cheapest and most easily constructed equipment would never return its cost. Except in a crude way, therefore, not much attention is paid in the construction of these little plants to economy of operation. The main idea is to erect them with the least possible cash outlay and at the same time to effect the largest practical saving of the mineral content. Under these circumstances the logwashing outfits and hand jigs found in the district are probably the machines for the job, and do the work



PLANT FOR CLEANING CARBONATE ORES

with a greater ultimate economy than a more elaborate and costly plant.

The usual procedure for the leasers is to mine and hoist out the ore in the cold winter months, piling it conveniently near the shaft and making no attempt to clean up until spring and summer, when it is possible to work in the open and obtain water for milling purposes without freezing troubles. The mines make little water, which must be carefully conserved for milling uses. Fortunately the log washers and hand jigs get along with the minimum quantity; and as no attempt is made to clean a large tonnage a small gasoline pump from the mine will suffice.

The ordinary cleaning plant used at Highland consists of a set of rolls, a log washer and two or three jigs, the number depending on the amount of ore to be cleaned daily and the richness of the feed. The accompanying sketch shows the layout of a successful little plant that was treating about 6 tons of hand-picked ore daily and making 3 or 4 tons of 40% "mixed" ore per 8-hr. shift.

\*Galena, Ill.

Four men, all leasers, were needed to operate the plant. One man loaded the sorted ore into a car at the dump and trammed it to the rolls. Another man fed the rolls, breaking up the large pieces to 3-in. size with a spalling hammer. The ore being friable, no other preliminary crushing was necessary. The other two men looked after the washer and jigs.

The ore had been sorted and contained little waste. It consisted of "bone" and "jack," in about equal proportions. It was fed to the 12x14-in. rolls in 3-in. pieces. The rolls were set close and made 10 r.p.m. The amount of dirt put through was only 6 tons in 8 hr., from which 3 tons of concentrates was made. As the average mill feed in a big mill is only 6 or 7% concentrates, it can be seen how comparatively rich this feed was.

The crushed ore from the rolls dropped directly down upon the log washer and the concentrates produced were moved toward the jigs. The washer consisted of a 10-in. timber, trimmed octagonally, with a shaft through the center resting in trunnions at each end. Blades of ¼-in. iron, 7½x3 in., were set spirally on the timber, and as the log revolved these blades disintegrated the ore and at the same time acted as a screw conveyor, forcing the heavier particles toward the head of the washer, while the lighter gangue was washed toward the rear end. It was turned by a gear making 8 r.p.m. The feed came near the rear end of the washer, falling on the ascending blades. The concentrates were gradually worked up toward the fore end and discharged on the jig floor, while the tailings were carried down by the constant stream of water that entered at the fore end. The device makes a surprisingly good separation, needs little water and less power and a minimum of attention. In this case all the water needed for it came from the overflow pipe of the gasoline engine used to furnish power. The total length of the washer was 14 ft., and the fore end was raised 5 in. above the rear end to provide the necessary grade.

The crude concentrates, after passing through the log washer, were shoveled on to the jig beds. Four jigs, 4x2 ft. 6 in., were operated by pulleys from the lineshaft, which consisted of pieces of 2½-in. pipe resting in pillow blocks of 4x5-in. timber. The jigs made 160 strokes per minute, with a 3-in. throw to the eccentric. The sieves were filled to within an inch of the top with crude concentrates and cleaned by hand every three minutes, the tailings being shoveled off the top and thrown to one side. The tray for holding the concentrates measured 3 ft. 3 in. by 1 ft. 6 in., with a depth of 10½ in. The jig beds were 3 in. deep and consisted of galena. Jig grates were ¼ in. mesh. After the jig tank is filled with water no more is needed for cleaning the ore. Power is furnished by a 12-hp. gasoline engine, which is ample. The drive goes to a countershaft and from there is belted to the various machines.

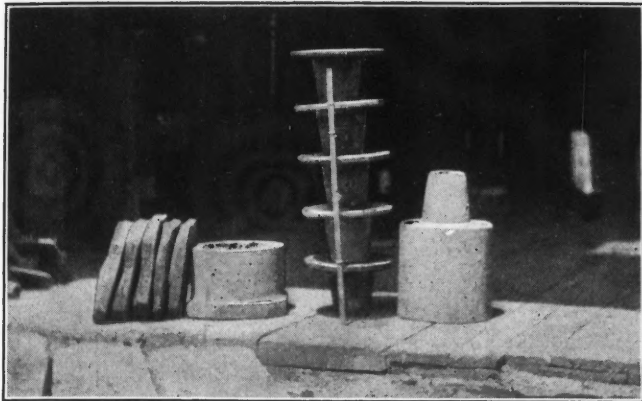
It would be hard to find an outfit that could be erected with less expense than this one. A few hundred dollars would cover the entire bill. In considering its efficiency it must be remembered that an additional saving would



entail a very much larger cost, not to be considered for the small amount of ore to be cleaned up. With no more elaborate plants than this one, hundreds of tons of carbonate ores were cleaned and sold in the Highland district last year. The entire plant can be easily moved around when the diggings are worked out, and thus always commands a good salvage. Skilled millmen or mechanics are not needed, although a good deal of experience is necessary to handle the hand jigs to the best advantage.

### Maximum Use of Shoes and Dies

In the accompanying photograph is shown a noteworthy accomplishment in securing the utmost possible efficiency from shoes and dies in stamp-battery work. The new shoes and dies are shown in contrast to those used as long



WELL-WORN SHOES AND DIES

as possible to give satisfactory production. The results were achieved by careful watching of the batteries and by regular and systematic feeding. They were obtained at the New Reliance mill, at Trojan, S. D.

### Waihi Grand Junction Mill

A description of the cyaniding process employed at the mill of the Waihi Grand Junction, on North Island, New Zealand, is described by Noel Carless in an extensive article.<sup>1</sup> The precise capacity of the mill is not stated, although it may be placed at about 400 tons per day, since there are 40 stamps, and it is said that the stamp duty has reached as much as 10.5 tons per stamp per day. The general system of treatment is crushing, stamping in 1100-lb. stamps, separation, tube milling, concentration and then separate treatment. The concentrates formed are returned to the tube mills for regrinding, being in a closed cycle from which they cannot emerge until ground fine enough to go off with the slimes.

The separation of sands and slimes is carefully made, and it is a fact of interest that the sands leached are finely ground. Only 4.5% of them will remain on a 100-mesh screen, while 40.9% pass through 200 mesh. It seems that in the grinding and separating processes gone through most of the value is extracted from the sands, so that when they reach the leaching tanks no serious treatment is given them other than a thorough washing, first with barren solution and then with water, after which they are discharged.

The slimes are treated in pneumatic agitators and fil-

<sup>1</sup>"Bull. 127," I. M. M., Apr. 8, 1915.

tered through a filter of the Moore type. Costs are given as follows:

COST OF MILLING AT WAIHI GRAND JUNCTION IN 1912	
Crushing .....	\$0.1338
Stamping .....	.2169
Tube milling.....	.3284
Concentrating .....	.0648
Treatment .....	.5817
Bullion cleanup .....	.0648
Assaying .....	.0446
General .....	.1013
<b>Total .....</b>	<b>\$1.5363</b>

The ore consists of quartz, manganiferous calcite and mineralized propylite, with about 10% of sulphides, chiefly pyrites, with which are associated galena, sphalerite, chalcopyrite, argentite and traces of arsenic, antimony or selenium. Ruby silver was found in one place.

Ore is crushed in 0.11% solution, and lead salts, about 0.5 lb. litharge and 0.22 lb. lead acetate, are added at the mortar boxes. Consumption of shoes and dies is 0.23 lb. per ton crushed for forged-steel shoes and 0.19 lb. per ton for cast-steel dies. There are 10 tube mills, two 19 ft. 3 in. long and 4 ft. 8 in. in diameter. Each of these requires 42 hp. at 25 r.p.m. Consumption of pebbles is 8 cwt. per week. The remaining eight mills are 16 ft. 3 in. long and 4 ft. 3 in. in diameter, requiring 27.5 hp. to operate at 27 r.p.m. and consuming 6 cwt. of pebbles per week. Consumption of sodium cyanide is 0.95 lb., or, in terms of KCN, 1.23 lb. per ton of ore crushed. Alkalinity is maintained by the addition of 0.9 lb. of caustic soda per ton crushed. Power to run the mill is placed at 710 hp., exclusive of lighting.

### Molybdenum Recovery by Elmore Process\*

The increasing demand of molybdenum for use as a hardening agent in the manufacture of steel makes the production of this metal of particular interest at present. The difficulty of commercial utilization of the ores of molybdenum is found in the separation of the mineral from the gangue; the molybdenite being soft and flaky, a large proportion becomes powdered in course of crushing, and is not recoverable by the ordinary method of washing. In a great many instances this difficulty has been overcome by the Elmore process.

The method is used at two mines in Norway, at one of which the plant is about to be enlarged, and large quantities of molybdenite concentrates have been shipped.

Several parcels of ore aggregating over 100 tons have been treated at the Elmore testing plant in London with the following results:

Tons	Percentage MoS <sub>2</sub> in Concentrates	Percentage Extraction
32	85.68	91.5
32	86.30	94.5
37	84.25	89.7
3 1/2	83.00	90.9
104 1/2	84.80	91.7

The ores in the above-cited tests were crushed to 30 mesh.

**King-Posts in a Stamp Battery** are often thrown out of plumb as a result of the settling of bins to which they are connected, says the "Australian Mining Standard," Jan., 1915, and also by reason of continual vibration. In either case it is preferable to allow them to retain the firm and settled position in which they have placed themselves rather than to attempt to re-plumb them. The guide blocks and camshaft bearings should be slightly altered in order to plumb the stems and level the camshafts.

\*From data furnished by the Ore Concentration Co. (1905)-Ltd.

# The Cost of Doing Things

## Hollinger Mining and Milling Costs

The figures printed herewith give the details of mining and milling costs at the Hollinger Gold Mines, Timmins, Ont. The total cost reported by the company in its annual report for mining, milling and other charges, including 79.2c. for depreciation of plant, was \$5.213 per ton of ore milled. There were 209,999 tons of ore and 28,850 tons of waste removed from the mine, practi-

### HOLLINGER MINING COSTS

Account	Per Ton	
	Ore Milled	Rock Broken
General mining charges	\$0.031	\$0.022
Superintendence	.069	.050
Diamond drilling	.053	.038
Crosscutting	.103	.074
Shafts	.050	.036
Drifting	.352	.254
Raising	.026	.019
Winzes	.031	.022
Tramways	.008	.006
Timbering, shafts, winzes, etc.	.044	.032
Stoping	.741	.534
Scaling	.016	.011
Timbering drifts and stopes	.140	.101
Track laying	.033	.023
Tramming	.415	.300
Pipefitting underground	.035	.025
Mine drainage	.034	.024
Hoisting	.196	.141
Landing and dumping	.040	.029
Drill repairs	.068	.049
Sharpening steel	.099	.071
Collecting steel	.039	.028
Mine sampling	.026	.019
Assaying	.006	.005
Change house	.009	.007
Surveying	.013	.009
Mine lighting	.023	.017
<b>Total</b>	<b>\$2.700</b>	<b>\$1.946</b>

### MILLING COSTS AND DATA

Tons of ore milled, including 2910 tons at \$11.17 for Acme	211,846
Average value per ton	\$13.60
Total value sent to mill	\$2,889,919
Average tons per day	583.59
Per cent. of possible running time	92.2
Average tons per 24 hr. of running time	632.97
Stamp duty per 24 hr. of running time	13.30
Unrecovered values:	
Concentrates stored for re-treatment	\$53,686
Loss in filter tails	116,879
Values recovered	2,719,354
Value per ton in tailings	56c.
Cyanide consumed per ton of ore	0.525 lb.
Lime consumed per ton of ore	1.557 lb.
Zinc consumed per ton of ore	0.532 lb.
Acid consumed per ton of ore	0.216 lb.
Lead acetate consumed per ton of ore	0.0031 lb.
Tons of solution precipitated per ton of ore	2.315
Zinc added per ton of solution	0.230
Average value of pregnant solution	\$5.698

### COSTS PER TON OF ORE MILLED

General mill charges	\$0.054
Superintendence	.047
Tailings disposal	.018
Lighting	.011
Heating	.039
Shoveling in bins	.012
Crushing	.079
Conveying	.034
Stamping	.160
Classification and tube milling	.188
Concentration	.062
Handling concentrates	.007
Treating concentrates	.032
Handling pulp	.040
Thickening	.014
Continuous decantation	.031
Filtration	.103
Neutralization	.012
Clarifying and precipitation	.063
Refining	.059
Pumping solutions	.021
Cyanide	.083
Cleaning mill	.019
Alterations	.034
Assaying	.015
<b>Total</b>	<b>\$1.237</b>

cally all of which came from above 425 ft. There were 297 men employed in the mine and 140 in the mill, office and general work, which indicates that about 480 tons of ore are handled per year per man. Men engaged in new construction work are not included in this figure. The accompanying table shows the distribution of mining costs as reported.

## West Rand Consolidated Mines Costs

The report of the West Rand Consolidated Mines for 1914 shows a production of 364,856 tons of ore, of which 310,750 tons was milled. The accompanying table gives a review of the milling operations:

### MILL DATA OF THE WEST RAND CONSOLIDATED

Milling	
Tons milled	310,750
Average number of stamps running	100
Total days run	285.85
Average duty per stamp per 24 hr., tons	10.871
Tube mills working	4
Total fine gold recovered, oz.	53,000.813
Recovery per ton milled	\$3.51
Cyaniding	
Tons of sands treated	168,584
Average value of sands charges	\$2.62
Average value of residues	.28
Tons of slimes treated	123,286
Average value of slimes charges	\$1.90
Average value of slimes residues	.24
Tons of concentrates treated	18,300
Average value of concentrate charges	\$8.06
Average value of concentrate residues	.95
Total tons treated	310,170
Average value per ton treated	\$2.65
Average value of residues	.30
Theoretical extraction, per cent.	88.43
Actual extraction, per cent.	89.80

The total recovery from milling was 53,000.813 fine ounces, or \$3.51 per ton treated; and from cyaniding, 36,006.733 oz., or \$2.38 per ton—a total of \$5.89 per ton milled. The working costs are shown in the accompanying table:

### WORKING COSTS OF THE WEST RAND CONSOLIDATED

	Per Ton Milled
Mining	\$2.65
Sorting, crushing and transporting	.18
Milling	.38
Cyaniding	.40
General expenses	.53
Office expenses	.50
Development redemption	.50
<b>Total</b>	<b>\$4.85</b>

## Stoping Costs at Copper Mountain, Utah

The accompanying tables show the working costs in the stopes of the Salt Lake Copper Co. at Copper Mountain.

### MINING COSTS AT THE SALT LAKE COPPER CO.'S MINES

	Level East "A"		Level West "A"		"B" Level	
	Costs per Ton		Costs per Ton		Costs per Ton	
Breaking	\$0.81		\$0.81		\$0.28	
Tramming	.82		.45		.33	
Sorting	.18		.19		.	
Powder	.10		.11		.04	
Fuse	.02		.02		.01	
Caps	.01		.01		.004	
Candles	.04		.03		.01	
Timbering	.		.06		.01	
General expense	.61		.65		.72	
<b>Total cost</b>	<b>\$2.59</b>		<b>\$2.33</b>		<b>\$1.404</b>	
<b>Tons produced</b>	<b>243.1</b>		<b>243.3</b>		<b>676.2</b>	



Item	Stope 102, Costs per Ton	Stope 108, Costs per Ton	Glory Hole, Costs per Ton	Station (a)
Breaking	\$0.95	\$0.90	\$0.51	\$252.00
Tramming	.93	.62	.54	253.90
Powder	.10	.10	.05	16.90
Fuse	.02	.03	.01	3.54
Caps	.01	.01	.01	1.48
Candles	.05	.04	.03	11.92
General expense...	.74	.68	.69	33.46
Total cost.....	\$2.80	\$2.38	\$1.84	\$578.20
Tons produced.....	287.6	368.2	182.4	

(a) Station, 50 ft. long by 22 ft. high by 9 ft. 6 in. wide = 386 yd. at \$1.49.

tain, working oxidized deposits in limestone by the square-set system. The last column shows the expense per yard of cutting a station underground. The item for general expense includes the cost of running a 3-mile aerial tramway. Miners received \$3.50 per shift of 8 hr.; trammers, \$3.25. The powder used was 40% Hercules; cost, \$17.75 per 100 lb. at the mine; fuse, \$32.50 per case of 6000 ft.; xxxxx caps cost 86c. per 100; and candles, 40 set 12 oz., 6's, \$3.45 per box.

### Mining Costs at Goldfield

The annual report of the Goldfield Consolidated gives, in a wealth of detail, the mining costs of 1914, during which time more than 30,000 ft. of development work

is because the total tonnage was not all produced by stoping; 18,000 tons came from development work, nearly 6000 tons came from contractors and over 5000 tons was

TABLE 1. TOTAL OPERATING COSTS

	Per Ton Total Ore
Mining	
Stoping.....	\$2.39
Development.....	0.65
Total mining.....	\$3.04
Moving dumps.....	0.04
Transportation.....	0.08
Milling.....	1.58
Concentrate treatment.....	0.27
Marketing by-product.....	0.03
Marketing bullion.....	0.04
Freight and treatment ore shipped.....	0.13
Sampling and shipping expense.....	0.005
General expense—including office, legal, corporation, administration and industrial insurance.....	0.37
Elko Prince examination.....	0.005
Tailings royalty.....	0.02
Filter royalty.....	0.05
Bullion tax.....	0.09
Income tax.....	0.05
Property tax.....	0.05
Flood damage.....	0.17
Contract ore.....	0.17
Total operating expenses.....	\$6.02

of high grade obtained from methods other than stoping. Beyond this the two tables require no explanation. They will earn, as they deserve to do, the commendation of

TABLE 2. DETAILS OF MINING EXPENSES

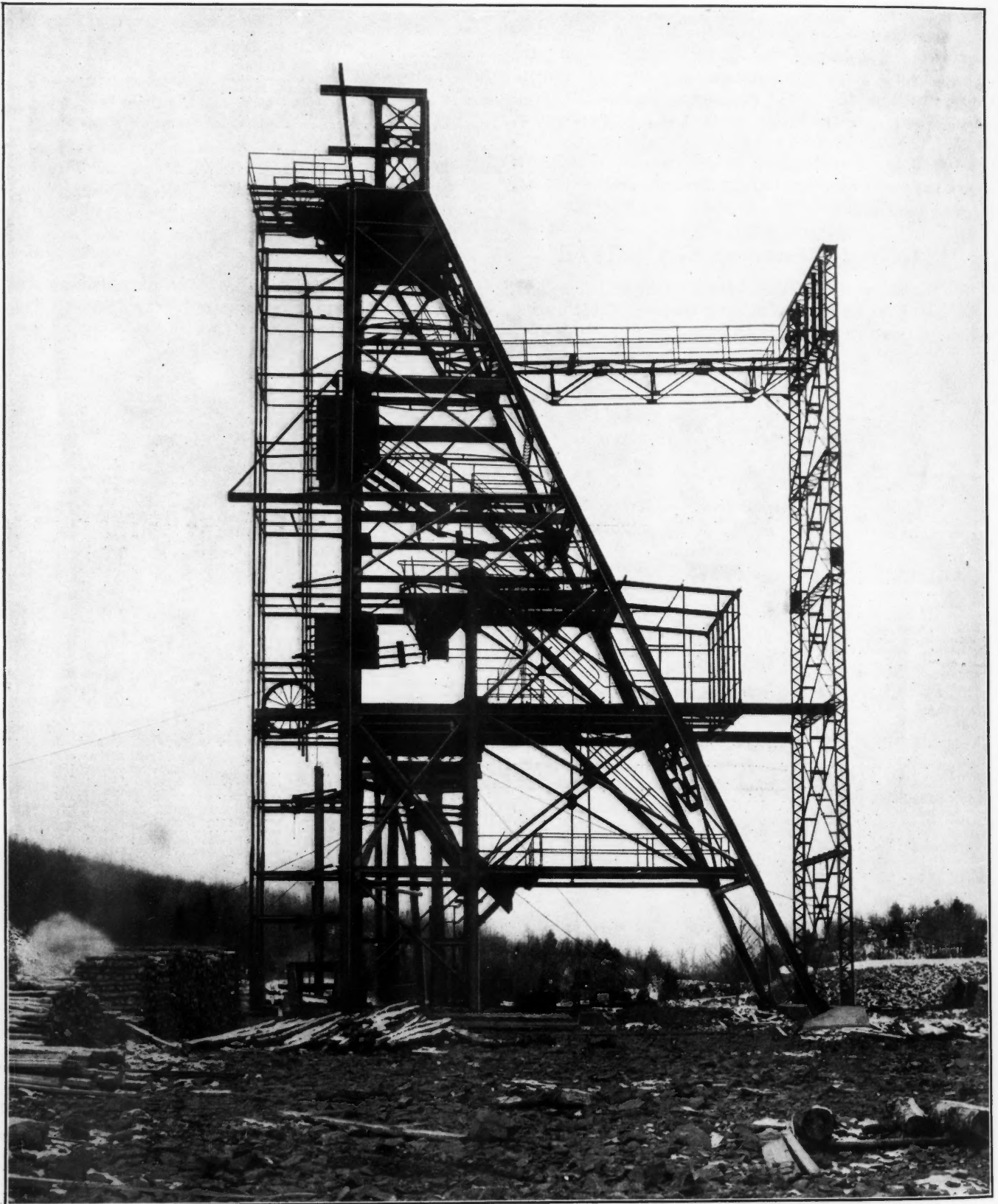
Item	Stoping Costs per Ton					Development Costs										Total Tons 300,993	Per Cent. Total Cost	
	Breaking	Timbering	Total Tons 282,936	Hoist- ing	Pump- ing	Sur- face	Total	18,415 ft. Drifts and Crosscuts, per ton	11,251 ft. Raises per ton	362 ft. Winzes, per ton	379 ft. Diamond Drilling, per ft.	Total 30,028 ft., per ton	Total Tons 300,993					
Superintendence.....	\$0.010					\$0.010	\$0.051		\$0.045		\$0.096		\$0.005	\$0.014				
Foreman.....	0.014					0.014	0.061		0.052		0.096		0.006	0.019				
Shift bosses.....	0.039					0.039	0.221		0.186		0.379		0.021	0.058				
Miners.....	0.436				\$0.001	0.437	1.505		1.326		3.436		0.147	0.556				
Shovelers.....	0.416					0.416	1.270		1.266		2.590		0.112	0.503				
Trammers.....		\$0.129				0.129	0.124		0.159		0.330		0.014	0.135				
Timbermen.....	\$0.231					0.231	0.425		0.333		0.856		0.039	0.257				
Cagers.....			\$0.038			0.038	0.031		0.039		0.056		0.003	0.039				
Hoistmen.....			0.060			0.060	0.049		0.064		0.095		0.005	0.062				
Top carmen.....			0.068			0.068	0.053		0.078		0.143		0.006	0.070				
Shaftmen.....	0.039					0.039	0.046		0.048		0.078		0.005	0.041				
Pumpmen.....				0.011		0.011	0.052		0.041		0.085		0.005	0.015				
Nippers.....	0.032					0.032	0.166		0.143		0.236		0.015	0.045				
Filling labor.....	0.250					0.250								0.235				
Blacksmiths.....					0.021	0.021	0.105		0.090		0.163		0.010	0.030				
Blacksmiths' helpers.....					0.004	0.004	0.010		0.010		0.021		0.001	0.004				
Carpenters.....					0.013	0.013	0.062		0.051		0.135		0.006	0.018				
Watchmen.....					0.013	0.013	0.074		0.065		0.192		0.007	0.020				
Diamond drill.....												\$2.327	0.003	0.003				
Diam'd-drill helpers.....												1.774	0.002	0.002				
Miscellaneous.....	0.040				0.018	0.058	0.293		0.258		0.498		0.028	0.083				
Total labor.....	\$1.237	\$0.270	\$0.129	\$0.166	\$0.011	\$0.070	\$1.883	\$4.598	\$0.281	\$3.798	\$0.142	\$9.490	\$0.12	\$0.005	\$4.409	\$0.440	\$2.209	64.78
Timber lagging.....		\$0.462					\$0.462	\$0.298		\$0.519		\$0.584		\$0.038	\$0.472			
Explosives.....	\$0.093						0.093	0.682		0.587		0.915		0.065	0.152			
Illuminants.....	0.018	0.004	\$0.002				0.024	0.069		0.059		0.133		0.007	0.029			
Drills—fittings.....	0.023						0.023	0.142		0.102		0.226		0.013	0.035			
Pipe—fittings.....	0.004						0.004	0.032		0.030		0.034		0.003	0.007			
Track—fittings.....			0.003				0.003	0.018		0.014		0.020		0.002	0.004			
Cars, repairs.....			0.002				0.002	0.013		0.012		0.019		0.001	0.003			
Iron—steel.....					0.006	0.006	0.040		0.032		0.070		0.004	0.009				
Lubricants.....				0.004		0.004	0.010		0.006		0.023		0.001	0.005				
Tools.....	0.008					0.008	0.037		0.032		0.072		0.003	0.011				
Diamond-drill parts.....												0.918	0.001	0.001				
Sundries.....						0.041	0.041	0.283		0.214		0.490		0.026	0.066			
Total supplies.....	\$0.146	\$0.466	\$0.007	\$0.004		\$0.047	\$0.670	\$1.624	\$0.099	\$1.607	\$0.061	\$2.586	\$0.003	\$0.001	\$1.641	\$0.164	\$0.794	23.27
Engineering.....	\$0.017						0.017	0.215		0.208		0.386		0.022	0.038			
Assaying.....	0.102						0.102	0.475		0.415		0.889		0.046	0.140			
Mechanical dept.....					0.035	0.035	0.129		0.127		0.198		0.013	0.046				
Electrical dept.....					0.011	0.011	0.053		0.056		0.057		0.005	0.016				
Sampling.....	0.004					0.004	0.012		0.011		0.072		0.001	0.005				
Surface.....					0.015	0.015	0.063		0.063		0.024		0.006	0.020				
Power.....	0.072			\$0.030	\$0.013		0.115	0.347		0.331		0.563		0.034	0.143			
Total dept.....	\$0.195			\$0.030	\$0.013	\$0.061	\$0.299	\$1.294	\$0.080	\$1.211	\$0.045	\$2.189	\$0.002		\$1.274	\$0.127	\$0.408	11.95
Grand total.....	\$1.578	\$0.736	\$0.136	\$0.200	\$0.024	\$0.178	\$2.852	\$7.516	\$0.460	\$6.616	\$0.248	\$14.265	\$0.017	\$5.019	\$7.324	\$0.731	\$3.411	100.00
Per cent. total.....																		

was done and 338,192 tons of ore mined. In Table 1 are given the total operating costs based on the total tonnage given in the foregoing. In Table 2 are given detailed stoping and development costs, which are apportioned to the two different tonnages given in the table. The reason these tonnages differ from the total tonnage production

the profession for the policy of the company in publishing such figures.

The MacNamara M. & M. Co. of Tonopah reports that milling costs for the seven months from Dec. 1, 1913, to July 1, 1914, were: Mining direct, \$4.237; development, \$1.094; mining indirect, \$0.639; milling direct, \$3.517; marketing, \$0.202; interest, \$0.198; milling indirect, \$0.407; total, \$10.344 per ton.

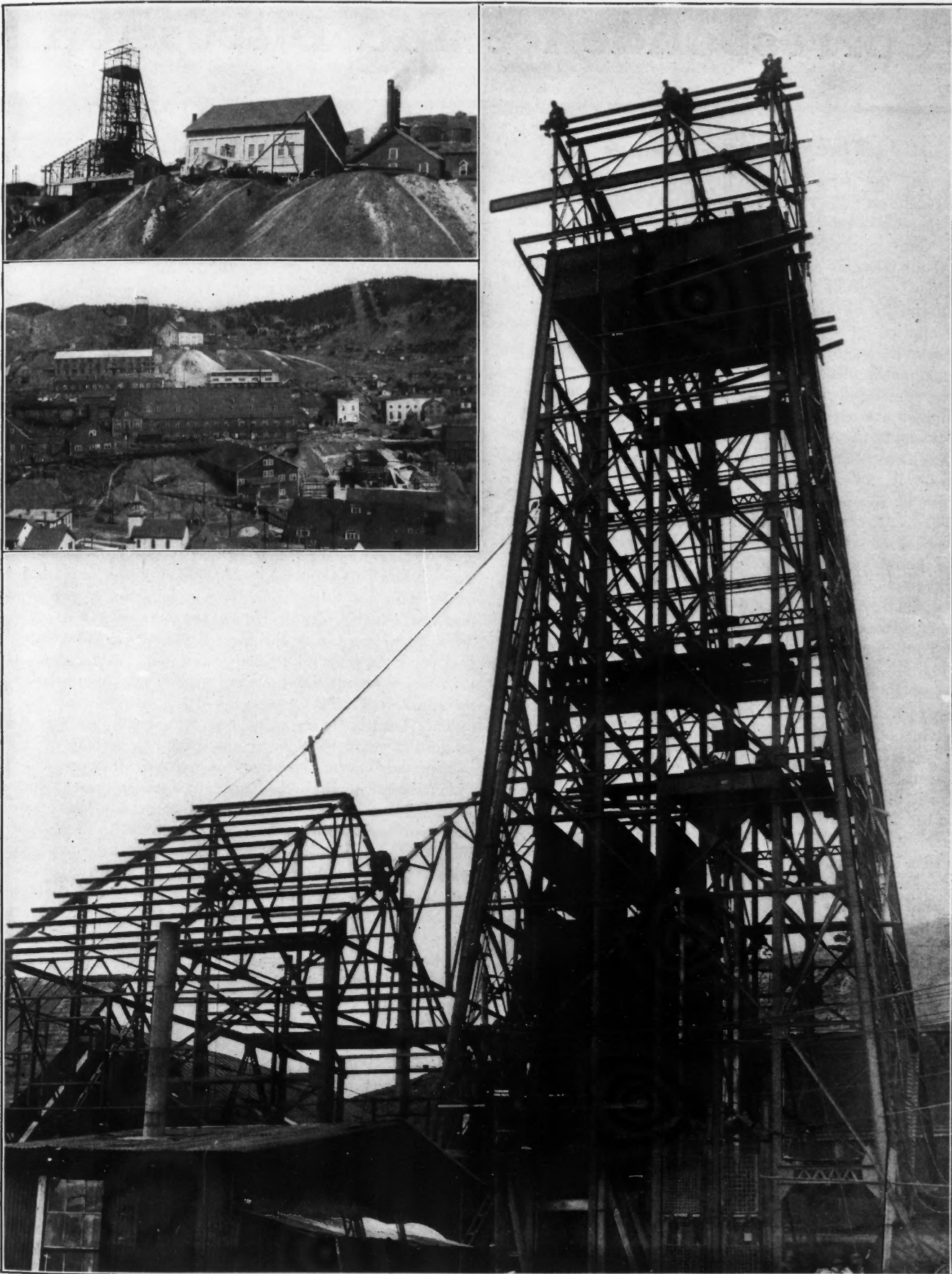
## Photographs from the Field



STEEL HEADFRAME OF ISABELLA MINE, OF CASCADE MINING CO.

This mine is at Palmer, on the Marquette Range, Mich., and has just entered the producing stage





NEW HEADFRAME AT THE B. & M. SHAFT OF THE HOMESTAKE, LEAD, S. D.

The small photos show different views of the headframe and of the boiler and electric plants now under construction

## Correspondence and Discussion

### The Patent Mania

I note the letter on the subject of patents from Mr. Croasdale on p. 744 of the JOURNAL of Apr. 24, and am led thereby to offer the following concrete cases from my experience as illustrations:

About 20 years ago I invented a cutoff valve for steam engines, operated by a single eccentric, which worked beautifully on a high-speed engine that I built.

I applied for a patent, and a patent issued in 1833 was cited by the examiner. While this inventor had the same fundamental idea, he had never reduced it to a practicable working device, and no benefit had ever been derived either by himself or anyone else from his patent.

Owing to the action of the Patent Office there was no inducement for me to go ahead and develop the device and market it, for the reason that I was not in the steam-engine business, and if I had attempted to go into it without any protection for the idea, as soon as I began to make any progress my competitors would naturally adopt the idea, and I would be without any compensation for the development work. Therefore in that case the Government, instead of promoting the development of improvements and accelerating progress in the art, held up a dead hand which actually prevented progress in this case.

The question that naturally arises is: What advantage is it to invention and progress to keep records of patents longer than their life, and what advantage is it to prevent invention by quoting a dead reference? If the present practice is carried on for a sufficient number of years it seems obvious that there will eventually be so many records to go through that we will all have to stop work and become patent examiners, in which case we will be in much the same position with anyone who gets so wrapped up in a system as to spend all his time in systematizing instead of doing productive work.

What objection is there to a liberal issue of patents to anyone who is making a bona-fide reduction to practice of any improvement where it cannot be shown definitely that such a patent would interfere with anyone who is actually producing a similar design? In the case of criminals the burden of proof is placed upon the Government, but the honest inventor has not only to prove his case, but he often has to submit to the domination of the personal opinion of some Government official backed up by purely technical theories or ideal dreams that have never got further than the paper they were printed on.

The fad of law-making has become so developed in recent years that it appears to have become a prolific field for the type of inventor whose reasoning faculties never carry him far in the engineering field when he attempts to reduce his ideas to practice.

It seems peculiar that men who do not prove to be the best engineers either in operation or construction have as much influence with legislators as they do; but on second thought it is easy to see why the person who can put up a good front impresses legislators more favorably than one who realizes every problem requires reduction to prac-

tice and an experimental period before it can be termed a success.

Why should not our law-making be built up in the same way as our engineering—by experimental reduction to practice and elimination of the failures and waste matter?

J. C. PARKER.

Philadelphia, Penn., Apr. 26, 1915.

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### Bill McGinty, Prospector--I

Misther Editor—I'm thinkin' ye might like to hear av some av me adventures down in the land av *frijoles, tortillas an' ley de fuga*.

Well, before the Panchos began to levitate the Sherman stuff, I heard av a rich mine in the western part av the State av Durango. I wud like to tell ye the name, but some other felly might buy it before I can graft enough out av me subway contract. Annyhow, 'tis an owld mine indade. 'Tis the first wan diskivered be the Spaniards in the wance rich an' prosp'rous camp av Guarisamey. The owld storekeeper that owned it got full av mescal wan night about the time George Washington quit his job av Prisident, an' swapped his owld mine for a new prospect, called the Candle-Harry or some sich name. So whin I learns some av the facts, I sez, sez I, "'Twill be a good plan to play up to the Candle-Harry business and thin I can put me hand out an' grab the other mine whin no wan is lookin'."

This Candle-Harry mine has been quarreled over for so many years that the litigayshun has become quite a pastime an' a post-graduate coorse for lawyers av all kinds, includin' plain lawyers, shysters, imminent counsel, diplomats, Siereties av State, Mexican licenciados, provishn'l prisidents, invintors av internayshn'l law, criminal lawyers an' other criminals. I gets into the game about the last half av the siventh innin', whin ivery wan was stretchin'. A Mexican lawyer felly was sint to the bat be the visitin' team. This Excelsior Gutierrez was to open up the case out at the town of Santo Ladrona, where the Candle-Harry mine is.

So wan foine January mornin' about six o'clock we pulls our freight. Leavin' the pleasant city av Durango be way av the Alameda, we starts south, crossin' the out-crop av some av the tin dayposits which were actively worked in the time av Santy Anny an' Benito Juarez. The whole western and southern part av the city av Durango is loaded with more or less tin, an' the hill av Remedios is pretty well gambocinoed out here an' there. They cud afford to work low-grade stuff then, because they wanted the tin pretty bad; an' labor an' charcoal was cheap, so they smelted it out on the spot. As Tommy Egleston used to say, their extraction may have been low, but it was as high as they cud get, an' they figured that they never lost what they didn't get, because they never had anny tin to lose except what came out av the furnace. Annyhow,

Note—We are not so optimistic as Mr. McGinty concerning tin deposits, and in general wish to state that we are not responsible for his opinions, his geography, or his actions.—EDITOR.



some av thim fellys liked to prospect the aisy places close to town.

There's still a lot av tin right there, waitin' for some felly with enough sportin' blood to spind money enough to see if a big concentratin' plant cud make money workin' the whole dayposit like a real mine an' sellin' the tailin's for pavin' more streets or makin' concrete blocks. The foine macadamized streets av the city av Durango are made with crushed tin ore, an' the sidewalks in some places were made av slabs av ore which wore down till the lumps av tin oxide stuck out like plums in a puddin', catching the poor ign'rant *pelados* on the bare toe an' causin' them to turn agin the guv'mint an' yell "*Viva zapatos!*"

Well, after crossin' over to the edge av town an' waitin' for wan av the *mozos* to kiss his swateheart good-by, or get a drink, or somethin', we pulls to the west an' hits out for the high ground. In a few hours we passed through the beautiful suburb of Cieneguita, consistin' av the remains av a ranch chapel an' a few scattered villas and lean-tos av 'dobe an' thatch. After passin' the time av day with the sad-eyed individools who lived there because they had no other place to go, we siparated our mules from a caravan av charcoal burros bound for Durango, an' continued follyin' the advice av Horace Greeley.

Within less than a half hour wan av the mules chants the "*grito de la independencia*" and cuts across the mesa for her dear old home on the Rio Tunal. Excelsior, the lawyer felly, raymimbers his name an' follys the mule as if the Madero rivolution had busted loose two years ahead av schedule. I kapes me eye on the commissary annymal an' flags Juan to do his duty an' hold fast to the all good. 'Tis a good plan to folly whin ye're travelin' through a country like that; an' a still better plan is always to have wan day's grub tied to yer person. For if ye get lost, an' even if yer saddle annymal quits ye, then ye can maybe kape alive till luck strikes ye again. But if ye have nothin' at all, an' maybe break a leg or somethin', ye stand less show than a Belgian in his own home town.

In a little while we rides down into an arroyo called the Neveria. This manes "ice-cream parlor," which it wasn't, and it also manes "ice factory," which it used to be. They had a kin av process to utilize the rapid evap-orayshun av *maguey* fiber to make thin sheets av ice.

Whin they got enough sheets they piled thim together—on the plan av ivery little bit added to what ye got makes just a little bit more. There was a moonshine mescal still an' speak-easy near by, where they still follyed the same plan, but usin' other material.

BILL MCGINTY.

Brooklyn, N. Y., May 1, 1915.

(*More Installments Threatened*)



### More Mine Taxation in Mexico

The fact that any stable basis for currency in Mexico is disappearing rapidly from the country leads the heads of the political parties to work overtime in devising new schemes for raising an income. The device hit upon by Venustiano Carranza, "First Chief" and "Chargé" of the executive power of the Mexican nation, is outlined in his decree regarding mine taxation. Of course it is not so hard on the companies that are producing gold, or that have been developing small properties and have substantial deposits in United States banks. It amounts to an

increase of from 237% to 535%, according to the number of claims held. But for those of us who have neither gold nor bank accounts to fall back upon, and who have to accept the Constitutionalist bills at par and are required to buy United States gold at 14 to 1, the tax is an increase of from 1400% to 2500%, which is not taxation but confiscation. If this tax goes into effect on July 1, as decreed, I shall lose the labor of 15 years.

In the Alamos district, Sonora, I have two adjoining claims, Azteca and Aztequita, of 9 and 14 pertenencias each, or 23 altogether. I have owned and held these claims since 1896 at a cost of about 6000 pesos. On them I have expended 7000 pesos in explorations and have not received one cent in return.

In normal times my taxes were 23 times 6 pesos, or 138 pesos per year, or \$46 per each four-month term. Under this new decree the taxes will be as follows:

10 pertenencias at \$12 =	120 pesos
10 pertenencias at 15 =	150 pesos
3 pertenencias at 18 =	54 pesos

Total, 23 pertenencias = 324 pesos in Mexican gold coin

I have never seen Mexican gold in circulation on the West Coast, and there was but a limited circulation in the whole country before the revolution—none since. The silver peso had almost gone out of circulation before the revolution, and since June, 1913, has absolutely disappeared. The silver *toston*—50c. piece—was the general coin in circulation when the Madero revolution began, but it has vanished absolutely. Our only recourse is to buy United States gold at 14 to 1, and as there are no banks or firms doing business in moneys out here, even United States gold cannot be obtained without a special trip to the frontier, an impossibility at the present time.

Even admitting, however, that the gold coin is forthcoming, then my 324 pesos Mexican gold becomes \$162 United States gold and  $162 \times 14 = 2268$  pesos in Constitutionalist bills, which I have been forced to accept at par with silver and bank bills since June, 1913. This means a tax which is an advance of 1649%.

I have another property of 32 pertenencias, which I have held since 1898 at an expense of about 5000 pesos in silver coin. I have spent about 36,000 pesos silver on development work here and so far have not received any return from it. Now, this decree raises my taxation from 171 pesos silver per year to 3486 pesos, or 2038%. It is to be remembered that I have no money except the Constitutionalist bills which I have had to accept at par with silver, under penalty, and I have actually exchanged over 12,000 pesos in silver for these bills within the last two years, all at par. The result is that I shall be obliged to drop all my mining holdings, the work of half a lifetime; for claims of even 2 pertenencias, of which I have several, that formerly cost me but 12 pesos per year will now cost 168 pesos per year.

You can readily see the object of this decree. It is to force everybody to pay United States gold, which the Carranza faction—there is no government—needs, and to blackmail the big companies that have large holdings. These are nearly all foreign. Whatever the aim, it means confiscation, and 90% of the present titles will be forfeited next July.

These orders were to be enforced at once, but as many had already paid their taxes, it was decided that the new tax could not be enforced until July 1, 1915.

E. A. H. TAYS.

San Blas, Sinaloa, Mexico, Apr. 19, 1915.

## Hydro-Electric and Compressor Plants at Chapin Mine

By L. E. IVES

All hoisting engines, rock drills and other machinery at the Chapin mine are operated by compressed air, generated at a hydro-pneumatic plant at Quinnesec Falls, about  $3\frac{1}{2}$  miles from the mine. This plant was installed in the early part of the '80s, and has operated economically since then. It consists of three 34x60-in. and one 38x60-in. duplex single-stage air compressors, each of which is geared to a James Leffel 50-in. special Samson double horizontal turbine.

The available head of this water power is 56 ft., and the water is conducted from the dam to the compressor plant in a steel flume 22 ft. wide, 16 ft. deep and 200 ft. long, supported on concrete piers. The water is delivered from the flume to the turbines through four penstocks 8 ft. in diameter. The compressed air is transmitted to the mine through a pipe line 24 in. in diameter and about 17,000 ft. long. Each of these compressors was in operation for over 90% of the entire time during a 12-month period and delivered on an average 15,000 cu.ft. of free air per min., while the average indicated horsepower in the compressor cylinders totaled 1810. The compressors deliver the air at 60-lb. pressure, the loss in transmission to the mine being less than 5 lb. In general, this plant has proved an economical source of power.

The new hydro-electric plant, housed in a steel and concrete building, consists of two 2205-kv.-a. G. E. 2300-volt, 3-phase, 60-cycle, 257-r.p.m. alternators and exciters direct connected to two horizontal, double-runner 2800-b.hp. Allis-Chalmers waterwheels. The waterwheels are equipped with cone-shaped housing for the rear bearing, which is an oil bearing, and is accessible from the operating room through an inspection tube 24 in. in diameter. This machine has no lignum-vitæ bearings. On the second floor are installed two 2000-kv.-a., 3-phase, 60-cycle, 13,200-2300-volt G. E. step-up transformers. On the third floor are placed the solenoid operating switches, installed in concrete compartments, also the electrolytic lightning arresters. The switches are controlled from the main board in the operating room. The switchboard, switches and lightning arresters are furnished by the Westinghouse Electric & Manufacturing Co.

The water is conducted to the waterwheels through two penstocks 12 ft. in diameter, and the current is transmitted to the mine at 13,200 volts by two transmission lines of 00 bare copper wire, carried on self-supporting, galvanized-steel towers manufactured by the American Bridge Co. This plant has been in operation since the middle of last June, and although electric storms have been frequent and severe, there has been no interruption in the transmission of power.

## Dinner to Prof. Henry S. Monroe

The Alumni Association of the School of Mines, Engineering and Chemistry of Columbia University is to give a dinner to Prof. Henry S. Monroe, who is about to retire as professor of mining at Columbia, the chair that he has occupied with distinction for a great many years. The din-

ner will take place at the Chemists' Club, 52 East 41st St., New York City, at 7:30 p.m., May 28. It is expected that about 200 guests will be present. George C. Stone, of the New Jersey Zinc Co., 55 Wall St., New York, is chairman of the dinner committee.

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## Air Blasts at Quincy Mine

A series of "air blasts" again occurred in the Quincy mine, Houghton, Mich., on Mar. 25, 1914. This is the first serious disturbance of the kind since 1909. Before this a series of "air blasts" occurred in 1906. The first disturbance of the kind in the Lake Superior copper district happened in the summer of 1904, when there was serious caving at the Atlantic mine which had the effects of an earthquake in that section of the country. Windows and china were broken and chimneys dislodged, and the shock was felt on the shores of Lake Michigan, 10 miles away. The Atlantic mine was finally closed in 1906 on account of caving. "Air blasts" have occurred on the Rand in South Africa and have been the subject of much discussion. Some claim that they are the result of altered strains and stresses due to large excavations and intimately connected with faults and other lines of weakness; others have claimed that they are the result of slipping of the rock strata, but this is not generally believed. It has been suggested that these blasts on the Rand are mostly due to the weight at great depths or to stresses set up by the effects of tectonic pressures caused by earth movements in the past. In the Central Rand mine these blasts occurred at 2000 ft. near a large fault with a throw of 100 ft. The disruptions took place near a large symmetrical fold, and it seemed evident that the force that produced the fold was still in operation.

Roof pressure is undoubtedly the cause of "air blasts" in mines where large areas have been worked out without giving sufficient support to the walls. This cause certainly seems to be the most feasible one in the case of the Atlantic and Quincy mines. This theory will not apply to "air blasts" in drifts in virgin ground. In the Brakpan Shaft No. 1 on the Rand a band of quartzite at 3000 ft. was continually breaking off in fragments. These were hurled across the shaft accompanied by a loud report. In this case the cause was certainly due to the weakness of the quartzite—its inability to stand some strain from overlying rocks. The cracking and breaking of veins at the bottom of mines might be accounted for by the enormous weight of a rigid hanging wall bearing upon the face of the vein. The strain on the vein being somewhat similar to the strain on a wedge placed at the heel of a crowbar, this strain would naturally increase as depth was gained.

In the Lake Superior copper district the walls are tough and solid. For years the practice was to mine out the vein without leaving practically any support for the walls. In most mines caving would have resulted long before it did in the Atlantic or the Quincy, had the same method of mining been employed. These "air blasts" which have occurred in series of disturbances at certain periods must be the final giving away of blocks of ground which have been gradually weakening under the load of the unsupported walls. The similar disturbances of a less serious nature must be movements similar, as evidenced by the cracking and splitting of the rocks, to those heard in the stopes of any mine where the walls are settling or giving



away. The only difference is that, the walls being tougher than usual, the period of cracking and breaking subsequent to complete caving is much longer and the sounds are more audible than in softer rocks.

Just previous to the cave-in of the Hampton stope in Goldfield, Nev., where the walls were heavy and soft, the movements of the ground and cracking of the timbers could be heard, but there was just sufficient time before the cave to get the men out of the stope and into the drifts leading to the shaft. As it was, three men working in an area some distance above and over from the stope were caught in a cave which followed immediately afterward. The rush of air in the drifts leading from the Hampton stope was so great just after the cave that men in the levels were blown several feet toward the shaft, and one was struck by a car which was sent flying along the tracks by the concussion.

According to the annual report of the Quincy, air blasts have continued with more or less frequency since July, 1914. As a consequence of the blasts, in March various crosscuts and drifts were closed up. No. 6 shaft timbers were crushed between the 51st and 58th levels. No. 2 shaft was crushed and closed between the 40th and 50th levels. Below the 50th level the shaft was not damaged, though crosscuts at the 57th, 64th and 66th levels were entirely closed and levels north badly damaged. The 67th, 68th, 69th, 70th and 71st levels north and south were not injured. The cost of repairing the damage done by air blasts amounted to \$57,190, and \$21,487 was spent in efforts to prevent them. It was stated in the report that in the earlier days of mining it was the custom to stope out the lode irrespective of shafts, etc. If the lode was rich in copper it was stoped out to the shaft without leaving pillars. There are practically no pillars in the area near No. 2 and No. 6 shafts to protect them; in fact, this area is one open stope.

It is only natural that caves should occur in this area in the Quincy, even though it has taken years to prove that the walls could not stand the strain. Fortunately for the Quincy, only a part of its ore reserve is in the area affected by the caves, and future operations can undoubtedly save other areas from caving until all ore is worked out. Many remedies have been advocated for the prevention of air blasts, or caving, as it should be called, in the Lake Superior district. Filling and packing stopes as near the face as possible would probably answer in some cases; but with an old mine with large worked-out areas open the cost would be great. Of late years at the Quincy the policy has been to leave pillars near the shafts, and caving has never caused any damage to these sections of the shafts. At the bottom of the mine these pillars are being left 200 ft. on each side of the shafts. Filling, or "rib work," as it is called, is also being employed in all new stopes. This was first employed after 1906, and for a number of years these rock packs proved effective; but experience has proved that this work was not carried far enough. The advisability of using sand to fill the voids and strengthen the "rib work" is being seriously considered. Some sort of a retreating system, with proper protection for the shafts, should overcome the danger from these caves. Some have suggested sinking main shafts and running main levels in the footwall. Generally this should be effective; but where the footwall is softer than the vein pillars it is quite possible that some disturbance to openings in the footwall might be caused by these pil-

lars, under enormous weight, being driven into the foot-wall, unless the openings were at a considerable distance from the vein or the walls supported so that no movement could take place.

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## Butte First-Aid Contest

SPECIAL CORRESPONDENCE

The efficiency of the instruction in first-aid work given under the direction of the Bureau of Mines was amply demonstrated on Sunday, May 9, when 2000 spectators watched a first-aid contest in which 16 teams from Butte and Anaconda participated. The event was under the auspices of the American Mines Association and directly under the authority of the officials of the U. S. Mines' Rescue Bureau, J. L. Boardman and his assistant, G. W. Grove, first-aid instructor, who have been in Butte for several weeks imparting instruction to classes of miners. It was the first such contest ever held there.

There were three separate contests, the one-man event, the two-man event and the team event. For the first event the prizes were \$30 and \$20; for the second, \$40 and \$25, and for the third, \$120, \$60 and \$36. Aside from these prizes, the team securing the highest general average in all events was entitled to special medals presented by the American Mines Safety Association. The results were:

One-man event—Leonard mine team, first; Poulin mine team, second.

Two-man event—Washoe Reduction Works' team, first; West Colusa mine team, second.

Team event—Anaconda mine team, first; High Ore team, second; Washoe team No. 16, third.

Highest general average for all of the events—Leonard mine team, 99¼%; Washoe team No. 16, 98⅝%, and the Anaconda mine team, 92⅖%.

Much credit is given to the Bureau of Mines instruction system and to C. W. Goodale, head of the Safety-First department of the Butte mines.

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## Iron Contents of Lake Ores

The Lake Superior Iron Ore Association has completed its analysis of the shipments of iron ore from the Lake region for the past season. The following table gives the shipments and the average iron content, natural state, in comparison with the previous season:

	1913		1914	
	Shipments, Tons	Grade Iron, %	Shipments, Tons	Grade Iron, %
Old Range bessemerers.	4,678,575	55.3237	3,248,715	55.3773
Mesabi bessemerers.....	13,877,060	53.2644	8,075,955	52.5751
O. R. nonbessemerers..	8,245,258	52.2179	6,424,034	52.5031
Mesabi nonbessemerers.	19,584,395	49.3445	12,726,990	49.5887
Totals .....	46,385,288	51.6311	30,475,694	51.6115

From these computations manganese and low-grade siliceous ores are excluded.

The records run back to 1902 and show a considerable drop in the proportion of bessemer ores shipped. In 1902 such ores were 65% of the total; in 1909 they were 45%; while in 1914 the proportion was only 37% of the total. The decrease in iron contents in all ores has been gradual but continuous since 1902, the reduction in the 14 years being about 3¾ units in bessemer and 4 units in non-bessemer ores.

## Ray Consolidated Copper Co.

The report of the Ray Consolidated Copper Co. for the first quarter of 1915 shows a total production of 14,463,213 lb. of copper—4,053,147 lb. in January, 4,830,553 lb. in February and 5,579,513 lb. in March. In addition to copper derived from concentrating ores there was a total of 136,742 lb. of copper contained in ore shipped to the smeltery during the quarter. This brings the total gross production for the quarter up to 14,599,955 lb. There was a gradual increase in production during the quarter in response to the increased demand for copper.

The total ore milled for the quarter was 656,652 dry tons, averaging 1.667% copper. The average mill recovery was 66.08%. Milling costs for the quarter were 48.95c. per ton, and the average mining and coarse-crushing cost was 52.20c. per ton, of which 3.017c. was the cost of coarse crushing.

The average cost per pound of net copper produced from milling ores for the quarter, after allowing for smelting losses and applying dividends of the Ray & Gila Valley R.R., but no other miscellaneous income as a credit to costs, was 8.911c. The combined cost per pound of net copper produced for milling and shipping ore for the quarter was 8.874c. These costs include all operating and general charges, as well as 12½c. per ton of ore milled, which is applied to the retirement of mine development cost.

The net operating profit for the quarter was \$777,759; miscellaneous income, \$4360, giving a total of \$782,119. Deducting \$40,580, interest on bonds, the net surplus is \$741,539. The earnings for the quarter are based on a price of 14.324c. per lb. for copper. All copper remaining unsold at the end of the quarter has since been sold at an average price considerably in excess of that at which the unsold was carried, and the resulting large additional earnings will appear in and as a part of the profits of the second quarter. It is stated that it is the intention of the directors to resume dividend payments on June 30 next.

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## Ontario Mineral Production in 1914

The following information on the metal and mineral production of Ontario in 1914 has been officially given out by the Deputy Minister of Mines, the items being arranged in order of descending value: Silver, 25,217,994 oz.; pig iron, 556,112 tons; gold, 268,942 oz.; nickel, 22,760 tons; portland cement, 2,665,650 bbl.; natural gas, 13,262 million cu.ft.; copper, 14,453 tons; iron ore, 240,059 tons; cobalt oxide, 643,891 lb.; salt, 104,774 tons; petroleum, 7,437,356 Imp. gal.; lime, 2,075,228 bu.; iron pyrites, 107,258 tons; gypsum products, 31,117 tons; sand and gravel, 359,100 cu.yd.; calcium carbide, 2381 tons; arsenic (refined), 4,059,868 lb.; graphite (refined), 1363 tons; quartz, 52,947; talc (products and crude), 10,135; corundum, 548; gypsum (crude), 43,183; feldspar, 18,062 tons; cobalt and nickel oxides, 113,843 lb.; mica, 349 tons; cobalt ore, 97 tons; nickel oxide, 303,752 lb.; phosphate of lime, 450 tons; peat, 600 tons.

The total value of the metallic products was \$33,345,291, and of the non-metallic products listed in the foregoing, \$7,756,419.

## NEW PATENTS

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

**AIR-WASHING AND CONDITIONING APPARATUS.** Willis H. Carrier, Buffalo, N. Y., assignor to Buffalo Forge Company, Buffalo, N. Y. (U. S. No. 1,138,081; May 4, 1915.)

**ALLOY—Metallic Compound.** Herbert B. Coho, Mount Vernon, N. Y. (U. S. No. 1,138,845; May 11, 1915.)

**ALUMINATE SOLUTIONS—Process of Treating Aluminate Solutions.** Henry Howard, Brookline, Mass. (U. S. No. 1,137,860; May 4, 1915.)

**AMMONIA—Method of Producing Ammonia and the Like.** John E. Bucher, Coventry, R. I., assignor to Nitrogen Products Co., Providence, R. I. (U. S. No. 1,138,191; May 4, 1915.)

**CRUCIBLE AND LIKE FURNACE.** Alexander Constantine Ionides, Jr., London, England. (U. S. No. 1,138,482; May 4, 1915.)

**CRUSHER—Roll Crusher.** Ray C. Newhouse, Milwaukee, Wis., assignor, by mesne assignments, to Allis-Chalmers Manufacturing Co. (U. S. No. 1,137,418; Apr. 27, 1915.)

**CRUSHING—Ball Mill.** Frank E. Marcy, Salt Lake City, Utah. (U. S. No. 1,137,878; May 4, 1915.)

**CRUSHING—Grinding Mill.** Edward F. McCool, Victor, Colo. (U. S. No. 1,137,224; Apr. 27, 1915.)

**CRUSHING—Grinding Mill.** Robert M. Willson, Riverside, Calif. (U. S. No. 1,137,685; Apr. 27, 1915.)

**CRUSHING—Means for Securing Tires on Crushing and Grinding Wheels, Rolls, and the Like.** Marvin A. Nicol, Willamina, Ore. (U. S. No. 1,138,399; May 4, 1915.)

**CRUSHING—Mill for Treating Ores and the Like.** Albert Victor Park, South Melbourne, Melbourne, Victoria, Australia. (U. S. No. 1,139,064; May 11, 1915.)

**CRUSHING—Ore Grinder.** Edward F. McCool, Victor, Colo. (U. S. No. 1,138,966; May 11, 1915.)

**DRILL—Rock Drill.** Moses Arthur Knapp, Oakland, Calif. (U. S. No. 1,138,612; May 4, 1915.)

**DRILLING—Attachment for Rock Drills for Supplying Water Thereto.** Charles Hansen, Johannesburg, Transvaal. (U. S. No. 1,138,214; May 4, 1915.)

**DRILLS—Reaming-Bits for Prospecting Drills.** William Thompson Underwood, Birmingham, Ala. (U. S. No. 1,138,332; May 4, 1915.)

**GASES—Apparatus for Washing, Cleaning and Cooling Gases.** Hans Ed. Theisen, Munich, Germany. (U. S. No. 1,139,385; May 11, 1915.)

**GOLD-SEPARATING MECHANISM.** Frank W. Stevens, Newton, Mass., assignor of one-half to Alfred Hopewell, Wellesley, Mass. (U. S. No. 1,139,143; May 11, 1915.)

**HOISTING AND CONVEYING MACHINE.** Mark R. Colby, Portland, Ore., and James Stewart, Cleveland, Ohio, assignors to The Brown Hoisting Machinery Co., Cleveland, Ohio. (U. S. No. 1,136,939; Apr. 27, 1915.)

**INGOT MOLD—Emil Gathmann, Baltimore, Md. (U. S. No. 1,137,264; Apr. 27, 1915.)**

**LEACHING—Process of Leaching Ores.** Jasper A. McCaskell, Salt Lake City, Utah. (U. S. No. 1,137,874; May 4, 1915.)

**METALLURGICAL FURNACE.** Uley Wedge, Ardmore, Penn. (U. S. No. 1,137,559; Apr. 27, 1915.)

**NITROGEN—Process for Fixing Atmospheric Nitrogen.** John E. Bucher, Coventry, R. I., assignor to Nitrogen Products Co., Providence, R. I. (U. S. No. 1,138,190; May 4, 1915.)

**ORE TREATMENT—Apparatus for Treating Ores.** Bernard MacDonald, South Pasadena, Calif. (U. S. No. 1,139,428; May 11, 1915.)

**PEAT BRIQUETS—Production of Wet-Carbonized Peat Briquets.** Nils Testrup, London, England, and Thomas Rigby, Dumfries, Scotland, assignors, by mesne assignments, to Wetcarbonizing, Ltd., London, England. (U. S. No. 1,139,315; May 11, 1915.)

**PERCUSSIVE TOOL.** Arthur H. Gibson, Easton, Penn., assignor to Ingersoll-Rand Co., New York, N. Y. (U. S. No. 1,138,209; May 4, 1915.)

**PERCUSSIVE TOOL.** Lewis C. Bayles, Easton, Penn., assignor to Ingersoll-Rand Co., New York, N. Y. (U. S. No. 1,138,179; May 4, 1915.)

**PHOSPHORIC ACID—Process of Rendering Available Phosphoric Acid.** Walter S. Landis, Niagara Falls, N. Y., assignor to Frank S. Washburn, Nashville, Tenn. (U. S. No. 1,137,065; Apr. 27, 1915.)

**SEPARATOR—Ore Separator.** Hugh H. McGovern, Oak Grove, Ore. (U. S. No. 1,139,206; May 11, 1915.)

**SLURRY—Apparatus for Mixing Slurry.** Aage Schröder, Charlottenlund, Denmark, assignor to F. L. Smidth & Co., New York, N. Y. (U. S. No. 1,137,294; Apr. 27, 1915.)

**SMELTING—Ore-Smelting Furnace.** George P. Gibson, Braddock, Penn. (U. S. No. 1,138,651; May 11, 1915.)

**STAMP MILL.** Edward H. Moyle, Los Angeles, Calif. (U. S. No. 1,137,272; Apr. 27, 1915.)

**STEEL—PROCESS of Refining Steel and Producing High-Phosphoric Slag.** Albert V. Gögler, Dortmund, Germany, assignor to the Firm of Deutsch-Luxemburgische Bergwerks- und Hütten-Aktiengesellschaft, Dortmund, Germany. (U. S. No. 1,137,681; Apr. 27, 1915.)

**WHITE LEAD—Means for Forming Lead Wire.** Adam Tudor Eyton, Nelson, B. C. (U. S. No. 1,137,199; Apr. 27, 1915.)

**ZINC—Briquet for use in Zinc Furnaces.** George S. Brooks, Depue, Ill., assignor to The New Jersey Zinc Co., New York, N. Y. (U. S. No. 1,137,835; May 4, 1915.)



## Editorials

### Calumet & Hecla Shares Prosperity

The Calumet & Hecla and its affiliated companies are going to distribute about \$500,000 among their employees to make good the loss of wages during the time when rates were reduced and operations curtailed, beginning last September. At that time the outlook for the copper industry was gloomy and the managements knew naught else to do than to reef sails. But during the last six months there has been a remarkable change and lately the copper mining companies have been making a great deal of money. The curtailment of last fall was instrumental in bringing about the present satisfactory conditions, and it is just the square thing that the workmen who were obliged innocently to suffer then should be rewarded now. It is characteristic of the Calumet & Hecla management to have thought of doing this before the idea occurred to anybody else.

### Use of Salt in Zinc Smelting

Elsewhere in this issue is summarized an interesting patent recently issued to George S. Brooks, who is associated with a subsidiary of the New Jersey Zinc Co., for an improvement in the art of zinc smelting, consisting in the briquetting of the charge after preliminary saturation with a weak brine. There is nothing new in the use of salt in zinc smelting, nor in the use of a briquetted charge, but the combination is novel, so far as we know. The process described by Mr. Brooks is being employed in the operation of three furnaces at the works of the Mineral Point Zinc Co. at Depue, Ill., and is showing advantages on the lines of those indicated in Mr. Brooks' specifications—that is, ability to charge more ore per retort than previously and reduction of the percentage of blue powder produced, which further increases the capacity of the furnace, inasmuch as the quantity of blue powder to be re-smelted is diminished. These results afford an opportunity for an interesting discussion of several important points in the metallurgy of zinc.

The use of a small proportion of salt in admixture with the charge for distillation is no new thing. This was indicated in Dony's patent of Dec. 7, 1809, and had previously been practiced at Döllach in Austria, where the old Carinthian process of smelting was employed and where 1.4% of salt, by weight, was added to the ore. These priorities did not, however, prevent one Bennett from obtaining a patent in 1861 for the use of salt in the charge for distillation.

About 25 years ago the regular use of salt was inaugurated at Auby, France, where about 1% was used; and about 15 years ago the smelters at Overpelt, Belgium, adopted this practice, using 0.5 to 0.8% of salt, especially when they began smelting Broken Hill ore, which made a good deal of blue powder. In recent years the use of salt has become common among zinc smelters in the Western districts of the United States. At Auby and Overpelt, in Europe, it was found that the addition of

salt to the charge reduced the production of blue powder. The experience in this country has been similar. Respecting the fact itself there is no doubt whatever, but with regard to the explanation of it there is a good deal of doubt and difference of opinion.

The production of blue powder occurs especially during the first stage of the distillation, when the temperature is relatively low and internal oxidizing agents are active. This results in the condensing pellicles of zinc becoming coated with zinc oxide, like a frosting, or showing merely a few hairs of zinc oxide. This prevents the pellicles of zinc from coalescing and consequently they accumulate in the condenser as a dust. No matter how strongly this dust be heated it cannot be melted.

When a little salt is used in the charge in the retort the formation of this dust is diminished. The same benefit is said to result from putting a little salt in a clay dish in the front of the retort. The explanation that is offered for this by some metallurgists is that volatilized sodium chloride or zinc chloride exercises a solvent action upon the oxide-coating of particles that would otherwise deposit as blue powder, and by removing the oxide permits those particles to coalesce. If the ore distilled be simply calamine, or if the salt be not mixed with the charge, there might be simply sodium chloride volatilized; but if the ore be roasted blende, there will inevitably be enough zinc sulphate present to react with any salt admixed therewith, producing zinc chloride, which is volatile and is a powerful solvent for zinc oxide, taking it up as oxychloride. When salt is used with roasted blende, drops of zinc chloride are found in the condensers. It is known, moreover, that when blue powder is heated under a cover of zinc chloride it is possible to obtain molten zinc.

Critics of this explanation say: "But the percentage of salt is so very small, how can it have any strong chemical effect?" The natural reply is that the percentage of zinc oxide to be removed is also very small and the action of the salt is undoubtedly most energetic in the early stage of the distillation, which is precisely the time when blue powder is especially deposited.

The opponents of this hypothesis point to experiments at Auby, where sodium carbonate was added to the charge instead of sodium chloride, giving equally beneficial results. They are led, therefore, to argue that the use of a sodium salt gives a yellow coloration to the flame at the end of the condenser and causes the latter to become a more satisfactory index for the regulation of the temperature of the distillation and condensation. This rather off-hand explanation is met by the claim that the use of salt is found to give beneficial results with furnaces that are under close pyrometric control, for which therefore no flame indicator is necessary for the proper regulation of their temperature. The counter retort is: "But does your pyrometer show even temperature throughout the furnace? It cannot do so absolutely unless you have a point in every retort. Everybody knows that a furnace may show local hot spots or cold spots."

So the argument runs, and the non-partisan metallurgist is likely to come to the conclusion that while the fact of the beneficial influence of salt is well established, no adequate, thoroughly satisfying explanation of it has been offered.

The advantage gained by briquette-charging is quite a different matter, being something that relates to the density of the charge, as to which there are rather wide variations in practice, discussion of which may be deferred until another time.



### The Apex Law at Tonopah

We have from time to time remarked on various phases of the apex question which cry aloud for reformation. From the most recent apex decision which has come to our notice we quote the following: "This interesting and evidently conspicuous phenomenon received some rather strong jolts on the rebuttal; but hardly enough to jolt it out of the case." And again, speaking of the veins, the court says: "They are respectable and probably were so before the playful Siebert fault came their way." Speaking of another theory advanced, the learned court says: "One distinguished witness (speaking of the vein) called it eccentric and said it was subject to undulations, and had the effect of shearing the 'halo' on the north side," etc.

Being ever athirst for knowledge, we set apart a time for an investigation of this "halo" theory. We find that a halo is actually "a circle of light appearing to surround a luminous body and resulting from the reflection, refraction or diffraction of its light"; or it "is a morbid discoloration surrounding," etc.; or, figuratively, "is an ideal glow or glory investing an object as viewed through the medium of feeling or sentiment," as the "circle of light surrounding the head of a saint." We incline to the opinion that there is in this new "halo" business nothing luminous or suggesting either reflection or refraction or diffraction of light, but that there is some evidence of morbid discoloration as viewed through a medium which should have been foreign to the case in hand.

We do not hesitate to admit that our "halo" is not yet sufficiently developed to enable us to be patient with a law that leaves large and vital decisions to the tergiversations of an imagination which can conceive a vein of "undulating habits" shearing a "halo" and which presents the subject in such a way that the court, in a state of self-preservation perhaps, drifts into a levity hardly in keeping with the judicial ermine.



### Forced Advance in American Chemical Industry

For years the American metallurgist has been lambasted at every opportunity for his backwardness in making byproduct recoveries. That the criticism has been mainly from those who did not understand the economics of the case has not altogether abated its sting.

Apparently the American manufacturer is now to be forced into byproduct recovery. We have chronicled, from time to time, the decisions of the Lackawanna Steel, Republic Iron & Steel, Tennessee Coal & Iron, Woodward Iron, Zenith Furnace and other companies to build toluol and benzol plants, and we are advised that a plant for the

production of liquid sulphur dioxide is being considered by another American company.

In the last week an announcement has been made of contracts for 279 Koppers byproduct coke ovens, which will have a capacity of about 3000 tons of coke per day. The last-mentioned report is the most encouraging sign that we have seen, as it is probably in coking that our greatest wastes have been incurred, and it is the byproduct coke oven which furnishes the basis for the organic-chemical industries.



### Mechanical Engineering in Mining

Returning from an extended business trip through many mining camps in the West, a member of the American Society of Mechanical Engineers voices surprise at what he considers the universally poor mechanical engineering in the mining field. He states that of the large membership of his society only three are to be found in mining districts, and he draws the perhaps natural conclusion for an observer unacquainted with the mining field that there is a wonderful opening for the mechanical engineer in the mining business.

Excepting of course the larger companies, whose engineering work is of the best in the country, and many plants of medium size which, in their way, are equally careful of such details, we must admit that mining in general presents some wonderful examples of mechanical engineering as it should not be practiced.

Strangely enough, however, this is not to be considered a general reflection upon the mine superintendent or manager, although of course we are not pretending to give them all an absolutely clean bill of health in the matter. The necessity and requirements and provisions of a mining operation are in a class by themselves. Time is a more valuable factor in a mining operation than in any other business. It is much more profitable to purchase a machine wholly unsuited to local conditions, but one which can be delivered promptly, than to hunt for the most efficient machine and wait for a long time for its delivery. The fact of poor mechanical engineering is counterbalanced on the profit and loss sheet by the time element.

We have seen occasions where it was necessary to play a fire hose on an air compressor to keep it from burning up while running, but this proved to be better judgment than to close down the entire operation at that particular moment to make repairs. Another most striking illustration was afforded by the purchase of a compressor for the Hayes-Monnette lease in Goldfield when the lease had but 30 days to run, and the shipping of this compressor in a baggage car attached to a special locomotive and run on passenger-train time from Denver to Goldfield. We know of no other production enterprise which would justify a move like this, and it is corollary to this urgent need that the choice of an efficient machine was wholly subordinated to immediate delivery. Good mechanical engineering is a *desideratum*, but not a *sine qua non*, in mining.

However, there is another cause for poor mechanical engineering around mines which should be the subject of emphatic and unanimous protest by those concerned. This is the result of a most unfortunate point of view



of the average stockholder. It is a mental phenomenon that the average resident east of the Mississippi River considers that a beneficent Nature has placed the desired gold, copper, lead, etc., somewhere in the West, and that all that is necessary to recover them are a railroad ticket and some receptacle in which to bring them away. On account of this, no other business promotion lends itself so easily to the sophistries of the charlatan as does mining. The result is that much of the mining equipment purchased and installed for mines is bought by people who are boomers and who know nothing of the problems in hand. When the proposition is turned over to a superintendent or manager who is capable and who has mechanical engineering sensibilities, it is often in a condition which he realizes only too well is almost hopeless from an engineering standpoint. His job is to do the best he can with what he has given him, and the consideration of outlay for new machinery is as much out of the question as would be the time for tearing out the old and installing the new equipment if it could be had.

If the small stockholder would exhibit as much interest in having an engineer handle the mining end of his investment from the start as he does in putting up a howl later on when results are unsatisfactory, we should have many fewer monuments to poor engineering in the hills and cañons of our mining country.

### BY THE WAY

The New Jersey Zinc Co. two weeks ago tendered a banquet to the foremen and shift bosses of its Franklin mine and mills. The banquet was given for having mined and run through the mills 60,000 tons of ore in one month, which is said to be the largest amount of ore ever mined in a similar period of time at the Franklin mines.

The embargo on coal exports from Great Britain looks as if it ought to help our coal operators to secure a large share of the trade which has gone to Argentina and other South American countries. This trade has been held by England because it imported largely from Argentina, and cheap freights westward could generally be secured. The chief difficulty in securing this trade at present is the high ocean freight rates—indeed the frequent difficulty of securing any bottoms at all for the trade.

In order to emphasize the ridiculousness of many laws aimed at operators of mines, a West Virginia parody on such legislation is published by *The Mining Congress Journal*. Limitations, which many would like to see enforced against mine operators, are applied to the farmer. While some exaggerations have been resorted to, in order to bring out the travesty, there is a grim lesson behind the burlesque which should not be missed by legislators who have been active in hamstringing industries.

The parody reads as follows:

A bill to regulate prices, to prevent extortion and to prevent injurious practices by farmers and certain others engaged in agriculture and commerce.

Be it enacted by the legislature of West Virginia:

Section 1. Only one price for a given commodity shall be lawful. A farmer desiring to change a price shall file a schedule thereof with the commissioner hereby created, which shall go into effect 30 days thereafter, unless sus-

pending by the commissioner at the instance of any consumer.

The said Commissioner of Agriculture shall carry into effect all of the provisions of this act; and he is hereby invested with all necessary powers to that end.

Sec. 2. No prices shall be increased, however, except upon due proof, the burden of which shall be upon the farmer, that existing prices are confiscatory of his goods and gear. In his discretion the commissioner may refuse to permit any such increase until a valuation by his engineers and accountants shall have been taken. In such valuation the farmer shall have no credit for past profits invested in new fields or improved structures, but shall be allowed only original cost plus borrowed money invested.

Sec. 3. "Commodity," as used herein, includes all grains, vegetables, live stock, dairy articles, excepting sand, gravel and manure, and hair.

Sec. 4. Every hired man shall work eight hours only per day, not including the Sabbath, and shall not recommence work unless he has completed a period of not less than 18 hr. of absolute rest and quiet. He shall not work on the Lord's day nor on legal holidays nor on Jack Love's birthday.

Sec. 5. Every farmer shall hire one more hired man than his work requires.

Sec. 6. The only permissible exceptions to the two foregoing sections shall be periods of stress resulting from earthquake, Halley's comet or European invasions.

Sec. 7. All wagons and all poles and doubletrees shall be provided with couplers, coupling with impact, so that the hired man need not go between the wheels of the wagon and the heels of the horses.

Sec. 8. All wagons shall be supplied with suitable brakes, grabirons, stirrups and platforms of standard dimensions to be fixed by the commissioner.

Sec. 9. All bulls, when moving on the highway or in unfenced areas, shall be equipped with a bell of not less than 50-lb. weight, a steam-whistle and an electric headlight of at least 1100 cp.

Sec. 9-a. All rams shall, when moving on a public highway or when having access thereto, be equipped with electric horns and headlights of such loudness and candlepower as may be fixed from time to time by the Commissioner of Agriculture by his order duly issued; provided, however, that this section shall not be construed to apply to hydraulic rams.

Sec. 10. Sheds shall be built over all fields where hired men have to work in summer.

Sec. 11. All fields, engines and machinery shall be fenced in; all belting shall be incased in metal housings; and all grindstones, churns, hay cutters, bull's-horns and other moving parts shall be strongly incased in sheaths for the protection of the hired man.

Sec. 12. All barns, sheds and other outbuildings shall, in cold weather, be adequately heated, and at all times shall be well lighted and policed.

Sec. 13. The right to mortgage real estate is a franchise reserved to the state. No farmer shall make any mortgage nor incur any indebtedness extending for a period of more than one month without the written approval of the commissioner, obtained upon petition and hearing, and upon paying the state treasurer 10c. for each \$100 of indebtedness. Indebtedness incurred without such consent shall be void.

## PERSONALS

Charles F. Rand is expected home from Cuba about May 25.

A. Longwell has changed his address to 410 Crown Office Building, Toronto, Ontario.

Heath Steele has gone to North Carolina and will return to New York early in June.

E. Norris Hobart has been examining copper properties in the Black Rock Mining district in Arizona.

Rush J. White has retired from the staff of the Federal Mining & Smelting Co. and has opened an office at Wallace, Idaho, as consulting mining engineer.

Arthur L. Parsons, of Toronto University, will make an investigation for the Ontario Bureau of Mines of the iron ranges on Hunters Island, west of Port Arthur.

P. K. Horner, manager of the Union Minière du Haut Katanga, was in New York this week. He will visit a number of the important copper mines in this country before returning to the Belgian Congo.

William M. Mehlhorn, who has been general superintendent of the steel plant of the Eastern Steel Co., at Pottsville, Penn., has been made a director and vice-president of the company in charge of manufacturing.

Webster P. Cary, graduate of Colorado School of Mines, 1910, has just been promoted from the position of mill superintendent to that of manager of the Atlas Mining Co., operating at Sneffels, Colorado.

O. M. Bilharz announces that he is located in the city of St. Louis in the practice of his profession and will now be able to give attention to the examination of and report upon mining and milling projects.

Alexander Taylor has been promoted from assistant secretary to secretary of the Lake Superior Corporation, the Algoma Steel Corporation and subsidiary companies, succeeding Thomas Gibson, who recently became president.

Prof. M. B. Baker of Queen's University, Kingston, Ont., has been commissioned by the Provincial Bureau of Mines to make a reconnaissance and map showing the geology and economic resources of the area in the vicinity of Kingston.

Frederick Haynes Newell, who has recently been appointed professor of Civil Engineering and head of the Department of Civil Engineering of the University of Illinois, entered upon his duties on May 1. He has been for 26 years in government service, principally as chief engineer and later as director of the U. S. Reclamation Service, and was previously employed in the oil country of Pennsylvania.

C. E. Leshar, associate geologist of the land-classification board of the U. S. Geological Survey, has been assigned by the Director of the Survey to take charge of the work of compiling the statistics of coal production for the annual volume "Mineral Resources." This work has heretofore been directly under Edward W. Parker, who resigned. Mr. Leshar is a graduate of the Colorado School of Mines and after his graduation was engaged in mining in British Columbia until 1910, when he went to the Geological Survey. As a member of the land-classification board, his largest contribution has been in perfecting the scheme for the valuation of the public coal lands.

## OBITUARY

Joseph Stepler, 89, died of pneumonia in Denver, Apr. 24. He began mining at Central City in 1861. He is credited with being the discoverer of gold tellurides in Colorado, he having run across them in 1872 in his Red Cloud mine, Boulder County.

Joseph Tarrigan Monell died at his home in St. Louis, May 9, aged 54 years. He was born in St. Louis, graduated from Washington University and practised as a mining engineer, chiefly in the Southeastern Missouri lead district until 1906, when he entered the government service. He leaves a daughter and two sons.

James C. W. Chipman, who was chief clerk for the Oliver Iron Mining Co. on the Marquette range for 26 years prior to January last when he was retired on a pension, died in Marquette, Mich., on May 11. He was born in Boston in 1843, went to Ishpeming from that city as chief clerk for the Lake Superior Iron Co., which was absorbed later by the Oliver company.

Peter Turnbull died at Leadville, Colo., May 4, aged 65 years. He was born in Canada and brought up in California. He went to Leadville in 1880, and had resided there since, being engaged in mining, as he had previously been in Utah. He located and opened the Ballard mine. At one time he was president of the Leadville Miners' Union; he had also represented Lake County in the Colorado Legislature.

George T. Wickes, a prominent Montana mining man, died at Helena, May 7, at the age of 73 years. Thirty years ago Mr. Weeks came to Helena from the South where he was engaged in operating iron mines. He became manager of the Wickes mines at the town of that name in Jefferson County. He next became engineer for the Helena & Livingston Smelting & Refining Co., operating smelteries in Helena and near Wickes. He then turned his attention to the coal resources of the state, opening the Cokedale mines in the Bull Mountain region, and making the preliminary survey of the Rocky Fork coal mines for the Northern Pacific. Three grown children and his wife survive him.

John P. Barnes died in San Francisco May 2, aged 83 years. He was born in Missouri and went to Montana among the pioneers in 1864. He worked at mining and milling in the York, Eldorado and Helena districts for 10 years with varying success. In 1867 and 1868, in company with A. G. Clark and Alexander Kemp, he constructed the Eldorado ditch from Trout Creek to Eldorado bar. In the fall of 1887 Mr. Barnes purchased a one-half interest in three mining claims in the North Moccasin mountains and in 1888, with his son, C. E. Barnes, he bought the other half interest from A. D. Harmon. He developed these and added others to them until they had a group of 15 claims known as the Barnes-King group. This group was later bonded to an Eastern syndicate and has had rather an eventful history.

Richard Webb, editor and owner of the "Amador Ledger" at Jackson, Calif., died at San Francisco on Apr. 18, from rupture of a blood vessel of the heart. Mr. Webb was born in England in 1843. He was educated at Adelaide, Australia, studied for the ministry at the Congregational College in Melbourne, and began preaching at the age of 16, but later learned the printing trade. In 1871 he went to California, and was employed in San Francisco and Sacramento as reporter and editor. He then went to Salt Lake, thence to New York and returned west to Virginia City. He finally settled in Amador County, California, publishing a paper, the "Foothill Ensign" at Sutter Creek, and in 1875 the "Amador Ledger." His knowledge of and close relation to the mining industry made him and his paper popular and useful in the Mother Lode region. Mrs. Webb will continue the publication of the "Ledger."

Professor David Alexander Louis died at his home in London, England, Mar. 25, aged 58 years. Born in London he studied at the Royal School of Mines. For some years he was employed in chemical work and research, but later turned his attention to mining and metallurgical work, gaining practical experience in Colorado, Germany and Italy. From 1891 he practised as a consulting mining engineer and metallurgist in London, making visits abroad for longer or shorter periods every year in the course of his work. In this way he frequently visited and was conversant with most of the centers of mining in Europe and the United States. He also lectured on mining at Leeds and in London. He was associated with Dr. Paul Dvorkovitz in the discovery of petroleum in Egypt. Professor Louis was an active member of many societies and a profuse writer, being the author of many papers on mining and metallurgical topics. He was a man of exceptionally wide knowledge and experience, and his loss is regretted by many friends.

John Birkinbine died at his home, Cyndwyd, near Philadelphia, May 14, aged 71 years. He was born in Philadelphia, the son of H. P. M. Birkinbine, who was noted in his day as a hydraulic engineer. He was educated in Philadelphia, graduating at the Polytechnic College of Pennsylvania. After two years' service in the army he became associated with the late P. L. Weimer as the firm of Weimer & Birkinbine, operating machine works at Lebanon Penn. Later he became manager of the South Mountain Mining & Iron Co. He was connected with other iron mining enterprises in Pennsylvania and Michigan, and gradually acquired a reputation as a consulting engineer. He was in Mexico for a time. Later he became consulting engineer for the Philadelphia & Reading Coal & Iron Co., Thomas A. Edison, the Cambria Steel Co. and the Colorado Fuel & Iron Co. He was for a number of years a special agent of the U. S. Geological Survey and he reported upon iron ores for the Twelfth and Thirteenth Census. He was past president of the American Institute of Mining Engineers, president of the Franklin Institute and a member of the Pennsylvania Forestry Association. He was a member also of the Engineers' and Manufacturers' Clubs of



Philadelphia, and of the Engineers' Club and the American Society of Mechanical Engineers, New York, and the Canadian Mining Institute. He was chief engineer and vice-president of the National Export Exposition, and from its inception in 1905 had been chairman of the Water Supply Commission of Pennsylvania. Mr. Birkinbine was active in the formation of the United States Association of Charcoal Workers, served as its secretary, and for nine years edited its journal. He was the author of numerous papers for technical journals and societies. Mr. Birkinbine leaves a widow, four sons and six daughters.

## SOCIETIES

**Society of Chemical Industry**—A joint meeting with the New York Section of the American Chemical Society and the American Electrochemical Society at Rumford Hall, New York, was held May 21. The subject for the meeting was distillation of petroleum.

**American Society for Testing Materials**—The annual meeting will be held at Atlantic City, N. J., June 22-26. The nominating committee has submitted the following nominations for officers: President, Professor Mansfield Merriman, New York; vice-president, General W. H. Bixby, Washington; executive committee, James H. Gibboney, Roanoke, Va.; William H. Hart, Lafayette, Ind.; John A. Matthews, Syracuse, N. Y.; Edward Orton, Jr., Columbus, Ohio.

**Colorado School of Mines**—Three new trustees have recently been appointed by Governor Carlson to fill vacancies in the board. They are Howard C. Parmelee, mining engineer and Western editor of "Metallurgical and Chemical Engineering," Denver; Harry M. Rubey of the Woods-Rubey National Bank, Golden; and Orvil R. Whitaker, mining engineer, Denver. These appointments are pleasing to all persons having the interests of this school at heart. The other members who hold over are Frank G. Willis, Cripple Creek and Capt. James T. Smith, Denver.

**American Institute of Mining Engineers**—The New York Section held a joint meeting with the New York Section of the Mining and Metallurgical Society of America at the Machinery Club, New York, May 19. The meeting was for consideration of the advisability and practicability of the societies appointing representatives on a committee of engineers, already appointed by national and local engineering societies with headquarters in New York, to present recommendations to the New York Constitutional Convention relative to changes in the state constitution.

**American Iron & Steel Institute**—The eighth general meeting, to be held at the Waldorf-Astoria, New York, May 28, will be opened with an address by the president, Elbert H. Gary. Papers will be read as follows: "Waste Heat Boilers," by Charles J. Bacon, steam engineer, Illinois Steel Co., South Chicago, Ill.; "The Commercial Production of Sound and Homogeneous Steel," by Edward F. Kenney, metallurgical engineer, Cambria Steel Co., Johnstown, Penn.; "Blast Furnace Advancement," by Andrew E. Maccoun, superintendent, Edgar Thomson blast furnaces, Carnegie Steel Co., Braddock, Penn.; "Merchant Rolling Mills," by Jerome R. George, chief engineer, Morgan Construction Co., Worcester, Mass.; "Recent Progress in Corrosion Resistance," by Daniel M. Buck, metallurgical engineer, American Sheet & Tin Plate Co., Pittsburgh, Penn. At the banquet in the evening the principal paper will be on "Welfare Work of the Tennessee Coal, Iron & R.R. Co. No formal discussion has been provided for on the program. It is hoped and expected, however, that there will be considerable informal discussion.

**American Institute of Mining Engineers**—The spring meeting of the Chicago Section was held Apr. 30 at the Chicago Engineers' Club. There were 29 members and guests present. After the dinner F. K. Copeland, presiding, introduced the president of the Institute, W. L. Saunders, who talked of the newer lines of activity of the Institute and the mining engineering profession in Chicago. Carl Scholz spoke of the condition of the coal mining industry in Illinois. Moving pictures of the Gary steel mills were shown and explained by Mr. Bruner. The annual election of officers resulted in the unanimous election of the present officers. R. W. Hunt, chairman; J. A. Ede, vice-chairman; H. W. Nichols, secretary.

The St. Louis Section held its annual meeting at the St. Louis Club on the evening of May 1. Addresses were made by the guests of the evening, W. L. Saunders, of New York, the president of the Institute, on "The Institute"; by H. W. Gepp, of Australia, on the "Lead and Zinc Deposits of Broken Hill, Australia"; and by V. H. Hughes, of Tulsa, Okla., on the "Cushing Oil Pool." The officers elected for the ensuing year were: Arthur Thacher, chairman; R. A. Bull, vice-

chairman; Prof. W. E. McCourt, secretary and treasurer; H. A. Buehler, R. R. S. Parsons and H. A. Wheeler, executive committee. The meeting was preceded by an excursion in automobiles to the fine new works of the Granby Mining & Smelting Co. at East St. Louis, where the sulphur is utilized in making sulphuric acid. The Section was the guest of E. S. Gatch, the president of the Granby company. Among those who attended were J. W. Malcolmson, of the Lucky Tiger Mine, Mexico; H. G. Hixon, of Iola, Kan.; and F. W. DeWolff, state geologist of Illinois.

## INDUSTRIAL NEWS

The Cook Well Co. is retiring from active business and will be succeeded by A. D. Cook, Lawrenceburg, Ind.

The Butters Patent Vacuum Filter Co., Inc., announces that it has moved its offices to Room 2852, Equitable Bldg., 120 Broadway, New York.

Electric furnaces are to be installed by the Michigan Steel Castings Co. at Detroit, in place of the small converter now used. Two Heroult furnaces, one of two tons and one of six tons capacity, will be used.

M. T. Davis, Jr., of the Kanawha Mine Car Co., Charleston, W. Va., advises that it has changed its name to the Kanawha Manufacturing Co. There will be no change in the policy or administration of the company.

Chalmers & Williams has recently sold to the Marsh Mining Co., at Wallace, Idaho, one 5x10-ft. adjustable quick-discharge tube mill, and to Balfour-Williamson & Co., for shipment to India, one 5x12-ft. adjustable quick-discharge tube mill.

The James McKay Co. is now operating its new forging plant at McKees Rocks, Penn., on crank and cam shafts, connecting rods and other miscellaneous forgings. Its board and steam drop hammers range in weight from 200 lb. to 9000 pounds.

Elmer E. Bratt, who for a number of years was the sales engineer of the Marshall Foundry Co., of Pittsburgh, Penn., has recently taken charge of the sales of the Webb City & Carterville Foundry and Machine Works, Webb City, Mo. Mr. Bratt intends to give the most of his time to new quarry and mine installations.

The Webb City & Carterville Foundry & Machine Works was recently awarded the contract for furnishing the entire equipment for the new 500-ton plant of the Granby Mining Co. at Granby, Mo. The equipment will consist of a 12x24-in. jaw crusher; one set of 42x16-in., two sets of 36x14-in., one set of 30x14-in. Cornish rolls and one set of 30x14-in. heavy-duty rolls, also one 8-in. centrifugal pump, besides the screens, elevators, jigs, etc. This company will also erect the plant.

The steel plant of the International High Speed Steel Co. at Rockaway, N. J., is now rapidly nearing completion, and it is expected that it will be in full operation by the latter part of June. The product will be confined to the highest qualities of tool steels, alloy steels, high-speed steels of all shapes and sizes; solid-octagon and cruciform, and hollow-hexagon and round rock-drill steels, for which the company has already achieved an enviable reputation in its famous Bulldog brand.

## TRADE CATALOGS

The Brown Hoisting Machinery Co., Cleveland, Ohio. Catalog U. Brownhoist transfer cars and larries. 32 pp., illus., 6x9 inches.

Jeffrey Mfg. Co., Columbus, Ohio. General Catalog No. 83. Elevating, conveying, crushing, screening, power transmission machinery. 384 pp., illus., 6x9 inches.

The Richardson-Phenix Co., Milwaukee, Wis. Bulletin No. 10. Peterson power plant oil filter and accessory apparatus for central oiling systems. 32 pp., illus., 8½x11 inches.

General Electric Co., Schenectady, N. Y. (Power and Mining Department). Bulletins 48,904 and 48,905, Electric Arc Welding. These bulletins take up the general subject of electric arc welding with supplementary notes regarding welding equipments, materials and special applications of electric welding. Bulletin 48,905 describes the stationary and portable welding apparatus developed by the company's engineers. The bulletins are well illustrated and contain much information that will be useful to those who contemplate doing electric welding.

## Editorial Correspondence

### DENVER—May 13

**Roosevelt Tunnel** has been pushed about 300 ft. since work resumed two months ago after the shutdown caused by the burning of the El Paso shaft that connects with this drainage adit. Heavy flow of water renders work difficult and the present progress is considered good. A. E. Carlton, heavily interested in this project, states that he has secured subscriptions of \$200,000 from mine owners that will be benefited by the completion of this bore. This amount will suffice to drive the breast an additional 8700 ft. and bring it into Vindicator territory. With the adit finished that distance, drainage will be afforded to practically every important mine in the district proper, for it is recognized that the Cripple Creek crater acts as a water-basin. Hence if an outlet for water be provided at some central portion, general water level will be lowered in every mine. Probably two years will be required to finish this task. The breast is approaching the edge of the crater and better progress is anticipated after entering the eruptive rocks, chiefly breccia. Elkton shaft will be reached in about 2000 ft. more.

### BUTTE—May 13

**The Hoist at the Mountain View** mine of the Anaconda company, since the morning of May 10, has been in steady operation. During the shut down of almost a year the frame was taken down, moved and set about 4 ft. from the original location to conform to the other changes made to the shaft and hoisting engine. By the end of the week it is expected the total working force at this mine will be 750 men.

**Anaconda**, in the course of time, will doubtless become a large producer of spelter. Large bodies of zinc ore have been opened in a number of its mines and processes for treating the ore are being rapidly developed at the Washoe works of the company. At these works the manufacture of sulphuric acid will also enable the company to make acid phosphate from the Montana phosphate deposits in which the company has taken an active interest.

### SALT LAKE CITY—May 13

**The Zinc Ore Producers** appear to have more trouble ahead of them says the Eureka "Reporter" of the Tintic district. During the last few weeks smelters have been accepting nothing but the high-grade zinc, carrying from 36 to 40%, which means a material decrease in zinc shipments from Tintic. Some of the properties will be able to make occasional shipments of the high-grade zinc, but where from 15 to 20 carloads of zinc ore are now being sent out under the present arrangements with the smelters the future shipments will probably drop down to two or three cars. It is said that all of the mines with the possible exception of the May Day, Lower Mammoth and Uncle Sam, are without zinc contracts, their ore being sold on the open market through the Utah Ore Sampling Co. Much of the zinc ore sent out from the Tintic during the past few months has carried under 30%, and the supply of high-grade zinc is very limited. As all the Tintic ores are a carbonate there is still a small market, which may be cut off at any time.

### SEATTLE—May 11

**The Alaska Coal Land Fraud Cases**, so-called, pending in the United States District Court since 1911 have been nolle prossed at the request of the Attorney General, through his assistant, Ernest Knaebel. The land involved was worth \$50,000,000. The action of the prosecution, it is understood, was caused by lack of evidence.

**Important Court Decision** has been rendered by the U. S. District Court at Juneau in favor of the Ebner Gold Mining Co., over the Alaska Juneau Gold Mining Co., which over a year ago brought suit against the former company to prevent it from using the waters of Gold Creek near Juneau. The decision is considered important as the Ebner company has a mill in operation while the Alaska Juneau mill is still in contemplation. While the Alaska Juneau was defeated in this suit, it won another in an equity suit against the Worthen Mill Co., involving valuable tide-land rights in front of the Alaska Juneau mill site. In this decision the court held that the owners of the land abutting the tide lands had riparian and littoral rights to the outlet, and that the land could only be held by occupation and not by the claim that it might be

needed some day. Immediately after the decision the Alaska Juneau announced that work would shortly be commenced on the erection of an 8000-ton milling plant, part of the work under the \$4,000,000 appropriation made by the company a month ago. Large wharves will also be erected on the property awarded by the court which will be used in assembling machinery and other materials for the mill. Among other improvements to be made by the company will be a large hydro-electric plant costing \$1,000,000 and the construction of a 30,000-gal. oil-storage tank.

### GALENA, KAN.—May 15

**Highest Zinc Assay on Record**—The last zinc ore produced by the Buck Eye mine is a record breaker, assaying 64.30% Zn. and selling on a basis price of \$79.80 per ton. Galena is justly proud of this report as it excels anything in the entire district and is the highest assay ever known in the history of the lead and zinc mines of the Missouri, Oklahoma, and Kansas district.

**The Horseshoe Mill** on the 40-acre lease of the McElroy and Luscomb land is to resume operation after an idleness of more than a year. It will be used as a custom mill to treat dirt from the subleases on the Horseshoe tract south of Galena. Several improvements will be made in the mill. Electrical equipment will be installed and the capacity will be brought up to 200 tons per day. D. C. Wise and Pat Tabor have a first lease on this tract and already 11 subleases are beginning to sink new shafts or clean out old ones. The ore is encountered at the 85-ft. level, and the ground is soft at this depth. Formerly this ground was mined only for lead ore and the best grade of zinc, resulting in large quantities of zinc ore being stored away with the waste underground or thrown away when hoisted to the surface.

### JOPLIN—May 15

**A Franchise to Operate a Lighting and Power System** in the city of Granby was voted to the Empire District Electric Co. at a special election at which not a dissenting vote was cast. The installation of electric power in the Granby district should be a great benefit to the mining industry, as heretofore the only power available was steam. The Granby M. & S. Co., which is building a 500-ton mill, will install electrical equipment to light and operate its plant; the mill will be modern and embody the latest improvements in milling design and methods as practiced in the Joplin district, including a large sludge department. This will be the first concentrating plant to be operated by electricity in the Granby district.

**The Zinc Smeltery** of the Collinsville Zinc Smelting Co. at Collinsville, Ill., has been leased by the Picher Lead Co. of Joplin. The Collinsville smeltery is a comparatively small one, having only 1536 retorts; it is coal-fired and has no acid plant; the plant has been idle about three years. When operated at full capacity it will treat about 300 tons of zinc concentrates per week. The entry of the Picher company into the zinc-smelting business is undoubtedly in line with its recent entry into the zinc-mining industry in Oklahoma where extensive mining development is being carried on. It is possible that the necessary ore required for the new smeltery can be supplied from the Oklahoma mines in the not distant future. The length of lease upon the Collinsville plant has not been stated, but it is known to be for a number of years. It is expected to have the smeltery ready for operation by June 1 when the Picher Lead Co. will be in the field for about 10 cars of ore per week.

**The Installation of a Large Fan** at the Chicago Mines Co.'s property, south of Carterville, Mo., is one of the most important results of the campaign that is being waged against tuberculosis in the Joplin district. The three state mine inspectors in this district, Clem Harland, Lee Burch and Walter Holmes, are coöperating with the Jasper County Anti-Tuberculosis Society and with physicians from the government in creating better working conditions in the mines. Other large mine companies contemplate the installation of fans for ventilation purposes. The fan at the Chicago property is 14 ft. in diameter, 4 ft. wide, and is operated by a 20-hp. motor. It is installed at the Mohawk shaft of the M. S. mine on a lease of the Connor Realty Co. A. J. Burnham, manager of the Chicago Mines Co., has aided in the anti-tuberculosis crusade not only by the installation of the fan, which acts either as an



exhauster or blower, but also by issuing orders to his workmen to discontinue the use of squibbing during regular shift hours. Drill men, who in the past would correct a crooked or clogged hole by the use of a squib, are now required to drill an entirely new hole. When the order first went into effect many new holes were drilled, but in the past week or two the workmen have shown more care, and imperfect holes are now the exception instead of the rule. It is Mr. Burnham's contention that 95% of the fine rock dust that irritates the lungs of the workmen comes from shots and not from the ordinary shoveling of ore. By eliminating the practice of squibbing during the regular shift hours he believes the dust evil will be largely overcome.

#### LORDBURG—May 12

**The Flow of Tailings from Mogollon Concentrators** into the Frisco River, whereby farming lands in Arizona are affected may yet result in suits against offending companies in New Mexico. Wiley E. Jones, Attorney General of the State of Arizona in reply to a letter written him by S. J. Kidder, manager of the Ernestine Mining Co.—see "Journal" of May 1—apropos of editorial correspondence on the subject appearing in the "Journal" of Apr. 3, 1915, states: "It does not seem to me that the publication of the article mentioned can in any way injure either of the Mogollon companies for it would not in any way cause me to begin suit in the matter to abate the nuisance occasioned by said discharge. This office is now looking into the matter, upon complaint of citizens of Graham and Greenlee counties, and upon our information gained from our own inspections will depend the action of this office. I wrote a strong letter of caution and protest to the New Mexico mining companies and threatened action on behalf of the State if the nuisance was not abated. Of course it is hardly necessary to state that I have no feeling in any way against them, and would desire to encourage them and all such industries in every way, but it is likely the residents along the river have just cause for complaint, and under the decisions of the United States Court, such nuisances can be abated by suit against the companies. My warning to them was with the express desire and hope of avoiding any suit whatever, but I must bring suit if compelled to do so."

#### KINGMAN—May 11

**Drilling for Water** in Wallapai Valley east of Kingman has been going on for some time and present indications lead to the hope of finding artesian water at a not much greater depth. Edward M. Fowler who is prosecuting this work has already spent about \$11,000. The State of Arizona has also appropriated \$8500 for this work. This valley is about 50 miles in length and averages about 15 miles in width; the greater part of the land is flat with a very easy gradient; the soil is very fertile and the climate equable.

**The Miners' Lien Law** was radically and wisely changed by the last legislature. As the law now reads, a mining claim under bond and lease is not subject to lien for bills due the supply man, as was the case under the old law, but only for laborers' wages and the laborer has lien rights only to the amount of two weeks' wages. The semi-monthly pay day is provided for by separate law and if the miner permits his employer to pass a regular pay day without payment of wages, he accepts personal responsibility and cannot place a lien on the property for more than one-half month's wages.

#### CHIHUAHUA—May 1

**Operations of the A. S. & R. Co.** in Mexico are at a standstill with the exception of the Chihuahua plant and the mines at Parral. Another furnace has been started at Chihuahua, making five in all in operation. There is no activity at Aguascalientes and Monterey except that at Monterey some ore is being shipped in.

#### TORONTO—May 11

**At the Annual Meeting of the McIntyre Mining Co.**, held May 5, the long-expected change in the directorate was made. Col. A. M. Hay of Toronto, president of the Trethewey was elected president and Sir Henry Pellat was made vice-president. The other directors are W. J. Shepard, J. B. Tudhope, J. P. Bickell, I. J. R. Mueiring, C. B. Flynn and M. P. Vander Voort. Canadian directors are in the majority. The new directorate will do much to restore public confidence in the company, whose affairs now appear to have passed the critical stage. The financial position has been greatly improved and the property is responding to careful and intelligent management. The financial statement for the year ended Mar. 31 shows assets as of that date of \$102,782, of which \$1840 is cash and \$46,791 gold bullion. The current liabilities are \$114,704, which includes \$57,507 bank overdraft. The net deficit on current account is about \$12,000.

#### CHRISTIANIA—Apr. 21

**Swedish Zinc**—The prohibition of Swedish export took effect from Apr. 20.

**Norway Nickel**—The Ringerike smelter in 1913 dealt with the following: Norway nickel ore, 14,683.5 tons; Greek ore, 994.4 tons; Australian ore, 236 tons; ferronickel, 2 tons; and Egyptian ore, 49 tons. The total metallic output for Norway in 1913 was 690 tons.

**Swedish Iron Ore**—Owing to the situation arising out of the overhauling of the Swedish ore boat, "Sir E. Cassel," the Grängesberg Coy, on Apr. 16, wired orders for the detention of three large ore boats bound for England from Norwegian ports. In the Baltic three German vessels engaged in ore traffic with Swedish ports are reported lost at sea, presumably from mines or torpedoes.

**A Rich Copper Find in Tyrol** is reported. The Austrian "Die Zeit" states that the well-known mineralogist Doelter has discovered a large copper deposit near Mitterberg, in Tyrol. The body of ore is described as being sufficiently large to ameliorate Germany and Austria's present copper famine. The copper works which had been shut down for a length of time are to be again started, and in a short time it is expected that 8000 tons of copper will be produced.

**Nitrates to Germany**—The Norwegian paper "Varden" notices the arrival at Langesund, Norway, week ending Apr. 10, from Odda near Bergen, of a German steamer with a consignment of raw material for explosives. The steamer which had followed the coast line from Odda to Langesund proceeded with its cargo (stated to be Norwegian owned) to Germany—presumably along the Swedish coast to Lübeck in the Baltic. There is no Norwegian export prohibition on nitrates.

**Nitrogen Fixation**—Since last Christmas the hands employed at Rjukan II construction in Telemarken have increased to 500. Some discharges took place at Easter, but it is expected that the staff will again be increased very shortly, as the intention is to complete the work next autumn. At Notodden the same company (Norsk-Hydro) is enlarging the layout of the nitrate works, and especially the packing department. Four new acid towers are also to be put up, and other developments on a large scale are to be carried out. The new large ammonia factory is working full time. The liquid raw material hitherto imported from England has been replaced by the home article.

**The Copper Produced in Norway and Sweden** is insufficient for home requirements. The annual import of copper to Sweden alone is from 17,000,000 to 18,000,000 Kg. The latter country has to send its refined copper abroad for rolling or drawing, though recently a copper-wire mill has been established in Drammen. The export of the metal is at present prohibited from both countries. "Thereon," a Norwegian paper, comments: "It is only two or three weeks ago that Government permission had to be obtained to export (to Germany) some refined copper from Rörös mines. It (about 12 tons) was to be exchanged for German electric cables. Whether the Germans sent the cables history does not say."

**The Regulating of the Porjus Falls** in Sweden was commenced in 1910. When quite completed the capacity will be 300,000 hp. The consequent electrification of the railway from the Kiruna iron mines to the Norwegian frontier (Riksgraensen), from whence steam is used, to Narvik port, was effected on Jan. 19 this year, and from Feb. 15 all the trains had been electrically run on the Swedish section. The latter is 113 km. in length, and whereas the time previously required for the ore trains to pass it was 7 hours it is now only 3 hours. The general results of the electrification have been very encouraging, and it is stated that the remainder of the line, from Kiruna to Lulea on the Baltic, will be shortly taken in hand. Over the northern section to Narvik port, in Norway, there is now an annual transit of over 5,000,000 tons of ore.

**Copper Smuggling**—The Swedish government is having an eye to the strenuous attempts to smuggle copper to Germany in all possible guises. Many of these attempts are known to have succeeded—after the event. At Traelleborg, on Apr. 14, quite a large consignment was seized. The delinquent was an engineering firm in Stockholm. Permission had been obtained from the Government to export a parcel of copper scrap to Germany to the amount of 15,000 kilos, on the understanding that the firm might import 45,000 kroner worth of electric lighting apparatus from Germany. When the "scrap" was searched a quantity of copper plates and wire was found concealed within it. A Hamburg firm, on the other hand, has been more fortunate, for with the aid of a Swedish middleman in Gothenburg and a legal flaw in the export embargo they bagged a fine assortment of copper utensils specially designed to contain copper plate. The revenue authorities have had the legal vacuum filled in.

# The Mining News

## ALASKA

**THE CIRCLE DISTRICT** is expected to increase its output over last year. John Stark and Anton Sutter have installed two new hydraulic plants on Mastodon Creek and J. F. Kelly has installed one on Miller Creek. New Berry dredge will be placed in operation in June and should make a good showing. Coal and Woodchopper creeks were prospected during the winter and additional ground suitable for dredging is reported to have been found.

**CAMEL BACK GROUP**—Four claims comprising Camel Back Group, situated in Mineral Lake district, Prince of Wales Island, have been bonded by William Armstrong for \$40,000.

**WILDCAT CREEK (Fairbanks)**—Wilson & Samson have discovered pay on Wildcat Creek on claim above Zero, on which Finlayson & Rowson have been working in fair pay for several years.

**BERRY BROS. (Circle)**—Union Const. Co., of San Francisco, has brought in parts and will set up mammoth dredge on Mastodon Creek for Berry Bros. Will have capacity of 2000 cu.yd. per day.

**JORGENSEN LEASE (Tofty)**—Jorgenson lease on Bock ground on Sullivan Creek, Hot Springs district, has been sold to Howell & Cleveland for \$5000, purchasers assuming debts incurred in prospecting and opening up during winter.

**GRANITE GOLD (Valdez)**—Now has its new plant in operation. Is expected to crush from 65 to 70 tons of ore per day. New tunnel to strike lead at depth of 340 ft. has been driven 270 ft. More than 2000 ft. of tunnel has been driven on property.

**GALENA MINE (Mayo)**—Tom Atkin has purchased interest in this property on Stewart River, Yukon. Thirteen hundred tons of ore, expected to average \$200 net per ton, has been freighted to steamboat landing and sent down via Dawson to Puget Sound.

**HAPPY CREEK (Fairbanks)**—John Fahy and Letendre, Strauss & Cosgrove are sluicing dumps taken out during winter, representing about 18,000 sq.ft. of bedrock and are expected to clean-up total of nearly \$30,000. Letendre and associates plan to sink new shaft at once.

**GRANBY MINING, POWER & SMELTING (Valdez)**—George E. Smith, superintendent of the Midas mine here, states that development work will be pushed on this property during summer. Crew will be put to work to develop orebodies and another crew will complete construction work on aerial tram from mine to beach. During past year over \$200,000 worth of development work was completed on this property.

**ALASKA JUNEAU (Juneau)**—Has probable ore above Gold Creek Tunnel amounting to between 80,000,000 and 100,000,000 tons, on which profit from 70c. to \$1 per ton will be realized. There is, in addition below Gold Creek Tunnel to depth equal to present bottom level of Douglas Island Mines, two miles away, at least twice this tonnage probable, in which case company has total of from 240,000,000 to 300,000,000 tons of ore. It is not commercially feasible, because of tremendous cost involved, actually to block out any large part of this tonnage at present. Certain facts having important bearing upon probable ore and its value are: Length of about 7000 ft. on the mineralized belt; development of three distinct horizons of pay ore; on surface, where 30-stamp mill operated for years, at point 800 ft. vertically below these surface workings, main crosscut tunnel approximately 1200 ft. below these surface workings, at all of which points milling results indicate practically uniform values. Wherever development has been done in ore, same approximate gold value has been determined. It is reasonable, therefore, to assume that quartz masses throughout property from main crosscut tunnel level to surface are of approximately same gold value per ton. Company has secured George O. Bradley to design and supervise erection of 8000-ton mill.

## ARIZONA

### Gila County

**INTERNATIONAL SMELTERY (Miami)**—Is virtually in operation now in way of drying out converters, fusing lining of reverberatory furnaces, bedding ore and fluxes. Original estimated cost, \$2,000,000. Capacity will be about 250 tons of copper daily, although production of copper from Inspiration and Miami concentrates, which it was built primarily to handle, for a time will be about 160 tons per day.

**ARIZONA COMMERCIAL (Globe)**—Three stopes in sulphide ore on 1300 and one on 1200 levels being worked and 175 tons of ore being shipped daily to Old Dominion smeltery. No drifting in progress on 1400, cutting of pump station having finished all work on that level for some time. The pumping plant is lifting about 450,000 gal. daily from 1400 level to 1200, whence it runs to Old Dominion shaft by connecting drift 8000 ft. long.

**OLD DOMINION (Globe)**—Third furnace started on account of ore shipments to smeltery from Arizona Commercial and outlying mines. In concentrator three full shifts are running and over 600 tons are being put through plant daily. Oil flotation being used as clean-up for vanner tailings and flotation concentrates thus made are now being dried in new Oliver filter plant instead of being settled in wooden bins, as formerly. Tonnage hoisted lately has been about 800 tons per day, which is larger tonnage than at any time since last July. Water on 1000 and 1200 levels decreased somewhat, but is still heavy and takes the full capacity of the normal pumping equipment. Steps being taken to unwater west winze from 1600 to 1800 level.

## Warren County

**COPPER QUEEN (Bisbee)**—Has made tentative gift of \$10,000 to local Y. M. C. A. for general improvement purposes including installation of bathing and swimming facilities. Offer contingent on doubling of present membership of 500.

## CALIFORNIA

### Amador County

**KEYSTONE (Amador City)**—Good grade of ore, some of which shows free gold, disclosed in hanging wall on 1200 level.

**TREASURE MINE CO. (Amador City)**—Assessment No. 38 of 5c. per share has been levied for further development. Pay ore has been blocked out but it is considered advisable to continue development before installation of mill. E. McCurdy is superintendent.

**OLD EUREKA (Sutter Creek)**—Reported that Col. Edward Green, of New York, has secured controlling interest in this old property, which consists of three mines and mill site, by levying assessments of 50c. a share on outstanding stock. Particular purpose of assessments was to reimburse Mrs. Hetty Green for amount expended for taxes in past 25 years that mine has been idle.

### Butte County

**GOLD HILL (Stirling)**—Reported that mine will be reopened. Construction of mile of ditch and dam will be necessary.

### Calaveras County

**FORD (San Andreas)**—Exploring of 100 level in progress with good extractions. Sample shipment of high-grade ore sent to Selby. Vein is about 6 in. wide and widening with advancement of drift.

**WHATCHEER (San Andreas)**—Property comprising 140 acres of blue lead channel at Chili Gulch reported to have been purchased by John Johnstone of Seattle, member of the firm of Johnstone, McKenzie & McDonald of Alaska. Twenty men are employed in development, and payment on purchase price said to have been made. There is large amount of rock already extracted said to average about \$3 per ton.

### Eldorado County

**RED MOUNT (Placerville)**—This property situated in Garden Valley district has been leased to W. E. Gill of St. Louis.

**MONTEZUMA (Nashville)**—Electrical machinery is being installed and as soon as old workings can be put in shape, underground development will be undertaken on large scale. Albert Burch of San Francisco, representing Bewick-Moreing company, is manager.

**ALPINE (Georgetown)**—Mine being unwatered and retimbered preparatory to resumption of development. Mine owned by Los Angeles men and was operated two or three years ago when disagreement of owners caused closing down. Sam W. Collins is superintendent.

**RISING HOPE (Placerville)**—Installation of rotary gravel mill with capacity of 80 to 100 tons in 24 hours is about completed. Development has been in progress for last three years. Large body of gold-bearing gravel blocked out in channel. George W. Englehardt is manager.

### Fresno County

**FRESNO COPPER (Clovis)**—Property reported sold to J. S. Douglas of Douglas, Ariz. C. C. Leavitt of San Francisco is making survey, and upon report future of the property will be decided.

### Humboldt County

**CORONA DE ORO (Eureka)**—Recent cleanup from this gravel mine valued at \$6000, averaging production of \$400 per day. Water is available only six or seven hours in 24 but two shifts are maintained. William B. Olmsted, manager and principal owner, was one of early prospectors and operators in Alaska, going there in 1894.

### Inyo County

**CERRO GORDO (Keeler)**—Twenty-five men employed on reconstruction of aerial tramway between mine and Keeler. All necessary timber received and two carloads of machinery from St. Louis. Ore bins at railroad station are about completed. Intermediate control station will be constructed at Flat Top, half way between mine and railroad. Recently two new zinc orebodies have been opened. Fifty men on pay roll at mine. Development work being prosecuted at four different points.

### Kern County

**GOLDEN (Caliente)**—Joseph Ferris, owner, has given leases upon this property in Amalie district.

**GOLD PEAK (Caliente)**—Mill has started on good ore. New machinery is being added to equipment.

**SYCAMORE (Caliente)**—J. W. Kelly and R. Pile are developing this property in Long Tom district. A 3-ft. vein of high-grade ore is reported.

**GLADYS (Randsburg)**—High-grade ore was recently disclosed and it is believed the vein is an extension of Sunshine. Vein is 18 in. wide at the 110 level.



**ZENDA (Caliente)**—Cooper Shapley and associates of Bakersfield and Caliente have taken over this mine and mill. Reported that cyanide plant will be increased.

**CHURCHILL (Johannesburg)**—Two shifts of men employed at this tungsten mine about four miles from Randsburg. Reported that 12-in. vein of high-grade ore has been disclosed.

**SUNSHINE (Randsburg)**—Sulphide ledge encountered at 500 ft. carries a 5-ft. vein with ore milling as high as \$100 per ton. Leasers say there is a large amount of ore in sight.

#### Nevada County

**BRUNSWICK CONSOLIDATED (Grass Valley)**—Four carloads of cement and six carloads of machinery for construction of new mill have been received.

**CLEVELAND (Nevada City)**—James Hawke, owner, contemplates installation of dry-land dredge on this placer on Deer Creek. He controls about 2300 ft. of bed of creek which has yielded gold since 1849.

**GOLDEN CENTER (Grass Valley)**—Concentrates amounting to 120 tons accumulated at mill are being hauled to Pioneer Reduction Works for treatment. It is stated that concentrates average \$80 per ton.

**CHARLES B. O'CONNOR** of Lake City is reported to have discovered good gold-bearing gravel near that town in old bed of Kennebec Creek. Ground has been prospected by shafts and opencuts. Tests have been made for distance of 3700 ft. along course of gravel channel.

#### Placer County

**HARMON (Westville)**—Reported that an electric plant will be installed this spring.

**KING (Loomis)**—Property leased to Auburn men for one year, considered one of best gravel mines in old river bed.

**WHISKEY DIGGINGS (Lincoln)**—Reported that Wallace Gibson will reopen the mine. It is one of the oldest properties in Valley View district.

**BOREALIS CONSOLIDATED (Auburn)**—Compressed-air drills and 1500-ft. electric hoist have been installed. Drifting for 225 ft. on 260 level has disclosed shoot of high-grade ore. Contract signed for increasing 10-ton mill to capacity of 20 tons. Cyanide plant also contemplated. Property is situated in Ophir district about three miles from Van Trent Copper Co. mines.

#### Plumas County

**ENGELS (Taylorsville)**—Concentrator at this copper mine resumed operation and arrangements made for regular shipments to Utah smelteries. Reported that other copper mines in this region are being reopened.

**JOSEPH (Quincy)**—San Francisco men have taken bond on this gravel mine situated south of Genessee Valley. Property has been owned and operated with profit by Anthony Joseph of Quincy for the past 28 years. Method of operation has been by hydraulic elevator and derrick.

#### Shasta County

**ASBESTOS DEPOSITS** covered by 12 claims have been located on Mears Creek west of Simms by H. R. Stevens and L. M. Emmons of Redding.

**DREDGING GROUND** amounting to 1277 acres on Churn Creek, east of Redding, is said to have been bonded by Eastern men who it is reported contemplate installation of dredges. The owners are T. Neilson, George Meding, W. C. Hawley, and Perry Mark of Redding. Perry Mark is superintending drilling.

**VICTOR POWER & DEVELOPMENT (Knob)**—Lane mill has been installed at Midas mines in Harrison Gulch district. Additional units will be installed. Recent cleanup of \$6000 shipped to U. S. Mint at San Francisco. R. D. Jackson, general manager.

**SHASTA BELMONT (Heroult)**—This copper property situated on Pit River between Copper City and Heroult will probably resume operations, according to advice from the head offices at Carson City, Nevada. Development was suspended at breaking out of war.

**DRY CONSOLIDATED (Redding)**—New hoist and other equipment will be installed for thorough development of 6-ft. ledge which shows good-grade of ore at depth of 75 ft. It is reported also that Dr. McEntyre is contemplating installation of dredge near Copley.

**SHASTA DREDGING (Redding)**—Dredge which operated for number of years at Horsetown is being removed to Gas Point. Smith Center will be the name of new town to be built near dredge. Seventeen cottages are being constructed for employees. G. V. Smith is superintendent.

#### Sierra County

**JIM CROW CANON (Downieville)**—Papoose quartz group is undergoing an exhaustive examination by A. F. Hughes, M. E. of Berkeley, on behalf of the owners, Captain H. S. Howland of San Francisco and associates.

#### Siskiyou County

**ISABELLA COPPER (Yreka)**—Advancement of main tunnel 100 ft. has commenced and development of main orebody will be prosecuted.

#### Tulare County

**TULARE MINING (Portersville)**—Tramway 4000 ft. long is being constructed for carrying ore from this magnesite mine. There is vertical drop of 700 ft. from mine to mill site.

#### Tuolumne County

**KNOX & BOYLE (Santa Ysabel)**—Property will be operated under lease. Car track and pipe line being laid and water will be pumped out, preparatory to installing machinery.

**EXPERIMENTAL (Sonora)**—A 3½-ft. vein of good ore disclosed in breast of long tunnel, a distance of 2700 ft. from portal. Tunnel has been driven through barren country. At point 270 ft. beyond vein disclosure, large vein has been tapped by shaft.

**BUCKEYE (Sonora)**—Company has been formed by Gibson B. Kelly and George L. Gary and development will be prosecuted on large scale. Is one of old mines of Table Mountain district. Said to be situated in same channel as the Springfield tunnel mine. M. J. Lidstone is manager. Installation of mill and hoist is contemplated.

### COLORADO

#### Boulder County

**HERALD (Sugar Loaf)**—Strike comparing with those made in this district 30 years ago has been made. Leasers Brough, Clark, Davis & Rinn opened 2-ft. vein filled with sylvanite and have mined carload lot that will be hauled and sold immediately. Results are expected to be spectacular.

#### Chaffee County

**MONARCH-MADONNA (Monarch)**—In preparation for sinking third shaft, air-compressing plant has been purchased and moved to mine from Salida copper mine. Reserves show well but main shaft is in such treacherous ground that it is necessary to abandon it as soon as new shaft can be sunk 350 ft. Upper levels worked through adits by 25 sets of leasers. Company employs 30 men.

#### Gunnison County

**YUKON (Parlin)**—Shipments have resumed for usual summer season. Although but a small mine, fair-sized orebodies have been developed and it will be possible to ship small tonnage of high-grade copper-gold ore.

#### Lake County

**WESTERN ZINC OXIDE CO. (Leadville)**—New incorporation owns works erected last year to manufacture zinc pigment from carbonate and silicate ores of this district. Officers for first year are: President, Howard E. Burton, local mining man and assayer; vice-president and general manager, A. E. Augustine, one of the two original owners of the plant. Experiments have been conducted to determine grade of fuel most suitable for this reverberatory treatment of the local non-sulphide ores with result that anthracite and coke have been selected for use during regular working conditions, with bituminous coal as a kindler. Twelve of the plant's 16 furnaces are handling about 40 tons of 15% crude ore per day. Daily production of oxide varies, of course, with grade of heads but during recent research with different fuels, daily output averaged about 6 tons of 75% zinc. Both quantity and grade of product will be materially increased in near future, it being Mr. Augustine's purpose to manufacture an 80% pigment. Employment is given to 25 men.

#### San Juan County

**INTERSECTION (Silverton)**—Stamp mill has resumed and will keep busy all summer on ore stocked during past winter.

**SAN ANTONIO (Red Mountain)**—Was bought at sheriff's sale by G. A. Niemann of Denver. Has been idle two years because of differences among owners. John F. Roper will be superintendent and intends to push mining of large bodies of copper-lead ores carrying gold and silver.

**GOLD KING (Gladstone)**—Mine production keeps mill running at capacity. Louis Bastian, mill superintendent, constructed an oil-flotation experimental machine with which he has conducted experiments that produced 16 carloads of fine concentrates. He is nearly ready to install several commercial-sized machines.

#### Teller County

**DOCTOR-JACK POT (Anaconda)**—Powell lease in shaft No. 6 on Work claim is to be equipped with electric hoist.

**ABE LINCOLN (Cripple Creek)**—Brothers & Strauss, leasing 500 level, have 8 ft. of shipping ore. Kenzie & Fabry, on 700 level, are shipping from 6-ft. vein developed in winze and have been stoping.

**COMMONWEALTH (Cripple Creek)**—Philip Merriweather has taken contract to lift upraise 800 ft. from Roosevelt tunnel level to connect with bottom of present 800-ft. shaft. This property lies in saddle between Gold Dollar mine on Beacon Hill and Elkton mine on Raven Hill. Proposed work will result in vertical shaft having two cage compartments, 1600 ft. deep.

### IDAHO

#### Custer County

**EMPIRE COPPER (Mackay)**—Output is now 3600 tons per month; 220 men are employed. On payment of June installment of purchase price control will be turned over to Godbe interests of Salt Lake who negotiated deal.

### KANSAS

**H. L. & S. S. MINING CO. (Lawton)**—Concentrating plant swallowed by cave-in. Shaft situated at mill not injured. New mill will be built.

### MICHIGAN

#### Copper

**SMITH-CLOSE (Ontonagon)**—Has awarded 75,000-ft. diamond drilling contract to Cole & McDonald. Drilling will be done in Porcupine district, near White Pine Copper Co.

**MOHAWK (Mohawk)**—Is contemplating erection of electric light and power plant this summer. Electrical equipment of this company has been very little, but electrification of rock houses, underground haulage and pumping has been talked of. Not probable that electric mine pumping will be considered as it is not very large item. Telephone system now being installed underground.

#### Iron

**JUDSON (Alpha)**—Is again on full time, going from four days per week to six; force has also been added to.

**FORBES (Iron River)**—Working force here was doubled this week. No ore is being shipped at present; all that is hoisted being stocked.

**ROLLING MILL (Negaunee)**—Fifty men were added to underground force this week. About 200 men are now working. Regular shipments of 500 tons daily being made.

**AMASA-PORTER (Amasa)**—Number of mine buildings and homes for employees to be built this summer. Present buildings are only temporary structures. Most of men walk from Amasa, four miles away.

**IRON MOUNTAIN LAKE (Ishpeming)**—More exploration work is to be done with diamond drills before any other further work is carried on. Drilling will start immediately. Not unlikely that present shaft will be abandoned and new one, much larger, sunk.

#### MINNESOTA

##### Duluth

**ZENITH FURNACE (Duluth)**—Contracts have been secured from Eastern explosive manufacturers to take output for more than a year after completion, not contingent on the European war, of plant being built to recover benzol and toluol from byproduct gas from company's coke ovens. Plant will be of sufficient capacity to handle entire volume of gas from coke plant.

##### Mesabi Range

**BIWABIK**—Drills working on Merritt Hill have encountered orebody, situated between Biwabik and Bangor location.

**HAWKINS (Nashwauk)**—Stripping commenced here May 4. One shovel is being worked two shifts. Two engines are hauling ore from pit.

**OLIVER IRON MINING (Chisholm)**—Work has been started on new shaft to be sunk near Great Northern station on lands developed last fall. Steel headframe will be erected. Shop buildings will be of concrete. Small crew now employed getting shaft started. Company will put down shaft on Myers property. Work on this mine was started last Saturday.

#### MISSOURI

**ORONOGO MUTUAL (Oronogo)**—Has secured mining leases on greater portion of town lots, Oronogo, and is now driving faces west under these lots; leases extend west about 1100 ft. from mill. New shaft 6x6 ft. in clear and 205 ft. deep has been sunk on one lot 1000 ft. west of mill, a 400-ton hopper and derrick has been erected over this shaft and drifting has been started. Ore will be transported to mill by an aerial tram, buckets will hold 3000 lb. of ore; tram will be operated by 25-hp. motor installed at shaft. Tramway stretches across southern portion of town and will be completed within 30 days. Ore occurs in sheet-ground formation and shows 4½ to 5% blende; face is 12 to 15 ft. in height.

#### MONTANA

##### Hill County

**HAVRE NATIONAL GAS (Havre)**—Third gas well of this company will be started within a few days. Will be located about a mile east of Hill County fair grounds. It is believed that the main gas flow which is known to exist in this field will be tapped by new well.

##### Lewis & Clark and Madison Counties

**BARNES-KING DEVELOPMENT**—Estimated clean-up of company for April of North Moccasin mine at Kendall, Madison County was \$43,900 from 4608 tons of ore. This would make an estimated yield of \$9.53 per ton of ore. Work on power line to company's Plegan-Gloster mines near Marysville, Lewis & Clark County, has been delayed on account of recent storms. Montana Power is pushing work on line between Great Falls and Deerlodge which will supply Milwaukee railroad which passes through country adjacent to Barnes King property. Branch line to main line from mines has already been constructed.

##### Silver Bow County

**BUTTE & SUPERIOR (Butte)**—Quarterly report period ended Mar. 31 gives tons ore milled, 117,860; average zinc contents, 17.35%; assay of concentrates, 52.92%; total zinc in concentrates, 36,382,742 lb.; mill recovery, 91.32%; total net profits, \$1,163,156.

**NORTH BUTTE (Butte)**—By middle of month will begin hoisting at new Granite Mountain shaft and transfer most of work from Speculator to new hoist. At present about 800 men are working and output is nearly normal.

**PILOT-BUTTE (Butte)**—Employing 50 men at present for work in ground not in dispute with Anaconda. During past month about 19 cars of 7 to 8½% copper ore were mined and shipped to Washoe. Tonnage for April close to 1000 tons. Company has large bodies of zinc ore in sight but no arrangements for handling it have yet been perfected and it is therefore not brought to surface.

**BUTTE-NEW YORK COPPER (Butte)**—Company has authorized issue of \$500,000 of 10-year mortgage convertible bonds. Object is to raise money for development work. Butte-New York is a holding company only, controlling Butte-Milwaukee, which is a subsidiary of Butte & Superior. Butte-Milwaukee claims which adjoin Butte & Superior property are developed under direction of latter company.

#### NEVADA

##### Elko County

**ELKO PRINCE (Midas)**—Will install 50-ton mill; construction to begin as soon as possible.

**CLOVER (Wells)**—This leasing company, incorporated recently, working Polar Star mine and adjoining ground 6 miles south of Wells. Good-grade lead-zinc ore being mined; regular shipments made via Tobar, on Western Pacific R.R. Net smelter returns average \$15 per ton.

##### Esmeralda County

**KEWANAS (Goldfield)**—Has made side-line agreement with Booth giving 250,000 shares treasury stock for relinquishment of extralateral rights.

**ATLANTA (Goldfield)**—Air raise connection made and production will be increased to 50 tons daily. New raise, 1011-A, is in full face of ore assaying \$27 per ton.

**LONE STAR (Goldfield)**—Has made side-line agreement with Booth and will resume development and exploration work stopped when apex litigation threatened.

**MERGER MINES (Goldfield)**—Receivership made permanent by U. S. District Court at Seattle. Counsel for plaintiffs announce that further suits will be brought against Merger directors for alleged abandonment and loss of corporate

property and against Jumbo Extension for recovery of Velvet claim.

#### Humboldt County

**NEVADA SHORT LINE R.R.** has begun extension from mill of Rochester Mines Co. to Upper Rochester. Work will be completed in 60 days.

**NEVADA PACKARD (Rochester)**—Large block treasury stock sold and work on new milling plant will begin soon. Several springs, large enough to furnish sufficient water supply, acquired. Estimated value of ore developed, \$2,000,000.

**LINCOLN HILL M. & M. (Rochester)**—Total production to date from two-stamp mill, \$50,000. Addition of five stamps and cyanide plant will be made. At mine, compressor and drills will be installed. Crosscut tunnel to be driven to cut Spur and Peerless veins; 200-ft. winze will also be sunk. New road from lower tunnel to mill being built; this will shorten wagon haul of ore by two miles. Power for mine and mill furnished by Nevada Valleys Power Co.

#### Lander County

**COPPER QUEEN (Battle Mountain)**—Development work on this group in Copper Basin progressing with satisfactory results. Property being worked by W. P. Hammon, of San Francisco. Options secured on 118 claims in Copper Basin; these will be prospected by churn drilling.

#### Lyon County

**PRESCOTT (Ludwig)**—Shoot high-grade copper ore opened in drift on tunnel level. This property just east of Nevada-Douglas, formerly operated by Greenwood company.

**NEVADA PROGRESSIVE (Yerington)**—Sinking of working shaft progressing rapidly, now nearly 300 ft. deep. Other development work under way and satisfactory progress being made.

**NEW CYANIDE PLANT FOR SPRING VALLEY DISTRICT**, near Mound House, will be built. Plant will treat old mine dumps in this district. Experimental work carried on for several months before decision made to build plant.

#### Mineral County

**BURNS & BLACKBURN (Hawthorne)**—Rich channel on bedrock opened in 140-ft. shaft. Gold is coarse, one nugget found valued at \$16. Pans \$6 to \$12 per cu.yd. Discovery made below Pamlico mine in Pamlico mining district. Expected channel will be three miles long; many claims being staked.

#### Nye County

**TONOPAH ORE SHIPMENTS** for week ended May 8 totaled 9871 tons, estimated at \$203,638, compared with 10,665 tons week previous. Shippers were: Tonopah Belmont, 3493; Tonopah Mining, 2600; Tonopah Extension, 1678; West End, 878; Jim Butler, 900; Tonopah Merger, 262; North Star, 60 tons.

**TONOPAH BELMONT (Tonopah)**—Has taken option on Potosi mine, in Nicaragua, covering 265 acres and placer rights along two rivers for 30 miles.

**TONOPAH MINING VS. TONOPAH EXTENSION**—By stipulation filed in court apex suit is withdrawn and side-line agreement covering disputed Sand Grass claim entered into. Full terms of settlement not made known.

#### Storey County

**JUSTICE MINE (Virginia City)**—Dangerous ground at Pacific Bend being fenced in. This territory undermined and may cave.

#### NEW JERSEY

**NEW JERSEY ZINC CO. (Franklin Furnace)**—This company is reopening old Stirling mine, which has been closed for good many years. New shaft is being sunk.

#### NEW MEXICO

##### Colfax County

**GOLDEN AJAX M. & D. (Elizabethtown)**—This company, of Denver, Colo., will overhaul its 10-stamp mill and install cyanide machinery at mine near Elizabethtown.

##### Grant County

**GEORGE S. CURTIS and FRANK J. DOLAN** plan to begin development work upon group of 65 claims in Burro Mountains, near Silver City, N. M., upon which they recently obtained option. Ledge of high-grade copper ore 35 ft. wide has been uncovered on property.

**SILVER CELL M. & S. (Pinos Altos)**—Recently organized with capital stock of \$300,000 for purpose of operating its mines in Pinos Altos district.

**PHELPS, DODGE & CO. (Tyrone)**—Has recently increased its operations at its mines in Tyrone district and its output of copper ore is being gradually enlarged.

##### Otero County

**MACE & NICHOLAS** of Sierra Blanca, Texas, are preparing to begin development work upon claim in Alamogordo district, which they recently bought from J. B. Knight.

##### San Miguel County

**PECOS RIVER COPPER (Cowles)**—W. C. Brace, of Denver, Colo., and associates have placed force of men at work developing this copper mine, which they have taken over under conditional bond and lease. David Brown, of Denver, mining engineer, is in charge of property.

#### PENNSYLVANIA

##### Susquehanna County

**NEW JERSEY ZINC CO.**—This company is doing churn-drill prospecting around old Ueberoth mine at Friedensville.

#### TENNESSEE

##### Polk County

**DUCKTOWN SULPHUR, COPPER & IRON CO., LTD. (Ducktown)**—U. S. Supreme Court on May 10 decided in favor of State, suit brought by State of Georgia for an injunction to prevent company from diffusing sulphurous fumes over Georgia border from operation of its plant in Tennessee. Court held that amount of sulphurous fumes must be restricted and an inspector appointed to fix limitations.



## UTAH

## Beaver County

**HORN SILVER (Frisco)**—Much development being done from 500- to 900-ft. level. Seventy men are employed. Ore recently encountered near King David line is four to five sets wide. Annual report for 1914 showed total receipts of \$205,279, of which \$163,978 came from sale of ore. Operating expenses were \$190,599, leaving net profits of \$13,698.

## Juab County

**TINTIC ORE SHIPMENTS** for April amounted to 530 carloads, estimated 29,000 tons, value \$725,000. This compares with 356 cars for month previous. Shippers were: Iron Blossom, 101 cars; Centennial-Eureka, 99; Sioux mill dump, 95; Eagle & Blue Bell, 55; Chief Consolidated, 50; Gemini, 39; Dragon Consolidated, 23; May Day, 18; Lower Mammoth, 16; Grand Central, 20; Gold Chain, 9; Eureka Hill, 7; Colorado, 7; Beck Tunnel, 7; Bullion Beck, 7; Victoria, 5; Carisa lease, 5; Yankee Consolidated, 5; Godiva, 2; Black Jack, 2; Sioux Consolidated, 2; Tintic Standard, 1; Ophongo, 1; Utah Ore Sampler, 1; Minnie Moore, 1; Uncle Sam, 1; Salvador, 1 car.

**IRON BLOSSOM (Silver City)**—Burning of the Knight mill has not affected profits, as there has as yet been no income from ore of character treated.

**GEMINI (Eureka)**—About 100 leasers are working at this property, between 500 and 1650 levels. April production amounted to 1900 tons valued at about \$30 per ton.

**MAY DAY (Eureka)**—Dividend declared payable May 26. There is \$44,601 in treasury, and five cars of ore shipped have not yet been settled for. Property in good condition; regular shipments can be continued for some time, and development being kept ahead of production. Eighteen cars shipped in April, about equally divided between lead-silver and zinc ore.

**RIDGE & VALLEY (Eureka)**—Stockholders have voted to increase capitalization from 250,000 shares to 500,000, par value \$1. The additional shares will be placed in treasury, to be offered later to stockholders, funds accruing to be used in new development planned. Company owns extensive area adjoining Gemini, through which work can be carried on at depth. New directors and officers have been elected. W. R. Wallace, president, and J. C. McChrystal, vice-president and general manager.

**TINTIC STANDARD (Eureka)**—Statement to stockholders has been issued by E. J. Raddatz, president. Two cars of ore shipped since last statement, (sent out Dec. 2), one in January and one in April, from 1200 level, where good milling ore has been opened, showing bunches and streaks of shipping grades. Assessment levied, delinquent June 1, to meet accumulated bills. Conditions are stated to be promising, and stockholders are advised to acquire treasury stock, which will be available on or before July 1. Company owns 10 patented and five unpatented lode claims, in East Tintic.

## Salt Lake County

**MONTANA-BINGHAM (Bingham)**—The tunnel is now in approximately 3700 ft., face being in siliceous limestone in Bingham Amalgamated ground. It is thought that Congor vein will be reached within 300 feet.

**WASATCH MINES (Alta)**—Ore in Columbus Consolidated ground opened 600 ft. from surface on dip of vein, is developing satisfactorily; there are exposed 9 ft. of copper and silver ore with an excess of iron.

**EMMA COPPER (Alta)**—Two shifts working on crosscut, being driven for extension of orebody in Cabin Fraction adjoining. Work being done through Flagstaff tunnel; there is about 150 ft. still to go. Face is in limestone.

**SALT LAKE & ALTA R.R. (Salt Lake City)**—Has tentatively agreed to build \$35,000 tramway from Tanner's Flat to railroad terminus at Wasatch, provided mining companies advance \$15,000 to be returned to them in freights.

**MICHIGAN-UTAH CONSOLIDATED MINES (Alta)**—Cliff Mining Co. operating lease here is preparing to rebuild headhouse of aerial tramway, recently destroyed by fire. Considerable ore has been accumulated by this lease.

**ALTA TUNNEL & TRANSPORTATION (Alta)**—The tunnel is being driven to the south from head of Silver Fork Cañon. Beside opening up mineralizing fissures in its course, will provide transportation for nearby properties in Big and Little Cottonwood.

**CARDIFF (Salt Lake)**—Oreshoot, opened in October in lower tunnel, has produced about 1800 tons of ore. Has been followed 225 ft. on strike, and main raise is up 160 ft. with ore showing most of way. No shipments are being made at present owing to roads.

**WEST TOLEDO MINES (Alta)**—West Toledo property, adjoining Cardiff on south has been acquired by new interests, and stock listed on Salt Lake exchange. Capitalization is 500,000 shares, par value 10c., with 264,012 in treasury. A. S. Ross is president of new company.

**SOUTH HECLA (Alta)**—Drifting being done to get under Wedge fissure on both 100 and 250 levels, in order to develop western extension of main orebody above Dwyer level. Ample ore blocked out for regular shipments, which will start in June. During the 1914 shipping season, production amounted to \$104,000.

**PRICE MINING (Salt Lake City)**—A new company has been incorporated to work in Big Cottonwood under above name. Property consists of 13 claims on Montreal Hill—nine unpatented and four patented, latter comprising the Clara M. group. Tunnel has been driven on Clara M., in which there is good showing. Capitalization is 1,000,000 shares, par value 25c., of which 500,000 remain in treasury. F. W. Price, vice-president of the Cardiff company, is largely interested.

**NEW UTAH BINGHAM (Bingham)**—Principal workings have been cleaned up, unsafe timbers repaired and put in order for full force of men during present month. Three leases have been let in Turngren tunnel, and one on Killkenny. Other leasers are now figuring on ground upon which they hope to commence work during month. It is intended to let from 12 to 15 leases on some of less important workings.

## Summit County

**PARK CITY ORE SHIPMENTS** for April amounted to 6500 tons valued at \$250,000 compared with 7831 tons in March, 8517 in February and 7859 tons in January. The shippers in April were: Silver King Coalition, 2945; Daly-Judge, 1543; Daly West, 1344; Silver King Consolidated, 157; Daly, 50; others, 461 tons.

**ONTARIO (Park City)**—Strike of ore of good grade made by leasers near the 600 level. Reported that company will start work with thirty men.

**SILVER KING CONSOLIDATED (Park City)**—Following recent snow in mountains, soft roads are again interfering with shipments. Much ore has been developed.

**PARK CITY MILLS (Park City)**—Holt-Dern roaster has been started on its 30-day trial run, and is operating satisfactorily. The capacity is 35 tons daily, with a minimum extraction of 85 per cent.

## Tooele County

**GETHIN-LEROY (Silver Island)**—Ten inches good clean high-grade ore in lower tunnel. Eighty sacks of ore averaging \$2000 per ton ready for shipment.

## CANADA

## British Columbia

**BRITISH COLUMBIA COPPER (Greenwood)**—Expected to resume production from Mother Lode mine in June. Development on newly acquired Copper Mountain properties continues with good results.

## Ontario

**AWIONIA (Ganthier Township)**—This mine is under option to L. H. and W. A. Timmins.

**RIGHT OF WAY (Cobalt)**—Vein found on 75-ft. level has widened to 2 in. assaying about 1500 oz. per ton.

**PORCUPINE GOLD REEF**—Mine has been unwatered. Compressor and other machinery will be installed.

**CROWN CHARTERED (Porcupine)**—Company is in liquidation; tenders for assets are called for up to June 8.

**PRINCESS (Cobalt)**—Mine has been leased by La Rose Consolidated to Sidney Smith of Haileybury on royalty basis.

**CART LAKE (Cobalt)**—This company has been put in liquidation on application of Peterson Lake Co., creditor for \$1640.

**FOLEY-O'BRIEN (South Porcupine)**—Negotiating for purchase of plant of Swastika Mining Co. for installation on its property.

**PORCUPINE IMPERIAL**—A five-drill compressor and other machinery have been installed and driving will be undertaken at 100-ft. level.

**NIPISSING**—During April mined ore of net value of \$170,577, and shipped bullion from Nipissing and customs ore of net value \$380,921.

**PORCUPINE CROWN**—Mill has demonstrated practicability of treating Porcupine ore by continuous decantation process. Extraction of 98.6% obtained.

**SILVER LEAF (Cobalt)**—A 4-in. vein of high-grade ore has been opened up in winze below 75-ft. level. Together with several feet of good milling rock.

**NORTH THOMPSON (Porcupine)**—Sinking of three-compartment shaft, about 15 ft. from present working shaft has been commenced. Will be put down to 300 level.

**DOMELAKE (Porcupine)**—Operations resumed on more economical basis. Overhead expenses have been reduced, and mining confined to day shift, which provides sufficient ore to keep mill in operation day and night.

**HOLLINGER**—Experiments with steel pebbles in the tube mills indicate likelihood of an increase in tonnage milled. Stated that 20 tons per stamp may be treated daily. New central shaft has been connected with present working shaft at 425 level. Of 100 stamps in operation 70 are treating Hollinger ore and 30 are handling Acme output.

**COBALT REDUCTION CO.**—The new cyanide mill installed on the Townsite property for the treatment of slimes is in operation. It has a capacity of about 175 tons, most of which come from the Dominion Reduction plant which handles the City of Cobalt & Cobalt-Townsite ores, and the remainder from the Cobalt-Lake mill.

**CANADIAN COPPER CO. (Sudbury)**—Reverberatory-furnace department put in operation for first time since last August, will smelt 15,000 tons of ore per month. Ball mill and wedge-furnace plant will also be started to pulverize and roast ore. Construction of new 25-ft. blast furnace has been begun. Output of Creighton mine being increased. Work commenced on sinking of new inclined five-compartment shaft. Complete new hoisting and rock-crushing equipment will be installed.

## Quebec

**CANADA CEMENT CO. (Hull)**—Canadian government has given company contract for 2,500,000 barrels of cement for use on Welland Canal extension.

## CHILE

**RECENT REPORTS FROM THE NITRATE DISTRICT** indicate a slight improvement in the general situation, though high cost of transportation of nitrates by reason of scarcity of vessels and general advance in freights has added to difficulties of disposal of stocks of nitrate on hand. Shipments to United States show a slight improvement, having been somewhat in excess of the corresponding period of last year, and those to the United Kingdom are apparently about normal, though the impossibility of reaching Germany, the largest importer of nitrates, coupled with the reduced demand from other parts of continental Europe, has reduced the total demand by more than one-half. Stocks on hand are estimated sufficient to meet the demands of the remainder of the current year, unless some unexpected outlet presents itself. The number of "oficinas," or nitrate reducing works, in operation is reported to be but 43 against 143 at the beginning of the war.

# The Market Report

## METAL MARKETS

NEW YORK—May 19

Copper, tin and lead were all dull and weaker in tone. Spelter advanced to a new high figure upon large sales, chiefly for military purposes.

**Copper**—Copper was very dull and quotations are based rather on prices asked than on sales right through the week. Small sales were made at 18½c., regular terms, in the early part of the week. In the latter part, copper was freely offered at the same price without finding buyers, and with indications that concessions would be made if necessary to consummate sales. Chile bars have been purchased at prices offering apparently a large profit on the sale of refined copper against them, but until it can be seen how the latter can be sold, the result of these transactions is problematical. The largest producers are nominally maintaining their asking price of 19c., regular terms, and sales at that figure have been reported, some of them rather substantial, but such sales appear to be to noncompetitive points or points whither delivery charges, etc., bring them down to the equivalent of 18½c., regular terms (about 18.55c., cash, New York), or less. The lull in the market, natural enough under the circumstances, is rather tending to weaken the feeling of confidence and there are more of the producers competing for business than there were a week ago. However, the copper producers have no reason to be concerned over the immediate outlook or be otherwise than satisfied with the prices they are now enjoying. The large foreign order for copper to which we referred last week is still hanging fire.

Exports from the port of Baltimore during the week ended May 15 included 561 tons of copper bars.

**Copper Sheets** base price is now 24c. per lb. for hot rolled and 25c. for cold rolled. Usual extras charged and higher prices for small quantities. Copper wire is 20c. per lb. car-load lots at mill.

**Tin**—Business in this metal has been rather light and the increase in supply is causing the price to soften a little.

**Lead**—Several large producers, including the leading interest, are now freely selling lead at 4.20c., New York. The consumer who must buy just in his own way, say, for a particular delivery or otherwise, may have to pay a small premium, but with respect to the general market, the tone is softer than it was last week. The advance in lead was apparently checked by fear of giving too great a stimulus to production.

Imports of lead into the United States in March were 5,609,079 lb. in 1914, and 9,432,278 lb. in 1915, nearly all, in both years, being lead contents of ore and base bullion. Exports in March were, in lb.:

	1914	1915	Increase
Domestic .....	.....	14,246,708	14,246,708
Foreign .....	492,207	4,601,628	4,109,421
Total .....	492,207	18,848,336	18,356,129

The extraordinary increase is, of course, due to the demand for war munitions.

**Spelter**—A moderate business was done during the early part of the week up to May 15, when a large contract that had been in negotiation for several days was consummated. On May 17 a quite extraordinary business was done, both as to tonnage and as to price, the transactions amounting to some thousands of tons at the highest prices yet recorded for spelter up to that time. These transactions involved large quantities of high-grade, intermediate and brass special spelter, as well as prime Western, and especially high prices were demanded and received for the last as a consideration for supplying the higher grades. Concerns that were unable to supply the latter were not able to compete for the business. Transactions were lighter on May 18, but some fairly large sales were made again on May 19.

The sales of spelter during our last week of record were for all sorts of deliveries, such as May to December, July-August, August-October, etc., and even November-December.

Brass special spelter was sold at 16¼c. and intermediate at 19c., these prices being realized on large tonnages.

Recent reports from Belgium are to the effect that the Angleur and Valentin-Cocq smelteries of the Vieille Montagne company are in operation, supplying the Germans with spelter and apparently finding no trouble respecting ore supply.

Zinc sheets base price is now \$18.50 per 100 lb. f.o.b. La Salle, Ill., less 8% discount. Usual extras charged. The makers are not anxious to sell just at present.

### Other Metals

NEW YORK—May 19

**Aluminum** again shows some increase in demand and more sales. Prices are a shade firmer, 19¼ @ 20c. per lb. being done for No. 1 ingots, New York.—**Antimony** is still scarce and there seems to be no hope of lower prices. A small quantity of Cookson's can be had at 45c., outside brands being 35c. No

DAILY PRICES OF METALS IN NEW YORK

May	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.
13	4.7950	50	18.50 @18.60	39½	4.20	4.10 @4.15	12½ @13½
14	4.7944	50	18.50 @18.60	39	4.20	4.10 @4.15	12½ @13½
15	4.7919	50	18.50 @18.60	38½	4.20	4.10 @4.15	12½ @13½
17	4.7913	50	18.50 @18.60	39	4.20	4.20 @4.15	13 @14
18	4.7903	49½	18.50 @18.60	38½	4.20	4.10 @4.15	13½ @14½
19	4.7963	49½	18.50 @18.60	38	4.20	4.10 @4.15	13½ @14½

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

May	Copper					Tin		Lead		Zinc	
	Silver	£ per Ton	Cts. per Lb.	3 Mos.	Best Sel'td	Spot	3 Mos.	£ per Ton	Cts. per Lb.	£ per Ton	Cts. per Lb.
13	23½	78½	16.92	79½	.....	163	163	19½ @20½	4.31	61½	13.25
14	23½	78	16.73	79	.....	162½	162½	20½	4.35	61½	13.25
15	23½	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
17	23½	77½	16.68	78½	.....	163½	163½	20½	4.38	62½	13.47
18	23½	77½	16.63	78½	.....	162½	162½	20½	4.38	66½	14.26
19	23½	75½	16.14	76½	.....	160½	160½	20½ @20½	4.36	67½	14.48

The above table gives the closing quotations on London Metal Exchange. All prices are in pounds sterling per ton of 2240 lb., except silver which is in pence per troy ounce of sterling silver, 0.925 fine. Copper quotations are for standard copper, spot and three months, and for best selected, price for the latter being subject to 3 per cent. discount. For convenience in comparison of London prices, in pounds sterling per 2240 lb., with American prices in cents per pound the following approximate ratios are given, reckoning exchange at 4.80. £ 15 = 3.21c.; £ 20 = 4.29c.; £ 30 = 6.43c.; £ 40 = 8.57c.; £ 60 = 12.85c. Variations, £ 1 = 0.21c.



future orders are being booked.—**Quicksilver** is quoted from \$74 for large lots up to \$75@80 per flask in New York, and from \$65@75 in San Francisco. Italian war rumors have strengthened the market. London price is still £11 and 15s. and £11 12s. 6d. from second hands.

**Gold, Silver and Platinum**

**Gold**—Imports of gold for the week included \$5,000,000 from France. Some more gold from Japan is reported at San Francisco.

**Silver**—During the week there was little activity in the silver market. The demand for silver on Indian account, which was active recently, has fallen off and the price has consequently shown a declining tendency, closing at 23½d. in London.

Shipments of silver from London to the East, Jan. 1 to Apr. 29, as reported by Messrs. Pixley & Abell:

	1914	1915	Decrease
India.....	£2,686,000	£1,877,000	£809,000
China.....	40,000	.....	40,000
Total.....	£2,726,000	£1,877,000	£849,000

A considerable stock of silver is still held in London on Chinese account, about £1,000,000 in value, it is estimated.

**Platinum**—The market remains about the same, with only small business reported. Dealers ask \$38@39 per oz. for refined platinum, while hard metal is held at \$42@45 per oz., according to quality.

Our Russian correspondent reports under date of Apr. 25 that there is no change. In Petrograd prices are nominal, no transactions being reported. At Ekaterinburg small sales are reported at 9 rubles per zolotnik—equal to \$30.08 per oz.—for crude metal, 83% platinum. Preparations for the season's work are being made by the large companies in the Urals, especially those owning dredges. The small producers are doing nothing. There is a demand for moderate quantities from Sweden, but it is doubtful whether the Government permission to export the metal can be secured, owing to a suspicion that the metal may be diverted from Sweden to Germany.

**Zinc and Lead Ore Markets**

PLATTEVILLE, WIS.—May 16

The competitive base price paid this week for 60% zinc ore was \$65@66 per ton. The base price paid for 80% lead ore was the same as last week, \$51 per ton.

SHIPMENTS, WEEK ENDED MAY 15

	Zinc Ore, Lb.	Lead Ore, Lb.	Sulphur Ore, Lb.
Week .....	3,969,470	90,000	687,160
Year .....	69,635,100	2,345,990	8,151,950

Shipped during week to separating plants, 4,482,800 lb. zinc ore.

JOPLIN, MO.—May 15

Blende, high price, \$78; assay base, 60% zinc, premium ore, \$75; medium grades, \$70@65; lower grades down to \$55 per ton. Calamine, base 40% zinc, \$45@42 per ton; average, all grades of zinc, \$69.70 per ton.

Lead, high price, \$52.50, base, \$51@52 per ton of 80% metal content; average, all grades of lead, \$50.93 per ton. Following the distribution of the Australian consignment of concentrates the demand slackened materially for the medium to low grades of this district with a consequent lowering of price offerings this week.

SHIPMENTS, WEEK ENDED MAY 15

	Blende	Calamine	Lead	Values
Totals this week..	13,879,170	826,550	1,561,380	\$551,060
Totals this year..	213,336,210	19,140,660	31,443,400	7,645,370

Blende value, the week, \$491,400; 20 weeks, \$6,529,420. Calamine value, the week, \$18,910; 20 weeks, \$348,810. Lead value, the week, \$40,750; 20 weeks, \$767,140.

**Iron Trade Review**

NEW YORK—May 19

The iron and steel markets just now are depending largely on foreign orders, but domestic business is improving on several lines.

Structural steel is beginning to show up better, and more contracts are reported. Orders for railroad cars are coming in better. The report of large orders for cars from Russia is confirmed, but no definite details have been made known. Scattering domestic orders are filling up the car shops. The agricultural-implement makers have begun to place orders for bars on a fair scale. The mills generally are running at 70 to 75% of capacity, and gaining slowly.

The pig-iron market has been rather quieter, and not so much new business is reported. Some good orders for basic iron have been placed, and prices are firm.

PITTSBURGH—May 18

The steel situation has materially improved, with greater export demand and with the heavy purchases of the Pennsylvania Lines, purchases which are expected to be followed by important buying by other roads.

Exports of tonnage products of iron and steel in March totaled 174,000 gross tons, or 27,000 tons more than in October, the best month until March since the war started. The exports are now believed to be running at the rate of 200,000 tons a month, in addition to which there is probably about 50,000 tons of iron and steel involved in automobiles, machinery, shrapnel, etc., the weight of which is not returned in the export statistics.

In the past two or three days the Pennsylvania has closed for about 14,000 freight cars, in addition to about 2500 cars lately ordered from its own shops at Altoona, and has purchased a few passenger cars and locomotives. The remainder, together with 138,000 tons of rails, are likely to be bought within the next week. The total purchases will amount to about 16,500 freight cars, about 194 locomotives, about 181 steel passenger cars and 138,000 tons of rails, involving altogether about 550,000 tons of iron and steel. The rolled steel involved is computed to represent about 4% of the steel industry's capacity for five months, during which time the major portion of the deliveries will be made. Inquiries from other roads total 15,000 to 20,000 cars and heavy orders are expected, now that the Pennsylvania has set an example.

The steel mills are operating at between 70 and 75% of capacity and with the increased business now being booked are expected to reach 85 or 90% by the end of July. It is not believed that the labor supply will permit of heavier operations and it is a distinct prospect that the mills will begin falling behind in deliveries, a condition that would undoubtedly bring out increased buying by jobbers and many manufacturing consumers, to replenish stocks which were reduced to abnormally low proportions when the buyers were able to secure prompt shipments from the mills.

**Pig Iron**—Buying of foundry iron in relatively small lots has increased, and more interest is being manifested in bessemer and basic. The furnaces are feeling in much stronger position and it is not likely that much more iron can be bought without at least slight advances in prices. There are many idle merchant furnaces but they will not get into blast until offered materially better prices. We quote the market unchanged but much firmer: Bessemer, \$13.60; basic, \$12.50; No. 2 foundry, \$12.75@13; gray forge, \$12.50@12.75; malleable, \$12.75, f.o.b. Valley furnaces, 95c. higher delivered Pittsburgh.

**Ferromanganese**—Deliveries of ferromanganese are increasing slowly. They remain much below current consumptive requirements but the mills are less uneasy as they now expect their stocks to be replenished as needed. The contract price remains at \$88, Baltimore, with little business being done. Small prompt lots command \$90@95, but are in limited demand.

**Steel**—Deliveries of billets and sheet bars continue to increase, and mills are shipping not far from their full normal tonnages. Consumers are well covered by contracts and fresh transactions are limited. We quote billets at \$18.50@19 and sheet bars at \$19@19.50, maker's mill, Youngstown, and about 50c. higher, maker's mill, Pittsburgh. Rods are \$25, Pittsburgh, with shipments good in domestic and export trade.

**FERROALLOYS**

Recent English quotations are as follows: Ferrotungsten, 75 to 85% tungsten and not over 1% carbon, \$1.08 per lb. Ferromolybdenum, 70 to 80%, \$4.32 per lb. Ferrochrome, 4 to 6% carbon, \$131 per ton; 6 to 8% carbon, \$126.50; 8 to 10% carbon, \$121.50. Ferrosilicon, 45%, \$68.50; 25%, \$49 per ton.

**Chemicals**

NEW YORK—May 19

The general market remains rather quiet and steady, with business on a moderate scale in most lines.

**Arsenic**—Business is slightly more active. There are sufficient supplies to meet all current demands. Prices remain about \$4 per 100 lb. for both spot and futures.

**Copper Sulphate**—Business remains steady and sales are fair. Prices are firm. Quotations are \$7 per 100 lb. for carload lots, and \$7.25 per 100 lb. for smaller parcels.

**Nitrate of Soda**—Business is again reported improving, with prices firm and unchanged. Quotations are 2.30c. per 100 lb. for spot and all positions this year.

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

Stock Quotations. The course of the week was a great break in prices over the President's 'Lusitania' note, followed by a partial recovery of prices, and another fall, anticipating an unfavorable reply by Germany.

COLO. SPRINGS, SALT LAKE, TORONTO, SAN FRANCISCO. Tables listing stock prices for various companies in these locations.

COLO. SPRINGS, SALT LAKE, TORONTO, SAN FRANCISCO. Tables listing stock prices for various companies in these locations.

N. Y. EXCH. May 18, BOSTON EXCH. May 18. Tables listing stock prices for various companies in New York and Boston.

N. Y. CURB May 18. Table listing stock prices for various companies in New York Curb.

BOSTON CURB May 18, LONDON May 7. Tables listing stock prices for various companies in Boston and London.

Monthly Average Prices of Metals. SILVER. Table showing monthly average prices for silver in New York and London.

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

TIN. Table showing monthly prices for tin in New York and London.

LEAD. Table showing monthly prices for lead in New York, St. Louis, and London.

SPELTER. Table showing monthly prices for spelter in 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 pig iron in Bessemer, Basic, and No. 2 Foundry.