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New Developments at Jerome, Arizona

SYNOPSIS—Jerome has been regarded as a one-mine camp, but earnest efforts are now being made to develop other properties. The United Verde Extension has money guaranteed for exploration in depth, on promising showings. Other mines also being pushed.

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An era of earnest development is now in progress in the Jerome district and a number of properties are being prospected thoroughly at depth to determine whether commercial orebodies underlie the favorable showings in the oxidized zone. Many prospects in the district have disclosed oxidized ores in the upper portions of the property but the work was not carried to sufficient depth to find out if a sulphide zone of commercial size existed below the oxidized showings.

capital. Mining people, generally, held aloof and thus for over 20 years the camp, outside of the United Verde, has stood unproved and, in recent years, almost inactive. Only within the last year or so has this condition been changed. The entrance last winter of a group of successful mine operators of the Southwest with the announced intention of sinking to a depth of 1600 ft. of more, directed attention to the lack of deep exploration and its possibilities. Several other organizations are sinking steadily and it is hoped that their efforts will be justified by conditions at depth.

THE UNITED VERDE EXTENSION

Prominent among the new developments in the camp is the work being done by the reorganized United Verde



UNITED VERDE EXTENSION PROPERTY

(The new shaft will be in the low saddle at the left of the illustration.)

As a result of the stock-selling schemes inaugurated after the success of the United Verde, the lay public—and even the mining public—gradually ceased to be interested in Jerome, assuming that it was a one-mine camp. The work of the promoters' organizations, when the money was actually spent at the property, rarely went far enough to disclose whether commercial orebodies lay beneath the oxidized showings, and the work of the local people of the district has been hampered by lack of

Extension Copper Co., which owns the Little Daisy fraction and four other claims immediately east of the United Verde. When the United Verde Extension company was reorganized last winter, James S. Douglas and George Tener, of Philadelphia, together with John C. Greenway, W. H. Gohring, Dr. L. D. Ricketts, George Kingdon, Maj. A. J. Pickerill, and other Southwest copper men, agreed to provide sufficient funds to explore the ground to a depth of 1600 ft. or approximately the dis-

tance the formation is assumed to have been thrown by the big fault northeast of the United Verde main workings. The Extension company has optioned the adjoining property of the Jerome-Verde Copper Co., augmenting its holdings to about 600 acres. There are about 2000 ft. of workings on the Extension ground, about 800 ft. of which has been done by the new management. The shaft on the Little Daisy is down 800 ft., and the old drift has been continued to the southeast under Bitter Creek to prospect the fault-line conditions. A winze is being sunk by three shifts to reach a depth of 400 ft., where a crosscut will be driven to explore the quartz formation passed through in the upper workings. From the 800-ft. level, a branch of the drift has been driven easterly to intersect the low saddle on the Iron Carbonate claim, opposite the town of Jerome. If ground conditions are found satisfactory, a shaft will be sunk a distance of 1600 ft. or more, it being the intention to sink 1200 ft. before any crosscutting is done. The exploration already done in the Extension ground has disclosed the typical oxidized formation, occasionally copper stained, and while some ore might be taken out in places, no commercial quantities have yet been opened and no attempt is being made to develop oxidized ore, it being the intention of the management to sink with the idea of finding commercial sulphide ore. The leading officials are well satisfied with the present conditions at the Extension property, which is now assured of a thorough prospecting under competent direction. David Morgan is in immediate charge of the prospecting, and about 35 men are employed.

ARKANSAS AND ARIZONA

The Arkansas & Arizona Copper Co. has the most elaborate development operation in the district; it has been spending from \$14,000 to \$15,000 per month and is fortunate in having ample funds assured to prosecute its work to a depth of 2000 ft. The company has already done about 5000 ft. of work, having sunk a two-compartment shaft to 1100 ft., with long crosscuts intersecting the north-south fault at the 600- and 1100-ft. levels; to the west of the fault on the 1100 level, a winze has been sunk 300 ft. and a crosscut driven easterly to intersect the mineralized schist encountered above and to get under the line of the shaft at the 1400-ft. level. Here a station is being cut and a three-compartment shaft will be raised to the 1100-ft. level, from which point another compartment will be added to the present two-compartment shaft. The shaft will also be sunk to 1700 ft. at an early date, and later to 2000 feet.

The property comprises 14 claims lying to the north of the United Verde. The principal mineralization so far disclosed is in the schist along the north-south fault; this was found to be mineralized where cut on the 1100-ft. level and on the 1400 level it has widened to over 100 ft., of which about 85 ft. is mineralized with chalcocopyrite. While some of this could be sorted and shipped, no general sampling has yet been made to determine the average content of the entire mineralized portion. A new Allis-Chalmers 18x36-in. double-drum corliss hoist was scheduled to be shipped to the property from Chicago on June 20; this hoist will have a capacity of 3000 tons in 24 hr. from a depth of 2000 ft.; three new 150-hp. return-tubular boilers will supply steam for new hoisting and pumping equipment that will be installed

during the next few months. A railroad, about a mile in length, is being surveyed to connect with the Verde Tunnel & Smelter Rd., which would thus give the company direct connection with the new smelting works at Clarkdale. The A. & A. company, as it is locally known, is backed by Little Rock and Memphis capital, and the property is managed by J. E. Leeper.

HAYNES COPPER CO. IS SINKING

The Haynes Copper Co. owns 161 acres, northwest of the United Verde, and in former operations, a 700-ft. 2½-compartment shaft was sunk and about 2000 ft. of drifting and crosscutting was done following diamond-drill explorations. The property was closed in December, 1910, but was reopened in November, 1912, by a new management representing the leading stockholders. The company plans to sink the shaft to 1200 ft. and then to crosscut northeast and southwest to explore at that depth the showings encountered above. The shaft has been unwatered and is being sunk by three shifts about 70 ft. per month. It was 886 ft. deep on June 18. The property is equipped with an Ottumwa double-drum geared hoist, Erie City boilers, and a two-stage Ingersoll-Rand compressor supplying 700 cu. ft. of air per minute at 90-lb. pressure to Rand drills. All water is pumped from the 700-ft. level by a Goulds triplex pump, a Cameron No. 7 sinker delivering to the Goulds pump the water coming into the shaft below the 700 level. About 25 men are employed at the property under the superintendence of Thomas E. Campbell.

THE HULL PROPERTIES

The Hull and Cleopatra Copper companies own an important area west of the town of Jerome and bordering the United Verde on the south and west. The control of these properties is held by ex-Mayor G. W. Hull, one of the pioneers of the district. Mr. Hull's individual claims together with the holdings of these two companies constitute one of the largest and most important areas in the Jerome district. The exploitation of the property on a large scale, however, has been held back by the inability to interest capital on the bases offered.

To develop these holdings, an adit has been driven from Deception Gulch for a distance of about 5000 ft.; a number of veins have been cut by this adit and on the Cleopatra, there is an open cut near the top of the mountain showing a good vein of carbonate ore with a sprinkling of chalcocite. Considerable amounts of sulphide and carbonate ores have been shipped from these properties to the Swansea and Humboldt smelting works and elsewhere, yet, comparatively speaking, the properties have had only a picayune development. The showings on the properties are probably the best in the district but there has been no development commensurate with these showings nor with the area represented. In the hands of a strong company, the property might be developed into an important shipping mine, but, instead, it has been operated in a small way for over 20 years without demonstrating the value of the property. It is now difficult to interest capital on a satisfactory working basis as the combined capitalization of the two companies is \$20,000,000, none of which is in the treasury.

The Calumet & Jerome Copper Co. is a local organization controlling five claims to the south, near Senator Clark's North and South Venture. This company is

proceeding slowly, working only two men in an adit now in 670 ft. At the top of the hill, the company originally sank a shaft 100 ft., encountering a schist containing chalcopyrite and pyrite; a crosscut was run for about 60 ft. in the schist and the adit is now being driven to tap the schist at a depth of 500 ft. George W. Avery is manager. Farther to the south, the Pittsburgh-Jerome Copper Co. has a number of men at work on its group of 21 claims. There are numerous other properties in the district on which assessment is annually done, that have favorable "showings" in the oxidized zone, but few of them have done enough work to determine whether the properties are valuable.

COPPER CHIEF HAS IMPORTANT DEVELOPMENT

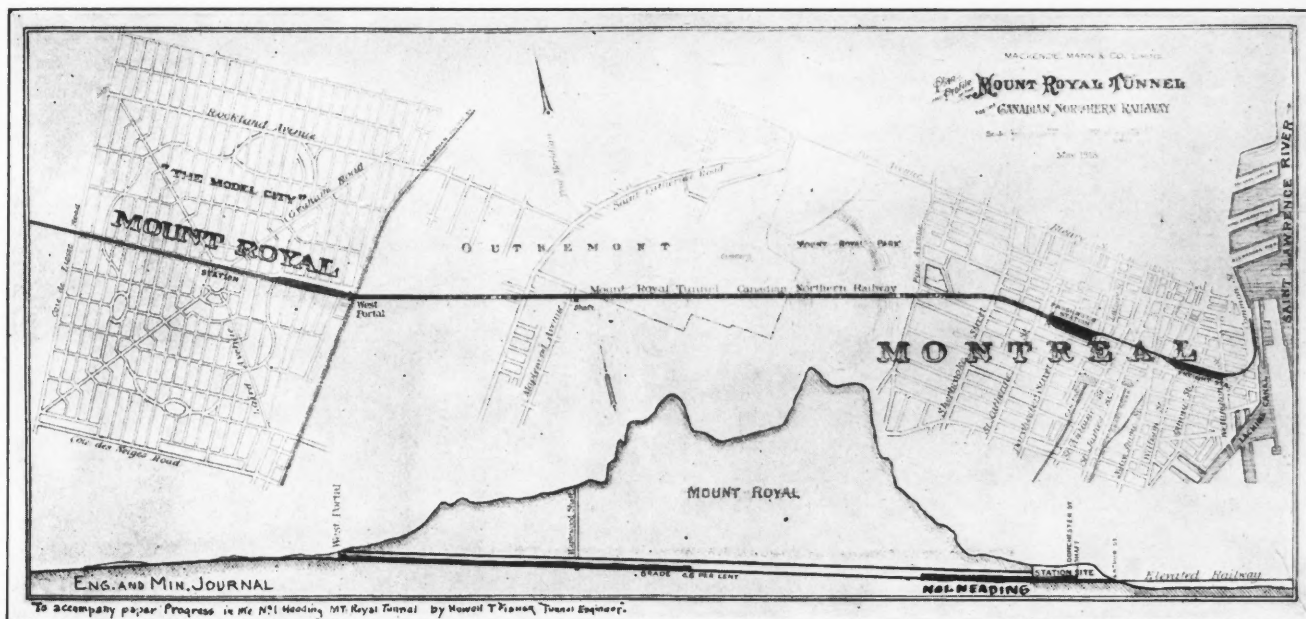
To the southeast in the Black Hills Range, but outside the Jerome district proper, the Copper Chief Mining Co. has developed several hundred thousand tons of ore that are reported to average about \$10 in gold and silver.

joins Senator Clark's Iron King mine and was the subject of litigation for several years. It comprises 23 claims, of which 11 are patented, and is owned by the Hayden and Migeon estates of Torrington, Conn., Franklin Brooks, of Colorado Springs, Colo., and Arthur Hende, of Prescott, Ariz. Two men are regularly employed at the property driving the 400-ft. adit to cut the sulphide ore at greater depth; this adit is now in about 900 ft. Resumption of work on a larger scale is now under consideration by the company.

Progress in the Mount Royal Railroad Tunnel

BY HOWELL T. FISHER*

A double-track tunnel about 3¼ miles long through Mount Royal will bring the Canadian Northern Ry. into the main business section of the city of Montreal, where



PLAN AND PROFILE OF MOUNT ROYAL TUNNEL, MONTREAL

little copper being present in the oxidized ore; copper-bearing iron sulphides were encountered above the 280-ft. level, but not enough work has yet been done on the sulphides to determine whether there is a sufficient body of same to smelt the oxide ores. The oxidized orebody is wide, varying from 80 to over 100 feet.

The shaft on the property has been sunk to 400 ft., where connection has been made with an adit now being driven to tap the sulphides at greater depth. Above the 400 level, about 2500 ft. of work has been done practically all of which is in ore at the 100-, 160-, 220- and 280-ft. levels. Excepting the United Verde, the Copper Chief has more ore blocked out than any property in the Black Hills Range, but it is not in a position to utilize same until more sulphide ores have been developed. The oxidized ores are not rich enough to ship to any distant point, but there is a good wagon road to the property from the Verde Valley and the ores could readily be sent to the new Clarkdale works when it is completed.

The mine was examined a few months since by engineers representing the Guggenheims. The property ad-

passenger and freight terminals will be built. It is being constructed by Mackenzie, Mann & Co., Ltd., which also represents the Canadian Northern Ry. The progress in the No. 1 heading, which is under the superintendence of Edward Duffy, has been such that I believe a description of the organization and methods will be of interest.

The speed at which a heading can be driven is often a controlling factor in estimating the time of completion of any project which includes a tunnel. The material penetrated should always be considered when a record for tunnel driving is stated in distance and time.

The No. 1 heading from the Dorchester Street shaft was started in September, 1912. It was driven slowly while in proximity to buildings and main thoroughfares and blasting was restricted in order to cause as little annoyance as possible to the public. At first the surface of the Trenton limestone rock was sometimes above and sometimes beneath the top of the heading. Near this surface the rock was in places found to be shaly and dis-

*Tunnel engineer, Mackenzie, Mann & Co., Ltd., 411 Dorchester St., Montreal, Que.

integrated and some timbering was necessary. As the tunnel advanced the distance from the top of the heading to the surface of the rock increased. Toward the end of April the heading had advanced so far under the mountain that shooting at night was allowed. The rock in the heading was a hard, dark-gray limestone.

Many dikes were encountered, which are cracks and fissures in the original limestone completely filled with an igneous rock which is even harder than the limestone and is known as camptonite, bostonite, etc. Whenever the drills were started in such rock there was a profusion of sparks. The rock from the heading is taken directly to a crushing plant, crushed and used for concrete. It was during the 31 consecutive working days from May 1 that the progress shown on the table was made.

The accompanying incomplete table, obtained from printed records, gives some idea of what has been accomplished and will facilitate a comparison and estimation of the value of the methods in force at the Mount Royal tunnel:

RECORDS OF WELL KNOWN TUNNELS

Tunnel	Size of Heading	Distance, ft.	Time	Material	Drills
Arlberg.....		641	1 mo.	Gneiss.....	Brandt
Simplon.....	6.5x9.5	685	1 mo.	Hornblende and Mica Schist.....	Brandt
Gunnison....	6x10.5	824	1 mo.	Dry shale.....	Jeffrey coal augers
Loetschberg..	6.5x10	1013	1 mo.	Triassic limestone.....	Meyer
Red Rock....	8.0x9.0	1061.6	1 mo.	Sandstone.....	Coal augers hand drills
Laramie.....	7.5x9.5	653	1 mo.	Granite.....	Leyner
L.C. & N.....	6.5x9.5	683	1 mo.	Slate, shale, 4-in. coal seam.....	Ingersoll-Rand
Ariz. copper..	8x8	799	31 days	Granite porphyry sufficiently hard to make good drilling.....	Ingersoll-Rand No. C 110
Mt. Royal....	8x12	810	31 days	Hard limestone and dikes of igneous rock.....	Sullivan FF 12 water drill

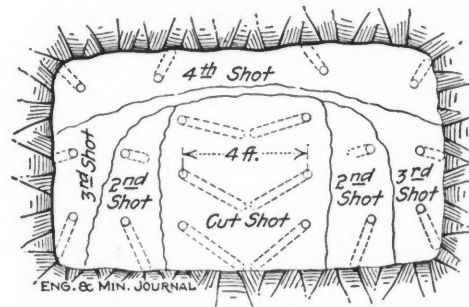
Every inch of the advance had to be blasted and every inch of drilling had to be done with compressed-air drills. The face of the heading was hard rock throughout. No thin seams of soft material assisted progress. The men worked in three eight-hour shifts from 4 p.m. until midnight, midnight until 8 a.m. and 8 a.m. until 4 p.m. When the men started their shift, the departing gang had fired their last shots, leaving the heading smoky, but smoke which was fast being diluted with the fresh air from the pipe which furnished air to the drills. From 20 to 30 cu.yd. of loose rock was ready to be handled by the muckers.

A regular routine was followed, beginning with an electrician putting up a string of lights upon wood thrust into drill holes. Drill runners and helpers sealed down the loose rock while muckers carried in the 4-in. air and 2-in. water hose and manifolds, placing them upon old drill steels thrust in holes in the side of the heading at about 5 ft. above grade. Pipe fitters connected the hose to the main air and water lines, and the muckers, after putting up the hose, pushed an empty car toward the muck pile. Four muckers then cleaned up the muck which had been blown out along the track, and three others transferred the material from the face, where the pile was high, back toward them.

After scaling was done the drill-runners cleaned a little muck back from the face where their horizontal cross bar was to be placed across the heading and, together with these helpers, the nipper and the barman, brought in the long bar, the drills and steel. The nipper and one helper then connected the air and water hose to the manifold. The hose was placed on bars thrust in the sides so that

they were out of the way of the muckers while the drill runners, helpers and barman set up jacks and wedged the bar into position. A paint mark set from the engineer's line by the inspector showed center line and grade of tunnel. The bar was set with reference to these marks. The drill runners and helpers then fastened their machines on the bar, connected the air and water hoses to them, oiled them and started drilling. This preparation took between 30 and 50 minutes.

Drilling then continued until the proper depth of holes was attained. During the drilling time the muckers were continually at work shoveling into the cars. They shoveled from slick sheets and were able to handle all the muck by the time drilling was completed. The horizontal drill bar used was 11 ft. long, and the screw was usually extended about 6 in. further to the blocking. The heading was nominally 8x12 ft., and made about 3.5 cu.yd. per foot advanced. The average advance per shot was about 4½ ft., which gave 15.75 yd. of solid to handle at each advance. This would amount to about 27 cu.yd. of loose material per shift to be handled by the muckers in less than four hours. As during most of the time three muckers were passing the muck back from the face, the other four loaded most of it from the slick sheets into the cars, say, 6 yd. to a man or 12 yd. per man per shift. These sheets were placed by the muckers just previous to the blasting and were covered with some muck to weigh them down and prevent them from being blown backward.



DRILLING DIAGRAM OF MT. ROYAL TUNNEL

When these were clean they were advanced and track laid. The storage-battery locomotive brought in two muck cars a trip, shunted them to the muckers as needed and pulled out the loaded ones. Drilling usually commenced about ¾ hr. after the blasting and continued about 2½ hr., while blasting took about ½ hour.

When once blocked up the horizontal bar was not moved. The drills were attached to short arms which gave sufficient radius for the drills to reach the position for drilling top or bottom holes. About 18 to 22 holes were drilled. The cut holes were usually about 7 ft. and the side holes about 6 ft. deep. When they were completed the drills were disconnected from the bar, the hoses were carried back by drill runners and helpers, steel was carried out by the nipper and manifolds by the muckers, empty cars were loaded with hammers, bars, shovels and other tools, and drawn out of the blasting range. Oil torches were lighted, powder was brought in, the cut-holes were loaded, the wire was connected. The pipe fitter opened the compressed-air valve and when everybody was out of range the signal was given to fire. After this the various side rounds were fired. The holes were drilled and shot about as shown by the accompanying

diagram. "FF12" Sullivan water drills were used. The steel used was Fjab and was very satisfactory. About 500 steels were dulled each day.

A bonus of 7% of their daily pay for every foot of advance over 14 ft. per day was paid to the men. This and friendly rivalry tended to make the men eager to secure good advances. They would not tolerate a poor worker in their midst. The distances driven in 31 consecutive working days at the Loetschberg, the Red Rock, and the Gunnison tunnels have been greater than the distance driven in the same time at the Mount Royal tunnel. The record of the Arizona Copper Co.'s tunnel approaches it closely. The Triassic Limestone at the Loetschberg was ideal for making distance. In both the Red Rock and Gunnison coal augers were used as the rock was soft. In the Arizona Copper Co.'s tunnel the material is officially described as "granite porphyry sufficiently hard to make good drilling." To make the distance in the materials through which these tunnels were driven it required hard work with good drills and good methods.

DAILY REPORT, MAY 6, 1913, ON MT. ROYAL TUNNEL

	4 p.m. to 12 Night	12 night to 8 a.m.	8 a.m. to 4 p.m.	Total 24 hr.			
Heading boss.....	1	1	1	3			
Muck boss.....	1	1	1	3			
Drill runners.....	4	4	4	12			
Drill helpers.....	4	4	4	12			
Jap driller.....	1	1	1	3			
Bar-man.....	1	1	1	3			
Nipper.....	1	1	1	3			
Muckers.....	7	7	7	21			
Car wranglers.....	1	1	1	3			
Electricians.....	1	1	1	3			
Pipe-fitters.....	2	2	2	6			
Drill repairer.....	2	2	2	6			
Dinkey skinner.....	2	2	2	6			
Brakemen.....	2	2	2	6			
Wranglers at shaft.....	1	1	1	3			
Signalmen.....	1	1	1	3			
Powder monkey.....	1	1	1	3			
Rounds.....	1	1	1	3			
Sticks of powder, 60%..	155	154	125	104	129	96	763
Caps, 30 grains.....	23	22	20	22	32	22	141
No. of holes.....	20	22	19	20	20	19	120
Total feet drilled.....	120	132	114	120	120	114	720
Hours actually drilling	2 : 00	2 : 10	2 : 15	2 : 00	2 : 30	2 : 10	13 : 05
Cars dumped.....	20	20	20	21	17	16	114
Advance.....	4.4	5.0	5.3	4.1	4.9	5.0	28.7

Remarks: During 12-8 shift 1 extra helper; during 8-4 shift 1 extra runner and 1 extra helper.

The appended copy of the daily report for Tuesday, May 6, 1913, is a typical one and shows the force employed. It does not include the time given by the two walking bosses, the superintendent, or the general staff.

The Cement Business

According to the *Journal of Commerce*, hesitancy in the undertaking of constructive enterprises on a large scale is making itself felt in the portland-cement industry. The total production of cement mills in the United States in June fell 2% behind that of June, 1912, and on July 1 less than 60% of the cement kilns in the country were in operation.

Owing to the accumulation of orders earlier in the spring shipments for the month continued large, approximating 8,000,000 bbl., about the same as a year ago and about 1,000,000 bbl. in excess of the output. The surplus stocks at mills on July 1 totaled 10,000,000 bbl., an increase of 6% over last year.

The significance of the cut in production may be better realized from the fact that for the first six months of the year the production of 39,000,000 bbl. was nearly 25% ahead of last year, while shipments were 14% larger than the first half of 1912. Surplus stocks increased nearly 3,000,000 bbl. in the half year.

The Lehigh district, which turns out about one-third of the cement in the United States, appears to be following the trend of orders more closely than a few years ago, when market conditions were so chaotic. Production in this district in June fell 10% per cent. below last year, while shipments increased 3%. Seventy-five per cent. of the Lehigh kilns were active on July 1, but the surplus stocks at mills on that date, amounting to 3,000,000 bbl., were only 4% larger than last year, compared with a 6% increase for the entire country.

Producers in the Lehigh district have evidently learned a lesson from the disastrous experiences of recent years and are taking steps to prevent market demoralization by reducing their output. Prices are being fairly well maintained as a result of this policy.

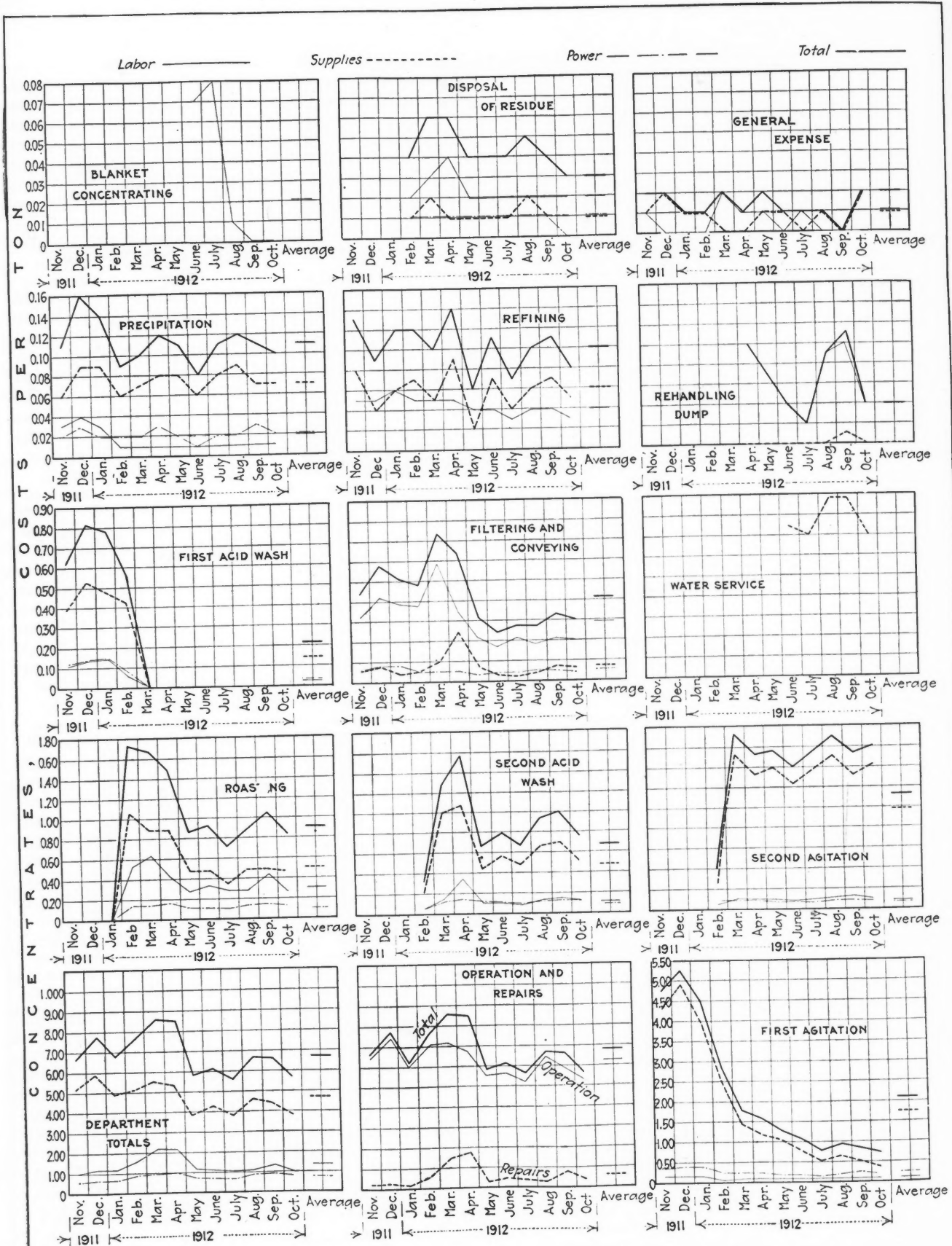
Condition of Rhodesian Mining

The annual report of the British South Africa Co. contains material of interest to the mining industry. The report covers the year ended Mar. 31, 1912, but the metal production for the calendar year of 1912 is also given. The principal items of production are: \$13,157,813 worth of gold; 176,532 oz. of silver; 216,140 tons of coal; and 69,260 tons of chrome iron ore. The tabular representation of Rhodesia's gold production shows rapid annual increases from 1898 to 1908 and comparatively small increases from that point onward.

It has been the consistent policy of the companies to increase their ore reserves for the purpose of creating greater stability in the industry and providing material to maintain output for several years in advance. The reserves of the important mines, as given by the Rhodesia Chamber of Mines, were something over 6,000,000 tons, valued at about \$65,000,000. The year 1911 witnessed an appreciable falling off in the number of small workers and tributors in the gold-mining industry. At the end of the period covered by the report, however, there was an increase in the number of these operators, which was gratifying as indicating a tendency on their part to work their properties rather than to attempt to sell them or dispose of them under option. The principle of helping these small workers by technical advice furnished by engineers of the British-South Africa Co. was revived and it is further suggested that if financial assistance be extended to such men when needed and justifiable, substantial advantages may be gained.

Rhodesia, like Australasia and our Rocky Mountain States, seems to be in need of more energetic prospecting. It is hoped and expected that the geological survey will aid in opening up the new districts for prospecting. The activities of the survey have been largely directed toward mapping and some assistance was rendered to the tin prospectors. There was a small increase in the number of native laborers employed in the mines, due largely to the fact that the recruiting bureau was reorganized. New regulations governing the health and treatment of native laborers were put in force, and a rigid system of inspection is practiced.

The Poro Nickel Mine, New Caledonia, Was Sold on Apr. 29, 1913, at public auction for 150,000 fr., after spirited bidding by la Société le Nickel, and la Société des Hauts Fourneaux, says "Echo des Mines." This property, on which an upset price of 25,000 fr. had been set, covers 1214 hectares in the midst of the charms of the rival companies.



CONCENTRATES PLANT OF THE GOLDFIELD

Regulation of Well Drilling through Coal

An outline of regulations proposed to govern the drilling of oil and gas wells which may penetrate workable coal strata, was drawn up by a committee, composed of representatives from the coal interests, natural-gas interests, petroleum interests, state geologists, state mine inspectors and the Bureau of Mines.

The code of regulations as published (Bureau of Mines Technical Paper 53, Petroleum Technology 12), is intended to obtain accurate location and record of wells which are to be drilled; cooperation of the well and the coal interests; the casing of wells penetrating coal seams or open workings in coal mines, so that gas may not leak from the well into the workings; the plugging of abandoned wells so as to prevent the entrance of gas into mines, and the entrance of water into gas and oil sands; and a system of inspection to control the drilling and the plugging of all such wells.

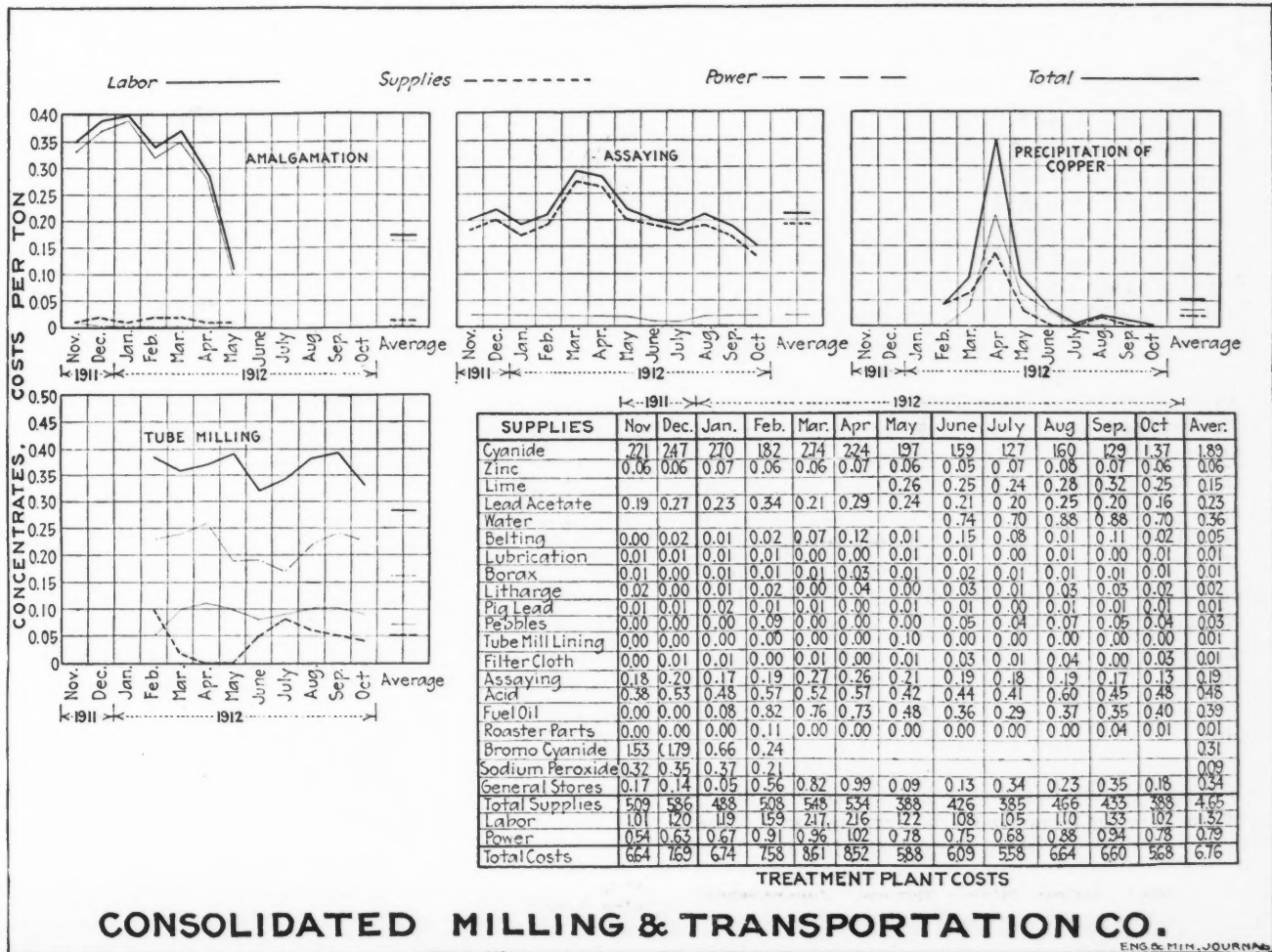
It is provided that where the well passes through a coal seam or a mine working that an extra casing shall be inserted surrounding the true well casing for at least 30 ft. above and 30 ft. below the coal bed, and the space between filled with puddled clay or cement. This is intended to prevent the entrance of gas into the mine and at the same time shut out water from the oil and gas sands; to allow a vent to the atmosphere; to retard corrosion of the inner casing, and to prevent the intermingling of various waters from different horizons.

It is further provided that when wells are abandoned,

they shall be filled tightly from top to bottom. The bottom of the hole is to be filled with a compact material up to a hard stratum below the lowest oil- and gas-sand and then plugged with three wooden plugs, each of which shall be at least 3 ft. long and driven into place. Above the third plug must be placed 10 ft. of tamped clay. Below the seat of every string of casing a similar plug is to be driven and all spaces between the plugs must be solidly filled with compact material, such as rock sediment, sand or clay. This method, while expensive, allows no pocket for the storage of gas under pressure which might break through into mine workings; shuts out gas, oil and water from the coal beds; prevents intermingling of gas and oil; and is tight enough to resist heavy pressure.

Goldfield Consolidated Cost Curves

Concentrate-treatment costs at the Goldfield Consolidated Milling & Transportation Co., Nevada, are shown in diagram on these pages. Similar information plying to mill operations was given in the issue of July 19, 1913, p. 124. The facts embraced in these diagrams is of decided value to the metallurgical profession, presenting, as they do, an actual record of work done by competent operators at a famous property. Favorable costs over short periods are easily shown, but are not always to be depended upon. Annual company reports, while usually reliable, are seldom in sufficient detail to be valuable to the technical man. These Goldfield facts are both; an epitome of successful practice.



Depreciation Charges on Mines

WASHINGTON CORRESPONDENCE

Among the important changes made by the Senate Committee on Finance with reference to the deductions to be made in computing and reporting income for taxation in the new tariff bill, a report on which was made by the committee during the past week (July 11), is a deduction permitted from income on mining property which is as follows: ". . . , a reasonable allowance for the exhaustion, wear and tear of property arising out of its use or employment in the business, not to exceed, in the case of mines, 5% of the gross value at the mine of the output for the year for which the computation is made; provided, that no deduction shall be allowed for any amount paid out for new buildings, permanent improvements, or betterments, made to increase the value of any property or estate."

The Rand's Ore Reserves

BY A. COOPER KEY*

The table presented herewith shows the quantities of ore in reserve at the principal Rand mines, at the end of 1912, or the latest date to which the estimates apply, as well as at the end of 1911. It is noticeable that many companies have changed the basis of estimate, the figures being now in mining tons instead of milling tons, the former standard. This has been decided upon, owing to the variability in amount of sorting or discarding of waste rock, which it is possible to perform. With an ample supply of labor, it is feasible to break ore in proportion to the quantity it is possible to mill and to sort this so as to send only fairly clean ore to be crushed; but if labor be short, it is difficult to keep the mills fully supplied, and there is a natural tendency not to be so particular as to the nature of the rock crushed.

The three great consolidations have enormous reserves of ore, for instance, it may be calculated that the Crown Mines has over £15,000,000 developed, the Randfontein Central something like £10,000,000, and the East Rand Proprietary roughly, £8,500,000. The Randfontein Central was able to add nearly 1,000,000 tons to its reserves last year, and the Crown Mines, half that quantity; the East Rand Proprietary, however, encroached on its reserves to the extent of 700,000 tons.

On the far East Rand, the Brakpan increased its reserve by over 500,000 tons, the value being maintained, while the New Modder not only augmented its aggregate by an even greater quantity, but increased the value of its entire 4,000,000 tons by 1/2 dwt., a most remarkable result. The Van Ryn Deep, which is shortly to commence crushing, had at the end of March increased its total to 1,500,000 tons, with a mine value of 7.6 dwt. The Consolidated Langlaagte accomplished an enormous amount of development last year, preparatory to starting the new battery to deal with rock from the sunken section, and the Village Deep records an increase both in total and in value.

The engineer of the Barnato group explicitly states the value of the reserves in terms of recovery and in the case of the Van Ryn Deep besides the mine value (as shown

*Editor, "South African Mining Review," Johannesburg, South Africa.

in the table) gives the estimated recovery. This value is also shown in the case of mines of the Goertz group, and this plan is certainly of advantage to shareholders.

CHANGES IN ORE RESERVES OF RAND COMPANIES ENGAGED IN CRUSHING

	December, 1911			December, 1912 or Latest Date		
	Tons	Dwt.	Inches	Tons	Dwt.	Inches
Aurora West.....	345,600	5.85	36	556,163	5.1	43
Bantjes Cons.....	772,201	7.3	..	840,800	7.0	41
(pillars).....	123,886	7.6	..	..	..	..
Brakpan.....	1,925,346	6.73	58	2,457,000	6.74	61
Cinderella Cons.....	740,157	6.73	..	573,000	6.7	46
partial.....	..	..	..	304,000	..	..
City Deep.....	1,941,883	8.1	..	1,914,540	8.7	58
..	136,992	8.2	..	209,110	8.6	..
City & Suburban.....	789,000	7.6	51	773,300	8.4	55
Consolidated	..	..	..	..	..	..
Langlaagte.....	397,017	a5.9	..	2,069,630	a6.4	..
deep level.....	1,222,630	a6.9	..	..	..	..
Consolidated Main	..	..	..	..	..	..
Reef.....	516,890	6.7	..	610,680	7.2	..
Crown Mines.....	10,124,072	7.25	..	10,607,670	7.1	62
Durban Roodepoort.....	1,018,140	..	..	..	..	..
Durban Roodepoort	..	..	..	..	..	..
Deep.....	965,650	6.6	..	965,300	6.7	..
(pillars, etc.).....	322,421	7.2	..	340,800	7.3	52
East Rand Prop.....	6,716,605	6.9	55	6,013,000	6.8	54
Ferreira Deep.....	1,837,808	9.7	64	2,070,900	9.4	61
Geduld Proprietary.....	607,300	8.18	44	e1,475,000	6.98	53
indicated.....	190,500	9.08	42	116,000	5.79	53
Geldenhuis Deep.....	2,262,840	6.2	..	1,904,700	6.3	49
Ginsberg.....	367,646	a6.8	..	346,681	a6.9	..
Glencairn.....	925,000	a3.5	..	761,000	a3.5	..
Jupiter.....	1,089,000	5.74	..	1,270,000	b4.4	..
..	..	..	..	101,000	4.0	..
Knight Central.....	644,300	6.60	22	647,000	6.1	..
Knights Deep.....	1,650,000	5.2	..	1,477,414	4.47	..
Lancaster West.....	472,700	6.65	..	335,500	6.1	39.5
Langlaagte Estate.....	1,281,307	..	..	1,370,639	..	..
Luipaard's Vlei Estate	432,000	5.2	..	500,471	5.7	..
partial.....	142,000	5.3	..	..	..	..
Main Reef West.....	627,260	7.0	55	685,720	6.3	..
May Consolidated.....	212,707	..	..	133,000	6.64	52
pillars.....	..	..	..	25,000	8.49	53
Meyer & Charlton.....	347,000	9.09	..	341,735	12.0	..
Modder B.....	2,355,700	7.5	51	2,594,000	7.2	54
New Goel.....	962,600	5.06	63	957,600	5.1	80
New Heriot.....	569,716	8.4	46	590,742	8.1	46
New Kleinfontein.....	1,146,531	7.49	44	1,190,663	7.59	46
New Modderfontein.....	3,341,830	7.6	56	3,900,000	8.1	59
New Prinrose.....	422,311	a6.7	..	413,033	a6.5	..
..	..	..	..	135,887	a6.5	..
New Rietfontein.....	361,484	a6.1	..	130,107	..	..
New Unified.....	288,343	a6.73	..	275,028	a6.4	..
Nourse Mines.....	2,050,000	6.6	..	1,969,000	6.6	..
Princess Estate.....	656,500	7.26	27.4	637,000	7.24	27.7
Randfontein Central.....	6,637,271	6.63	..	7,600,000	6.2	..
..	..	..	..	1,130,600	11	75
Robinson.....	1,526,661	11.4	73	e242,500	..	..
Robinson Main Reef.....	1,307,000	4.2	..	1,160,800	4.3	..
Robinson Deep.....	1,140,000	7.2	..	1,114,000	6.7	..
Roodepoort United.....	448,800	5.49	42	c379,283	5.08	41
partial.....	..	..	..	100,000	6.34	38
Rose Deep.....	3,670,160	6.0	57	3,695,100	6.1	56
Simmer & Jaek.....	..	..	..	2,680,000	6.2	..
partial.....	..	..	..	438,000	5.3	..
Simmer Deep.....	1,312,000	4.9	..	1,430,693	b4.2	..
partial.....	..	..	..	144,296	4.08	..
Van Ryn.....	1,655,910	6.4	..	e2,064,500	6.42	..
partial.....	86,872	5.76	..	89,365	5.24	..
Village Deep.....	2,159,792	6.1	..	2,235,300	6.9	52
Village Main Reef.....	1,775,175	9.2	..	1,418,754	8.8	..
West Rand Cons.....	1,003,000	5.25	49	c1,116,733	6.02	49
partial.....	418,000	5.25	49	326,500	..	..
Witwatersrand.....	1,225,084	a6.65	..	1,331,540	a6.1	..
Witwatersrand Deep.....	1,436,000	6.79	49	1,492,257	6.83	50
Wolluter.....	808,800	6.45	52	832,977	6.48	50

ORE RESERVES OF DEVELOPING MINES

Mexico.....	258,060	6.5	54	496,438	6.18	59
Rand Collieries.....	374,200	5.4	42	..	..	..
Van Ryn Deep.....	603,716	7.2	..	1,278,003	7.1	51

Partial means partially developed or probable ore.

a Estimated recovery value.

b Mine grade.

c Mining tons instead of milling tons in 1911.

d Old workings, stope and shaft pillars.

e As at June 30, 1912.

Variation in Hoist Design

In the JOURNAL of July 5, p. 2, an article entitled "Variation of Hoist Design" mentioned one of the three large hoists of the Newport Mining Co. as being a simple, slide-valve engine. The hoist, as a matter of fact, is of the corliss type and the assumption that it was of the slide-valve type was unwarranted on our part. The Nordberg company builds only corliss engines for hoisting purposes and does not care to be accused of going back to the dark ages by manufacturing slide-valve hoists.

What Has Been the Fume Damage in California?

By L. H. EDDY

SYNOPSIS—All smelting plants but one moved from Shasta County or closed. No such damage to crops as claimed. Present agitation unjustifiable. Decline in precious-metal production followed closing of smelting plants. State-created commission expected to settle difficulties.

The present situation and recent history of copper and gold mining and smelting in relation to the farming interests in Shasta County, Calif., are greatly misunderstood, as the entire matter has been grossly misrepresented. Development in agriculture and horticulture has been not only contemporaneous with, but dependent upon the development and operation of copper and gold mines. Likewise the development of a large proportion of the gold mines has depended entirely upon the operation of copper mines and the establishment of smelting works in the county. This statement is based on personal knowledge and investigation. My first visit to Shasta County was in 1899, when the Mountain Copper Co., Ltd., was operating the plant at Keswick and mining copper ores at Iron Mountain, employing 1200 men at mine and reduction works.

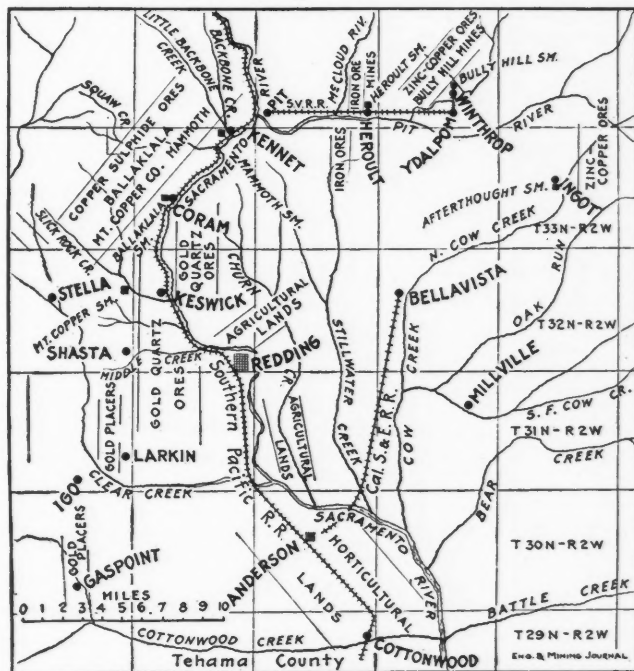
KESWICK PLANT REMOVED IN 1906

The Keswick plant was established in 1895 and was closed down permanently in 1906 on account of complaints made by the farmers and the Department of the Interior that the fumes from the open-air roasting were destroying trees, crops and other vegetation. The company now operates at Martinez, on San Francisco bay, shipping ores from Iron Mountain by rail. In the period named there was comparatively little farming in the county, on a commercial scale. In the earlier years of this smelting operation farmers hauled firewood to Redding and sold it at \$3 per cord and returned with baled hay purchased at Redding. In recent years the farmers have been busy farming, the price of wood is \$6 per cord, and there is no demand for baled hay, as the farmers grow their own.

The Bully Hill works began operation in 1901, the Mammoth in 1905, the Afterthought in 1905, the Balaklala in 1907. The Bully Hill was closed down by the Forest Reserve in 1910 and has since been experimenting with methods for the recovery of zinc from the Bully Hill ores and treating copper and gold as byproducts. The Afterthought had operated only nine months, closing down on account of the presence of zinc in the ores. Experiments are being made at this plant also for the recovery of zinc and the treatment of copper and gold as byproducts. This plant did not smelt long enough to give the Forest Reserve or the farmers much chance to complain. Neither this nor the Bully Hill plant is situated in agricultural or valuable forest districts.

The complaints of the farmers were so insistent, following the closing of the Keswick, Bully Hill and Afterthought, and the effort was so strong to compel the Mammoth and the Balaklala to close down permanently, that the Mammoth installed a baghouse which went into commission July 6, 1910 and the Balaklala closed tem-

porarily in July, 1911, and is still out of commission. The capacity of the Mammoth plant was reduced from 1500 to 1000 tons of ore per 24 hr., and the number of employees from 1200 to 800. About 800 tons of the ore now treated is sulphide extracted from the Mammoth mines, and about 200 tons is obtained chiefly from the gold mines in the vicinity. Notwithstanding the Mammoth has satisfactorily reduced the fume to a minimum, the farmers have continued their complaints. In April another effort was made to secure unity of action in the Farmers Protective Association and bring legal action against the Mammoth; but failing in that they petitioned the supervisors of the county for an appropriation of money to aid them in the prosecution. The board of supervisors declined to make the appropriation, on the ground that the farmers had not proved that their crops were being damaged. Failing in this they appealed to the grand jury, composed solely of farmers,



MINING MAP OF SHASTA COUNTY, CALIF.

which early in May reported to the Superior Court and recommended that the district attorney bring suit against the Mammoth Copper Co. on a charge of maintaining a nuisance, and based their recommendation on a purported examination of county hospital lands which they declared in the report had been damaged and the crops ruined by fume.

NO DAMAGE VISIBLE ON COUNTY FARM

I visited Shasta County in the latter part of May, making a 60-mile trip through what is known as the "smoke belt," and interviewed a number of farmers, some of whom were members of the farmers' association. I visited the county hospital lands and saw growing oats, potatoes, alfalfa, fruit and flowers equal to any in the county and excelling some in other sections. The fact is that neither the land nor the crops at the county hos-

pital had been damaged in the slightest degree and besides the visible evidence I was credibly informed that there was absolutely no damage done at the time the members of the grand jury made their visit. Owing to the long hot and dry spell there was some discoloration at the points of blades or leaves of the oat stocks, which is common in any farming section during a hot and dry period. There was absolutely no damage done to these crops from any cause, nor to any of the crops in all the farming sections in the vicinity of Anderson, Cottonwood, Happy Valley, Churn Creek and Balls Ferry. These sections are south of Redding and distant from the Mammoth smeltery 20 to 30 miles.

I also visited the hay ranches north of Redding and saw the heaviest crops of alfalfa that I have seen in the state during the present season, in travel that included eight other farming counties. I interviewed farmers and others interested in farming indirectly, particularly as to any damage that may have been done by fume in the past two or three years. All of them admitted that whatever damage had been done in that period was of slight consequence, and none of them could point to any ill effect from fume upon his crops in the present season. The evidence was plain that the present crops over the entire county will exceed all other years, and it is of record that 1912 was the best year up to that period and that 1911 was a great improvement on former years.

It is conceded that in the years the Mountain Copper Co.'s works was operated and in the years when the Bully Hill, Mammoth and Balaklala were simultaneously operating, and before the Balaklala had adopted the Cottrell system and the Mammoth had installed the baghouse, there was some damage done to some of the crops by fume; but this damage was not of an extent that should have caused the closing down of the smelting plants, and it would have been willingly paid for had the farmers been reasonable in their demands. A great deal of the so called fume damage was the result of frost or of hot north winds; but it made no difference to the farmers what the cause might be, they endeavored to make it appear that the smelters were to blame.

SHASTA COUNTY RICH IN AGRICULTURE DESPITE FUMES

In the period of 14 years since my first visit to Shasta County I have made other visits and traveled over almost the entire county, in both mining and agricultural sections. The growth of agriculture and horticulture has advanced to a surprising extent. New lands have been cultivated and old lands that were supposed to be barren have been brought under cultivation, and Shasta County is today one of the richest in agriculture and horticulture in the state. This advancement has been made not in spite of the smelters, but because of them. When the Mountain Copper Co. first began at Keswick to smelt ores extracted from the Iron Mountain mines, in 1895, the mine and works employed about 200 men. With the establishment of other smelting works and the development of copper and gold mines the number of men employed directly and indirectly on account of the advancement in mining in the county, reached a minimum of 5000 and a maximum of 10,000. The farmers themselves acknowledged that this great advancement in mining has created a large market for their crops and

been the direct inducement for improving their lands and establishing a large and profitable agricultural and horticultural industry.

The production of copper in Shasta County increased, from the beginning in 1895, to 21,385,863 lb. in 1899. In 1900 the production of copper was 25,736,473 lb. In 1908 with the Mountain Copper Co. out of commission as to smelting, and the Bully Hill, Mammoth, Balaklala in commission, the copper production amounted to 33,852,842 lb. This was increased in 1909 to 50,013,511 lb. During the year 1910, when the Bully Hill was closed down by the Forest Reserve the complaints of the farmers against the Mammoth and the Balaklala increased, and the copper production for that year decreased to 40,397,284 lb. In 1911 the Balaklala was closed down in July, and the copper production of the county was reduced to 29,618,032 lb. With the decline in the production of copper there naturally followed a decline in the production of gold and silver, although the operation or closing of the smelting plants did not affect the milling and concentrating ores in the western part of the county; the mines in that section have developed and prospered without regard to the development of the copper region.

In 1909, when the highest mark for copper production was reached, the gold production was 77,423.65 fine oz.; silver, 1,414,346 fine oz.; the total value of gold, silver and copper was \$8,836,706. That was an increase in 10 years of \$4,202,751. The total value decreased in 1911 to \$5,222,988. In the early history of copper smelting in Shasta County there was a large demand for siliceous ores used for fluxing. A number of mines in the vicinity of Keswick, Coram and Kennett carry large bodies of low-grade white quartz and small shoots or veins of sulphuret ores. The white quartz could not be milled profitably; the sulphuret ores could only be profitably treated by smelting or cyanidation; at that time the cyanide process had not been developed to treat this class of ores because of the presence of copper. The smelters created a demand for both grades of ores from these mines. When the Mountain Copper Co. plant went out of commission and the other works began operating the demand for these ores continued to increase up to 1909, after which year the smelteries gradually were forced to close until the Mammoth plant was the only one remaining in operation. At the present time there are only two of these quartz mines that are assured of a positive and regular market for ores of this character. The Mammoth Copper Co. operates the Quartz Hill mine on a royalty lease, using 15,000 tons minimum ore a year; and buys ore from the Reid mine. These two mines furnish the greater part of the necessary fluxing ores, but the company buys or treats ores from other mines, including the Little Nellie, McCarthy, Silver King and some from the Delta district, also some ores from southern California and Idaho.

In the period when the plants were all smelting, a large number of small gold mines were developed, and there was a large amount of development and exploration on the copper belt. The Golinsky, the Trinity, the Stowell and other copper properties were practically ready for the extraction and treatment of copper ores. Had the progress in mining reached in 1909 continued and advanced, as the conditions warranted but for the interference of the farmers, the mining and agricultural

prosperity of Shasta County would today be fully and safely established.

ZINC AND IRON SMELTING NOT INTERFERED WITH

The development of the iron-mining and smelting industry has not been interfered with by the farmers, and no complaints have been made of the experiments in zinc smelting. The Noble Electric Steel Co. recently installed three new furnaces and is producing a good quality of iron at Heroult; and the Bully Hill should soon be producing commercial zinc, with the Afterthought following closely. These industries and the continuance of the Mammoth works, together with the active gold mines in the western part of the county, have saved the mining industry from complete abandonment.

The mining congress, representing northern California and southern Oregon, which was held in Redding in May, appointed an investigating committee which reported back resolutions condemning the farmers for their attack on the smelting industry.

The recent session of the legislature passed an act creating a commission composed of the state veterinarian, the secretary of the State Board of Health and the state horticultural commissioner to investigate complaints of injury to animal life and vegetation by smeltery wastes and report to the governor, and empowering the attorney general to prosecute. This action on the part of the state should result in a settlement of the differences between the farmers and smelters on a sane basis and prevent recurrence of the past troubles.

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Iron-Ore Resources of Brazil

There is no greater authority on the mineral resources of Brazil than George Chalmers, the general superintendent of the St. John del Rey Gold Mining Co., says the *Iron and Coal Trades Review*, June 27, 1913. In connection with its gold-mining operations, the company has acquired considerable areas of iron-ore lands. Since 1903 the company has been gradually buying small portions worthy of purchase until its estate now amounts to over 90,000 acres. This property is, of course, only one out of the many which exist in Brazil, but as giving some indication of the resources of iron ore in the Minas Geraes district, we reproduce the following remark from Mr. Chalmers' report, relating to the properties of his company:

In one direction for a distance of 23 miles one can travel almost entirely on canga or crust, rubble ore or outcrops of iron. In another direction something like 16½ miles can be covered, over the same wealth of iron. In numerous places, beginning with those close to the mine, there are extensive areas of canga or crust, one million to one million and a half square yards in area with masses of solid hematite in places. Some years ago a little exploration was done on these crusts to ascertain the thickness, tons, etc., but what little was done went to show that it averaged about 60% iron and was rather high in phosphorus, while the hard solid hematite went from 60 to 67% and was low in phosphorus. Although the presence of the lodes beneath the crusts was known, estimates in the absence of proper explorations could only be based on what was in sight. In November, 1911, sanction was obtained to begin explorations with the object of obtaining some reliable data as regards the orebodies beneath the crust. What has been done in the way of exploration during the year is sufficient to show that the lodes beneath the crust are in some cases not only infinitely more valuable than the crust and rubble ores referred to, being of higher content and low in phosphorus, but as regards tonnage, great as the former may be, there is practically no comparison. In one deposit alone in which Mr.

Chalmers originally estimated the crust, or surface ore in sight, as under 30 million tons, showing an average content of 60%, he now confidently estimates that the tonnage below, from the crust down to the portion explored by tunnels, is at least 160 million tons. Of the continuance of the lode to a great depth there is little doubt, but even from the lowest point at which it could be explored by tunnels in the side of the mountains to where it would be possible to extend the railway, ore would be laid open that would more than treble that tonnage. Crosscuts that have been put into the lode measure in all 1589 ft., and the average assay derived from 570 samples taken at equal distances throughout that length amounts to 67.3 iron and 0.053 phosphorus. Exceptional as these results may appear to be, there is still another feature in the ore which will recommend itself as one of great importance to the mining engineer, namely, that the tunnels have been driven rapidly through the ore with only light blasting; at the same time no timbering has been necessary, with the exception of points where lines of yellow ochre have been passed through. From this important fact it will be gathered that the ore is admirably adapted for economical stoping, while at the same time it would appear not too friable for transport.

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Buffalo Mines

The Buffalo Mines, Ltd., in the year ended Apr. 30, 1913, shipped 726 tons of concentrates from the low-grade mill, and 35½ tons of high-grade ore direct from the mine, yielding 1,147,966 oz. of silver. Including material on hand, the total production for the year was 2,235,853 oz., valued at \$1,385,474. Income from other sources amounted to \$6432. Operating expenses were: Mining, \$122,753; treatment, \$119,415; depreciation, \$28,881; increased by other items to a total of \$310,280. Administration expenses were \$57,391. Transportation and treatment expenses were \$133,042. The net income was \$891,193. Dividends of \$650,000 were paid during the year.

Development during the year comprised 1762 ft. of drifting, 30 ft. of raising, and 25 ft. of station cutting. Broken ore to the extent of 25,767 tons remained in the stopes, and untreated slime tailings on the surface contained 12,000 oz. Ore reserves developed were approximately 57,330 tons of ore, containing about 30 oz. of silver.

There was broken and hoisted during the year 10,221 tons, as the result of development operations, 44,352 tons from stoping, and 3224 tons of broken ore. Of the total 57,797 tons hoisted, 2014 tons were sent to the waste dump, and 55,783 tons were milled. The ore milled averaged 45.83 oz., and gave a total recovery of 82.64% in the concentrator, 39,798 oz. being recovered as metallics, 982,697 oz. as jig concentrate and 1,090,189 oz. as table concentrate. The cyanide plant treated 10,320 tons of slime concentrate, averaging 15.45 oz. and recovered 74.70%, or 119,160 oz. of silver.

A new amalgamating and refining plant was put in commission in the latter part of November, and during the remainder of the fiscal year treated 222 tons of table concentrate, 182 tons of jig concentrate, and 35 tons of high-grade ore. There was also refined 1438 lb. of metallics from the low-grade mill, 8012 lb. of precipitate from the cyanide plant, and 821 lb. of base bullion. The total production of refined bullion was 764,030 oz. of silver. Considerable silver still remains in the residue.

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Gas Engines Are Most Economical for metallurgical establishments, in spite of higher first cost, is the conclusion of Mr. Gercke, in "Stahl und Eisen," after examining the claims of steam turbines, gas engines and Diesel and other combustion motors.

The Coeur d'Alene Mining District

BY F. R. INGALSBE*

SYNOPSIS—Brief history and outline of nature of deposits in the Coeur d'Alenes, Idaho. Surface prospecting difficult. Mining industry in vigorous and healthy condition. Future promise is excellent. Development should take place in copper and zinc.

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The Coeur d'Alene mining district is situated in the mountainous Panhandle of Idaho. It lies in a timber belt on the west slope of the Bitter Root Range, within the Coeur d'Alene national forest. As mapped by the U. S. Geological Survey the district has an area of about 400 square miles, and is rectangular in shape; there are, however, a few small mines outside this rectangle. The streams have a general westward course from the Montana-Idaho divide where the elevation is less than 7000 ft. above sea level, to the lowest point, about 2200 ft., which is on the North Fork of the Coeur d'Alene River where it leaves the district near its northwest corner. The country is mountainous, but not extremely rugged. Much of the area within easy reach of the mines has long since been denuded of its timber, but comparing the Coeur d'Alene with other Western camps of like importance, it is favored with a good supply of cheap timber for mining purposes.

CLIMATE AND SITUATION FAVORABLE

The annual precipitation varies greatly in different parts of the district but averages high, and there is a heavy snow fall, sometimes equaling 200 in. in a winter. The wettest months are usually October, November and May, while the driest months are July, August and September. The average temperature in the valleys is not far from 45° F., and the annual range is from a few degrees below 0° to something less than 100°. There is considerable agricultural land in and near the district, so that supplies of fresh fruits and vegetables are plentiful and fairly cheap. Railroad facilities are good and are being improved and extended as rapidly as developments warrant. The Oregon-Washington R.R. & Navigation Co. and the Northern Pacific Ry. Co. are competing for traffic, and it is reported that the Chicago, Milwaukee & St. Paul may cross the district in the near future. Wagon roads are good and practically all parts of the district can be reached over them.

DISTRICT OPENED BY LIEUTENANT MULLAN

John Mullan built the first road across the Coeur d'Alene Mountains about 50 years ago.¹ This invasion aroused the hostility of the Coeur d'Alene Indians, although there had been a colony of Jesuits on the St. Joe River for a number of years. The first prospectors from the East entered the district via Thompson Falls and Prospect Creek on the Montana side of the divide. This "Old Mullan Road," as it is locally called, traversed what has proved to be the most productive part of the district, but the valuable deposits of lead-silver ores were not uncovered until several years later.

*Missoula, Mont.

¹Capt. John Mullan, U. S. A., "Report on the Construction of a Military Road from Fort Walla Walla to Fort Benton."

Although the first product of the district was placer gold, the first known mineral location was a quartz lode located some four years previous to the discovery of gold in 1882. This discovery was followed by a rush to the North Fork of the Coeur d'Alene River early in 1884, giving rise to Eagle, the first town of the district.

LEAD-SILVER DEPOSITS ATTRACT ATTENTION

In 1884 the lead-silver fissures on the South Fork of the Coeur d'Alene began to attract attention and the town of Wallace had its beginning. About this time Murray became the largest town and the county seat of Shoshone County. Several rich orebodies were opened during 1885, and a second rush took place to the South Fork country, this time from the placer camps on the North Fork. Ore began to be shipped out by wagon, and prospecting went on vigorously. In 1887 a railroad was built from a shipping point on the Coeur d'Alene River as far as the place where Kellogg now stands.

Mining now became highly remunerative and development went on at an accelerated pace. Silver brought a good price and only first-class ore, averaging close to \$100 per ton was taken out. With the advent of mills and better railroad facilities the district began to draw attention as a producer in the early '90s. Wages were \$3.50 per day and have remained almost stationary up to the present time, although in 1892 and 1894 attempts were made to cut wages, resulting in serious strikes and great loss to the largest producers.

The period from 1892 to 1899 was one of more or less trouble between the operators and the miners, who were strongly organized, but from 1900 to the present time the camp has been an open one; all labor is procured through a bureau maintained at Wallace by the principal operators. Good labor has continued to be fairly plentiful and no strikes or other labor troubles have taken place for about 14 years.

ACTIVITY SHOWN AT PRESENT

The present is a period of expansion on the part of the larger companies. The Federal Mining & Smelting Co. has recently purchased two large adjacent properties at Burke and Mullan which have been idle for a number of years, and there is an interlocking ownership of this and the Hercules company. The Bunker Hill & Sullivan is developing an extensive acreage of new ground on the south side of Kellogg Mountain and interest in the Sunset Peak properties has been renewed.

STEADY INCREASE IN METAL PRODUCTION

The first two years of recorded production, 1884-1885, saw only gold taken from the ground; the next year saw something over \$100,000 in lead and silver shipped to the smelters. The largest gold production is recorded for 1894; much of this came from the mines above Murray where the Golden Chest company was carrying on extensive operations on its lode claims. Today the entire gold output comes from the lode mines and most of it is a by-product from the copper and lead-silver ores. In 1911 Shoshone County produced \$16,306,680 in lead, silver,

zinc, copper and gold, practically all of it coming from this district.² For this year Idaho stood second in lead production (being surpassed only by Missouri), fifth in silver, and ninth in gold, copper and zinc. There has been a steady and healthy increase in production of these metals since their first recorded production, excepting, of course, periods of marked depression in price. It is notable that many silver camps in the Northwest died sudden deaths during the early '90s, while there was only a small depression in the Cœur d'Alene production curve. This should be regarded as an indication of vigor and long life for the district.

DISTRICT PREVAILINGLY SEDIMENTARY

Both igneous and sedimentary rocks occur, the latter type being much more abundant and older. The Cœur d'Alene is a sedimentary district, the basal complex never having been reached within the mining area. On the shore of Cœur d'Alene Lake, gneisses and schists outcrop which are supposed to underlie the Prichard slates, the lowest exposed formation within the district. These slates are arenaceous and not always easily recognized, even by the trained eye. Above is the Burke quartzite, a light-gray, fine-grained, indurated sandstone with some greenish shales interbedded. The distribution of this formation is pretty well understood by the prospectors because it is the source of several of the large orebodies. Above the Burke lies a more massive quartzite known as the Revett, which also is a producer.

Next in order come the limy shales of the Wallace and the flaggy sandstones of the Striped Peak formation. The lines of demarkation between these horizons are not easily located on the ground, since the change from one to the other formation is gradual and almost imperceptible. There are no known unconformities within the series. The total thickness is given by the U. S. Geological Survey as 17,200 ft.³ It is to be remarked that the Prichard slate is known to be 8000 ft. thick, but its base has never been found, so far as I am aware; hence its total thickness is greater than these figures, but how much greater remains for the geologist or mine operator to determine. All of these formations are pre-Cambrian in age. The Striped Peak formation is overlain locally with high terrace gravels, glacial deposits, and alluvium, and the district as a whole is under a mantle of soil, or talus, of sufficient general distribution to limit natural outcrops to vertical cliffs, and the backbones of a few ridges.

IGNEOUS ROCKS SHOW LITTLE RELATION TO ORE

The igneous rocks consist of irregular, more or less massive intrusions of monzonite, syenite, and basic dikes. Of these, the basic dikes occasionally accompany ore-shoots. The massive, more acid, intrusions apparently have no relation to the lodes, although they have been encountered in several of the smaller mines.

The country is intensely faulted in the vicinity of the producing mines. During the period of upheaval, lateral pressure and gravity folded, crushed and faulted the entire system and it was probably during this process that the intrusions took place. There are two prevailing fault trends: About N 70° W and about north and south.

²Mineral Resources of the U. S., 1911, I, p. 28.

³Prof. Paper No. 62, p. 25.

QUARTZITES PRODUCE MOST OF LEAD-SILVER AND ZINC ORES

The Burke and Revett quartzites are the most important sources of lead-silver and zinc ores. There are a few small producers within the St. Regis and Prichard and it is only fair to state that there is considerable difference of opinion in some instances as to what formation the ore lies in. The Prichard slate is the home of the gold-bearing lodes. The opinion is quite common among many of the mining men of the district that the area about Murray, known as the north country, will never develop any important producers; although there are several good-looking prospects and small producers there, the orebodies, so far as developed, are all small. This country is supposed to be largely Prichard, nevertheless, it is probable that a readjustment of the geological map would result from a careful study of recent developments.

The prevailing strike of the producing lodes is N 60° to 85° W, while the dips are about evenly divided between north and south. The Bunker Hill lode which strikes N 45° W and dips about 40° southwest, is a marked exception to the above statement; it is the flattest lode of importance known in the district, and it is, also, the largest.

LARGE FAULTS USUALLY BARREN

The ores have been deposited in and along small faults and fractures, while the larger faults like the Osburn have not produced up to the present. As a rule, the fault fissures are filled with crushed and decomposed rock, sometimes accompanied with vein quartz and are important ground-water courses. The fragments of country rock have often been replaced by ore and occasionally, as in the Bunker Hill lode, the country rock itself has been replaced to a considerable distance from the main fissure.

All the geological evidence supports the common theory that the ore solutions were forced upward through more or less open fissures and deposited largely as replacements. It seems logical to suppose that the larger faults, as well as the smaller, should be producers and I know of no rational explanation of this exception having been made. On the other hand, there have been a few "blind" fissures opened which have been the source of rich ore-shoots. For example, the shoot in the Tyler workings above Wardner is not known to have an outcrop, which suggests that the deep-seated fissures with limited upward range are favorable for exploration. It is possible that the large open fissures did not supply the requisite pressure or did not retain sufficient of the exuded gases to precipitate the sulphides from their aqueous solution.

BASIC INTRUSIONS AND ORE SOMETIMES ASSOCIATED

In cases where basic dikes are associated with the ore, it is apparent that the intrusion took place during the period of mineralization; hence it seems that the ore-bearing solutions may have come from the same differentiated magma which expelled the material of the dike. The intrusion had no marked effect either upon the nature of the mineralization or upon the gangue material of the lode; in other words, intrusion was coördinate with mineralization, was effective during a shorter period, and was apparently accidental, with no definite relations which can be traced to cause or effect.

Oreshoots vary extremely in dimensions, horizon and regularity, and the engineer experiences difficulty in predicting their extensions; speaking of the district as a whole, perhaps their most marked characteristic is lack of law and regularity.

ALMOST ALL ORE IS SULPHIDE

The Cœur d'Alene ores are sulphides with argentiferous galena as the predominating mineral. The ratio of silver to lead is by no means constant throughout the district, nor even in different shoots on the same lode. Different mines vary from about 35 oz. silver per ton of lead to about 115, the Gold Hunter standing close to the latter figures. Sphalerite is important in several of the large mines, but in others, such as the Bunker Hill & Sullivan, it occurs in negligible quantities.

In the upper parts of the lodes there are, of course, carbonates, cerussite being the most important, but the production from this source is extremely small. Pyrite, pyrrhotite, siderite, quartz and occasionally barite, together with tale-like material and crushed country rock are associated with the ores of the lead-silver mines. In the copper district east of Mullan, bornite, chalcocite and chalcopyrite are original while the oxidized minerals, cuprite and malchite, make up a good part of the ore. In some instances the chalcocite is probably secondary. The gangue minerals are practically identical with those of the lead-silver lodes, although occurring in different proportion, and, as a rule, the copper ores carry sufficient gold to yield smelting returns. The gold ores of the Prichard in the Murray district consist of native gold, pyrite, galena and sphalerite, associated with a quartz gangue.

OUTCROPS ARE OBSCURE

In every case observed by me the lodes show undoubted indications of movement and considerable rock alteration. Although it is generally supposed that the larger faults carry no ore, it is a fact that they are often closely paralleled by others of smaller dimensions which have turned out to be profitable mines. The outcrops of the larger faults can be traced on the surface, but the smaller, ore-bearing fissures, cannot; indeed, as stated above, these sometimes have no outcrop at all. When we remember, also, that the country is under a mantle of soil and talus, the difficulty of surface prospecting is readily perceived. It is not surprising that many of the rich orebodies lay for many years almost under daily-traveled trails without their presence being suspected. At the present time most of the effective exploration work is being done underground rather than on the surface. Occasionally sulphide ores are found at the grass roots, but more often they lie several hundred feet from the surface and thousands of dollars in development work is required to bring them to light. The Hercules mine, above Burke, is a typical example of this class of lode. On the other hand, the Bunker Hill lode has a conspicuous outcrop and was naturally one of the first to be discovered.

FRACTURE ZONE OUTCROPS SHOW INDICATIONS

As stated above, outcrops of the lead-silver lodes consist of fracture zones, showing considerable local alteration of the country rock, carrying a fault breccia, and a clay-like gouge on one wall, sometimes accompanied with vein quartz and iron oxide. The alteration is probably

hydrothermal in origin and can be distinguished by the trained observer from ordinary weathering. These are what are called "indications" and are important in directing surface exploration. The trouble comes in locating these indications. It would seem that, having chosen a region otherwise favorable from the geological point of view, the best method to follow would be to conduct surface trenching through the overburden in directions at about right angles to the known direction of local faults. Naturally the chosen place will be on a mountain side well above the valley bottom, where the soil is not excessively deep and where fragments of fault material can be found in the float.

The practice of starting at the valley level to drive long tunnels to indications found a thousand feet or so up the mountain side cannot be too strongly condemned. The prospector should stick to his indications until he is rewarded with something better and then, lacking money, he should permit the company to do the long adit work. Thousands of dollars worth of noneffective labor would be saved every year to the Cœur d'Alene district if this suggestion were followed.

APEX LAW USUAL NUISANCE

The law of the apex has caused, and still is causing, much litigation, uneasiness and uncertainty, in the Wardner district. A country of extremes in topography, steep slopes and unusual dissection, where the lodes lie at relatively low angles, and where production and exploration by several companies are going on side by side, it is not surprising that the courts are eternally busy straightening out property rights under our antiquated federal mining statutes. In other parts of the Cœur d'Alene district this law is not such a nuisance because, fortunately, the lodes are nearly vertical.

In general it can be stated that in districts of greatly diverse topography and low-dipping veins, the law of the apex, while of some possible benefit in the early stages of development, becomes the source of unending trouble when mining has reached a highly developed stage. The weaker company, obtaining its entire product from a single oreshoot, is always at a disadvantage because of the possibility of injunctions being issued against it, necessitating closing down the entire mine. This is no theoretical conclusion arrived at by the writer, but rather a statement of historical fact. In the present stage of development it is not stretching the truth greatly to say that so far as the extralateral rights statute is operative in the Cœur d'Alene district, it is a source of litigation rather than of justice. As a matter of fact, it is to some extent inoperative either through mutual agreement, or because the verticality of lodes leaves no necessity for extralateral rights, or in localities where the lodes are relatively flat and the operators are coming to depend more and more upon surface rights rather than upon the apex law to substantiate their underground rights and maintain their undisputed titles to discoveries and lode extensions.

FUTURE DEVELOPMENT WILL INCLUDE COPPER AND ZINC

The district as a whole has not reached its maturity and it is safe to say that production will continue to increase for many years to come, and that prospecting will from time to time open up new orebodies of considerable importance. Few or none of the large shoots have been

explored to their lower limits, indeed, the largest mines are yet shallow, comparatively speaking. There are also parts of the district in which geological conditions are favorable, which have not as yet been systematically prospected. Here is a promising field for the stronger mining companies. Prospectors are not being bountifully rewarded for their sacrifices and hard work and naturally they are becoming less active as time goes on. It is only a matter of time when practically all the surface exploration will be done by strong operators, and this is as it should be—those who receive the benefit should bear the burden.

It is altogether probable that gold never will become an important product, but present indications point to an increasing importance of copper and zinc in depth.

SUMMARY OF SITUATION

Summarizing, the Cœur d'Alene district may be described as consisting of folded and faulted pre-Cambrian sediments in which more or less argillaceous quartzites are the principal horizons for ore. There are a few intrusives with as yet indeterminable relations to ore genesis. Production has continued to increase at a healthy rate since the beginning and will doubtless continue, under past and present industrial conditions, for many years. Mining and milling have reached a high degree of efficiency and all natural conditions are unusually favorable. A considerable part of the district is still in the prospect stage and it will be several years before the ore-bearing areas will be definitely outlined. Operators are employing the best technical advice in the country and prospering thereunder.

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East Butte Copper Mining Co.

The report of the East Butte Copper Mining Co., for 1912, states that there was mined during the year 99,458 tons of ore, wet weight, of an average assay value of 5.78% copper. Of this amount, 72,865 tons carried 6.98% copper, and 29,593 tons carried 2.48% copper. The reduction plant treated 96,601 tons of company ore, dry weight, and 85,173 tons of custom ore, dry weight, producing 14,709,460 lb. of copper, 370,675 oz. of silver and 16,920 oz. of gold. The gross value of the metals shipped was \$2,841,204. This was increased by other items of income so as to give a gross income of \$3,155,475. The cost of mining, treatment, freight, selling and refining, and the cost of custom ore purchased was \$1,821,060. Charges for miscellaneous operations were \$54,679. Interest charges were \$231,136. Additions to equipment cost \$64,900. The net surplus on operations remained \$983,701. An average price of 16.692c. per lb. was received for copper in New York, and an average price of 61.482c. per oz. for silver. Development work for the year consisted of 7130 ft. of drifts and crosscuts. It is planned to sink the main working shaft 600 ft. during the coming year. A sample mill of 1200 tons daily capacity erected during 1912 is giving satisfaction. A pipeline to bring water from Elk Park, for use in the concentrator instead of mine water, was laid. It is planned to increase the plant capacity by enlarging the furnaces during the coming year. The opportunity for custom smelting is stated to be improving.

The company continued the operation of the proper-

ties of the Pittsmtont Copper Co. under an extension of the agreement of Apr. 8, 1909. Under this agreement company notes aggregating \$1,625,575 fell due Dec. 1, 1912, and were met by applying cash surplus to the extent of \$1,125,575, and by issuing notes for \$500,000, payable in five equal monthly installments. With the settlement of these obligations and the exchange of 111,000 shares of its capital stock, the company secured 800,000 shares of the common stock of the Pittsmtont Copper Co., out of a total of 1,000,000 shares issued, together with 200,000 shares, the total issue, of preferred stock of the company. It also secured bonds of the Pittsmtont company, amounting to \$1,751,333.

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Nipissing Mining Co.

The annual report of the Nipissing Mining Co., for the year 1912, states that there were shipped during the year: 121.56 tons of high-grade ore, containing 325,247 oz. of silver; 1414.49 tons of low-grade ore, containing 330,991 oz. of silver; 180.61 tons of concentrates, containing 153,373 oz. of silver; and 146.18 tons of silver bullion, containing 4,258,641 oz. of silver. After adding 20,827 oz. of silver from Nova Scotia company bullion and deducting 369,501 oz. of silver from purchased ore, the total Nipissing shipments remain 4,719,578 oz. of silver. The net value received from sales is given at \$2,827,300, which includes an item of \$674 from sales of cobalt. The average price received for silver was 61.457c. per ounce.

Disregarding shipments, the production in 1912 was 1836.84 tons of material, containing 4,688,261 oz. of silver. General operating expenses for the year were \$566,533, equivalent to 12.08c. per oz. This includes an item of \$19,293 for hydraulicizing, and covers underground, ore sorting and loading, jigging, sampling, technical, administration, boarding house, etc., insurance, taxes, and general and legal expenses. Other costs per ounce distributed over the total production for the year were: High-grade mill, 2.12c.; low-grade mill, 0.66c.; depreciation, 1.12c.; custom milling, 0.87c.; marketing, 1.31c.; corporation, New York office and traveling expenses, 0.30c.; giving a total cost per ounce of 18.46c., reduced by rent and interest receipts to 17.39c. The total cost of production, \$815,280, represents 28.14% of the value of the ore and leaves earnings for the year of \$2,081,710. Dividends of \$1,800,000 were paid.

During the year there was prosecuted 6105 ft. of drifting, 4673 ft. of crosscutting, 1484 ft. of raising, and 758 ft. of sinking. The cubic yards stoped were 15,762. Ore reserves are given as 3304 tons of high-grade, carrying 5,491,343 oz. of silver; 76,247 tons of mill rock, carrying 1,535,071 oz.; and 108,926 tons of ore on the dump carrying 2,616,924 oz.; the total ore reserves being, therefore, 9,643,338 oz. of silver.

The Nipissing Reduction Co. continued to treat the low-grade ore from the Kendall dump, pending the completion of the new plant. There were treated 13,894 tons of dry ore, assaying 13.33 oz. per ton, and there were obtained 144,814 dry tons of concentrate, with a net value of \$68,283, of which the Nipissing Mining Co. received \$30,106 as profit. A contract has been arranged for the sale of the residue from the high-grade mill, whereby a fair price is received for the cobalt contents. Hydraulic prospecting will be continued this season.

Waste of Natural Gas

It was not until 15 or 20 years after the first utilization of natural gas that the pronounced decline of production caused producers and consumers to realize that the supply was limited, says the U. S. Bureau of Mines, Technical Paper 38. Because the waste threatens the life of gas fields it has prevented many investors from building plants in the various fields, thereby depriving the localities of increased population and wealth. The geologic occurrence of the gas in the sandstone, sand, or limestone reservoirs is such that the flow of gas from one well causes a decrease in the flow of others and a reduction of the supply throughout the entire field, and instances are common where carelessness and indifference in drilling have resulted in waste of gas from formations penetrated above the regular sand. Furthermore, if the formations are loose, the gas sand fairly shallow, the pressure great, and the proper precautions are not taken in setting the casing, the gas may escape around the casing, loosening the ground rapidly, and ultimately gaining sufficient volume and pressure to blow the casing from the well. Such "blowouts" have happened a number of times in the Texas and Caddo fields. They are likely to occur in the first wells drilled in any field, before the conditions attending the gas pockets are generally known; but there is usually little reason for a second or a subsequent "blowout" in a field, because precautions can be taken to prevent it.

Waste in drilling is not so great as formerly, because at the present time drillers have usually every facility at hand to close a well as soon as completed. By proper preparation most wells can be packed, tubed and shut in within two hours. According to the conservation commission of Louisiana, the waste from the two principal "wild" wells in Louisiana had its beginning more from a lack of knowledge of what precautions would be effective than from negligence or indifference. The waste from the first big gas well encountered in drilling for oil in the Buena Vista Hills field of California was due to the unexpectedness of the great flow and to local inexperience in handling such pressures. This well was controlled only after a Texas operator had been engaged to do the work.

The most notorious waste at present is in Oklahoma, Louisiana and California. The commission on the conservation of the natural resources in Louisiana, after an exhaustive examination of the situation in the Caddo field, found that the waste approximated 75,000,000 cu.ft. per 24 hr., an amount equal to twenty times what the city of Shreveport uses now in the same space of time and equal to $\frac{1}{20}$ of the amount consumed by the entire United States. It also found that the value of the gas wasted from a single "wild" well in that state was in excess of \$2000 per day. There were three principal wells in the Caddo field from which the greater part of the waste occurred. They were known locally as the "dry gas well," the "mud gas well," and the "salt gas well." Two of these have been closed by the owners, thus proving that closure is feasible. No attempt has been made to close the other, and when visited in February, 1912, it consisted of a crater perhaps an acre in extent, in the center of which the gas was forcing a geyser-like mass of mud and water to a height of 20 to 30 ft. During much of the time this well is burning. The gas from this well has been going to waste for three years. Two other wells having an estimated volume of 20,000,000 or 30,000,000

cu.ft. per day blew out and burned for one or two years. In the Caddo field at least 400,000,000 cu.ft. of gas has at certain times been wasted daily, practically all the waste being preventable. McDowell states that the daily waste of gas in Oklahoma by escape into the air is equivalent to at least 10,000 tons of coal daily, and he states that 80% of this loss is preventable.

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Tonopah Mining Co.

The report of the Tonopah Mining Co., of Nevada, for the year ended Feb. 28, 1913, shows that the average mining costs for the year were \$3.266 per ton of dry ore shipped to the mill and \$2.726 per ton of wet ore and waste hoisted. Practically all the segregated direct costs are lower than those of last year, including 15.6c. in development work, due to smaller tonnage.

Estimated tonnage of ore on Mar. 1, 1913, was 200,702 tons valued at \$3,062,661. This amount includes assured, probable, and possible unbroken ore, ore on dump, and ore stored at Millers, Nevada. The estimated value is \$15.25 per ton.

Total receipts for the year including mine and mill products sold, receipts on investments of all kinds, etc., amounted to \$3,511,304. Disbursements amounted to \$4,055,000, of which \$1,925,992 was expended in the purchase of bonds and in other investments and in the payment of dividends No. 27, 28, 29 and 30. The excess of disbursements over receipts amounted to \$543,696, which was derived from surplus.

During the year there were milled and treated 173,336 dry tons of ore, averaging 0.23 oz. gold, and 21.75 oz. silver, or \$18.16 per ton. The total content of the ore milled during the year was 39,825 oz. of gold, and 3,769,669 oz. of silver, of which there were recovered by concentration 1027 dry tons of concentrate, averaging 3907 oz. of gold and 567.07 oz. of silver per ton, or a total smelter gross value of \$443,503.

The cyanide treatment yielded 2,925,733.15 oz. of bullion containing 32,273 fine oz. of gold, and 2,789,508 fine oz. of silver. The slags were concentrated by a jig, the tailings of which were fed into the stamp battery. The contents were recovered in the mill at a cost much lower than by the old plan of shipping as a byproduct. Other byproducts were mixed with and shipped with the concentrate. The cost of marketing the product, including freight, treatment, sampling, and express on bullion and concentrate, amounted to 64,522 or \$0.3762 per ton and concentrate, amounted to \$64,522 or \$0.3762 per ton during the previous year.

The combined extraction of both gold and silver was 89.34 per cent. The mining cost was \$3.27 per ton.

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Alabama Coke Output

Alabama's output of coke in 1912 amounted to 2,975,489 short tons, against 2,761,521 short tons in 1911, according to the U. S. Geological Survey. Alabama retained in 1912 second place in the rank of coke-producing states, having superseded West Virginia in 1911. A large proportion, possibly over 90%, of Alabama's coke is consumed in furnaces owned by the interests controlling the coal mines and coke ovens.

DETAILS OF PRACTICAL MINING

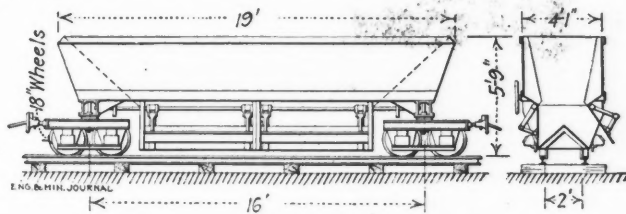
Cars for Underground Electric Haulage

The accompanying drawing shows the outline of the 12-ton car used for electric haulage on the 13 level of the Crown Mines, Ltd., South Africa. The cars have a side discharge, according to R. C. Warriner (Journ. So. Afr. Inst. of Eng., April, 1913), and are mounted on two trucks, which are spaced 16-ft. center to center and have each two pairs of 18-in. wheels with a 25½-in. wheel base.

The length of the car body is 19 ft., its width, 4 ft. 1 in., and its height over rails is 5 ft. 9 in.; the length of the car over buffers is 22 ft.; the track gage is 24 in. The draw bars are attached to the truck frames instead of to the car body. This permits negotiating the relatively sharp 50-ft. radius curves into the crosscuts without difficulty. In fact, the cars will take a 25-ft. radius curve. A seat at each end of the car is for the attendant who travels with it.

The locomotives that draw the trains, weigh eight tons each and carry two motors, which may be run in series or parallel, giving two speeds without resistance losses. They can exert a drawbar pull of 3200 lb., at 10 miles per hour.

The cars are handled in trains of eight and average about 80 tons per trip. The loading through the arc-type gates, which are used, takes from seven to eight minutes, the discharging from five to seven minutes. The running time depends on the length of the haul, but the complete cycle for a round trip averages about 26 min. Thus, two trains working 16 hr. per day, can handle 5800



SIDE-DISCHARGE, UNDERGROUND 12-TON CAR

tons. The highest point of economy will not be reached until this maximum capacity is attained. The power costs are low, running from 0.1 to 0.2c. per ton, the white-labor cost runs from ½c. to ⅙c.; the colored, from 1.0c. to 1.3c.; supplies from 0.8c. to 1.8c., and repairs from 0.5c. to 1.7c. The total cost over five months, handling 417,000 tons, averaged 4.8c. per ton.



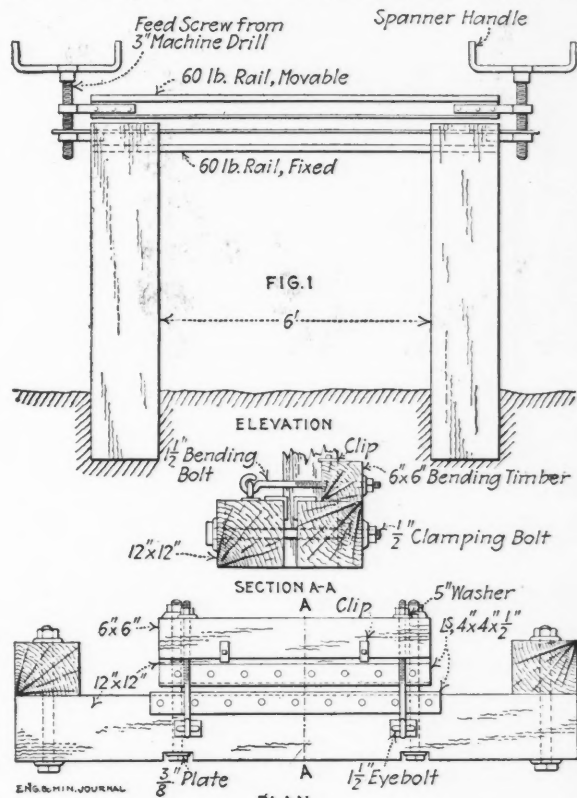
An Extremely Difficult Underground Connection was made between two large vertical shafts of the Brakpan mine on the Rand, as described by Charles B. Brodigan (Sir Clement Le Neve Foster Memorial Lecture). Of the two shafts in question one was 3098 ft. deep at the point where it struck the reef, and the other was 3724 ft. deep. The length of the inclined connection made was 4413 ft. No other underground connection existed. The connection holed through to about ¼ in. in both level and line, a remarkably accurate job, particularly in view of the great depth at which it was necessary to swing the plumb bobs in the shafts.

Devices for Bending Plates

By CLAUDE T. RICE

It often becomes necessary to bend iron plates in a mine shop. This is particularly true where the mine manufactures its own cars. In the shops of the Desloge Consolidated Lead Co. of Southeastern Missouri, two devices are in use for this purpose.

In Fig. 1 is shown a vise, made of two 60-lb. rails set horizontally, one below the other, with the flanges together. The plate is inserted between these rails, which



CLAMP AND BENDING DEVICE FOR STEEL PLATES

are tightened together and the bending done by hammering. The lower rail is set on two posts in notches, and projects a few inches beyond each post. The web and head are cut away at the ends and the flange drilled to permit the passage of the vise screws. These screws, made from the feed screws of machine drills, work in nuts, which are under the flange, and have lugs bearing against the posts to prevent turning. Collars are riveted to the web of the upper or movable rail, which is shorter than the lower rail and these collars project sufficiently to allow the screws to work through them. In the drawing the upper rail is shown lifted to admit a plate. The tops of the screws are fitted with double-ended spanners to serve as handles for tightening and loosening. The vise is capable of handling plates up to ¾ in. in thickness.

An apparatus which includes a bending device and eliminates hammering is shown in Fig. 2, and in the photograph, Fig. 3. It consists of two horizontal timbers side by side, by which the plate is clamped vertically and another timber moving on bolts, which does the actual bending. The clamping timbers are 12x12 in., their upper adjacent edges being bound with 4x4½ in., angles. Two 1½-in. horizontal bolts with suitable washer plates and nuts on one end, are used for clamping. The opening between the timbers is adjusted by these to any width, so as to control the sharpness and the amount of the bend. Through the fixed 12x12-in. timber are two vertical 1½-in. eye-bolts and linked into these so as to form a hinge are two horizontal 1½-in. eyebolts. These latter pass through the 6x6-in. bending timber, and by means of nuts on their ends, this timber is drawn horizontally against the vertical clamped plate and bends it down. On the top bearing edge of this timber are two

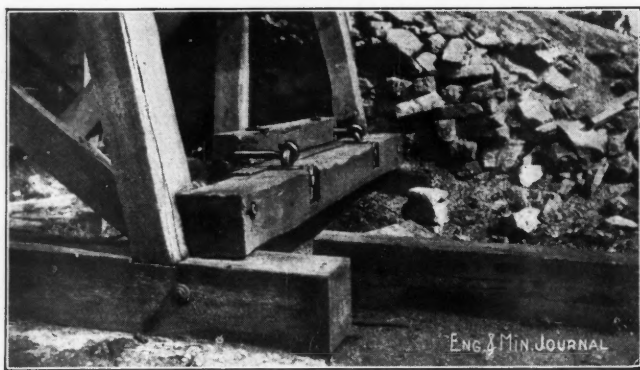


FIG. 3. CLAMPING DEVICE INSTALLED

elips or buttons, which can be turned out to come over the top of the plate and by swinging the timber up somewhat, the bending of the plate can be started above the clamping line.

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Seepage Losses in Alaska Ditches

Knowledge of the amount of seepage loss in the ditches of the Seward Peninsula is important, but is difficult to determine since the inflow from small water courses crossed by the ditches cannot be calculated, says the U. S. Geological Survey. Storage methods are not usual in this region, and the ditches run at full capacity only during periods when the ground is well saturated with water. The flow at such times is augmented by the discharge of small streams whose aggregate volume is large. The flow of these streams is too small to measure and furthermore any measurement would not include the underflow through the gravel beds. While during low-water periods these streams are dry, the ditch itself runs lower, and owing to a reduced wetted perimeter, the amount of leakage is smaller; so that although seepage can be determined under such conditions, it will not give true values. The character of the country largely determines the loss by seepage. The use of sod reduces the loss from this source and when ditches are built over frozen muck, seepage is ordinarily small, since these have bottom and sides of fine sediment backed by solid frozen material, rendering them almost impervious. During drought the percentage lost by seepage is much greater than when the water supply is well sustained. During the unusually

dry season of 1909, measurements were taken on the Miocene and Seward ditches, which gave results varying from 0 up to something more than 1 sec.-ft. of loss by seepage per mile. In one case where the water was extremely low, the percentage loss was greater than 50. The mean value of the loss on the Miocene ditch for the upper 12 miles was 0.55 sec.-ft. per mile, and on the entire Seward ditch was 0.44 sec.-ft. per mile.

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Electric Welding

The electric-welding process is applicable to a great variety of work, such as repairing shrinkage cracks and blow holes in castings, repairing broken parts, however large, cutting metal and bending pipes. In operation, the usual practice is to connect the work to be welded with one wire from the electric circuit and to attach the other wire to an electrode handled by the operator. The elec-

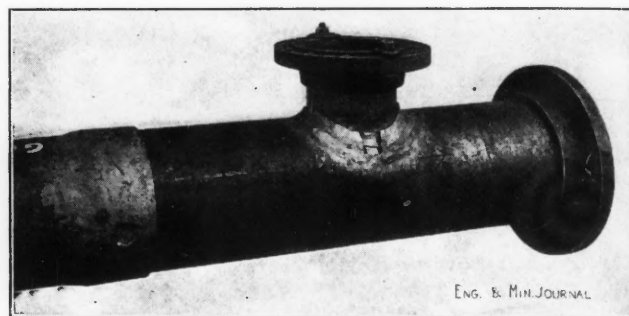


FIG. 1. JOINT OF TWO PIPES AND NIPPLE BEFORE WELDING

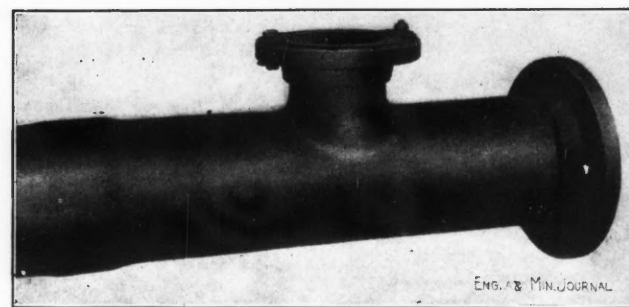


FIG. 2. PIPE AND NIPPLE JOINT AFTER WELDING

trode is first brought into contact with the work, establishing the circuit and then drawn away so as to form an arc. The operator can then move his electrode about the work as required and the arc will follow, thus enabling him to direct and concentrate the heat as necessary.

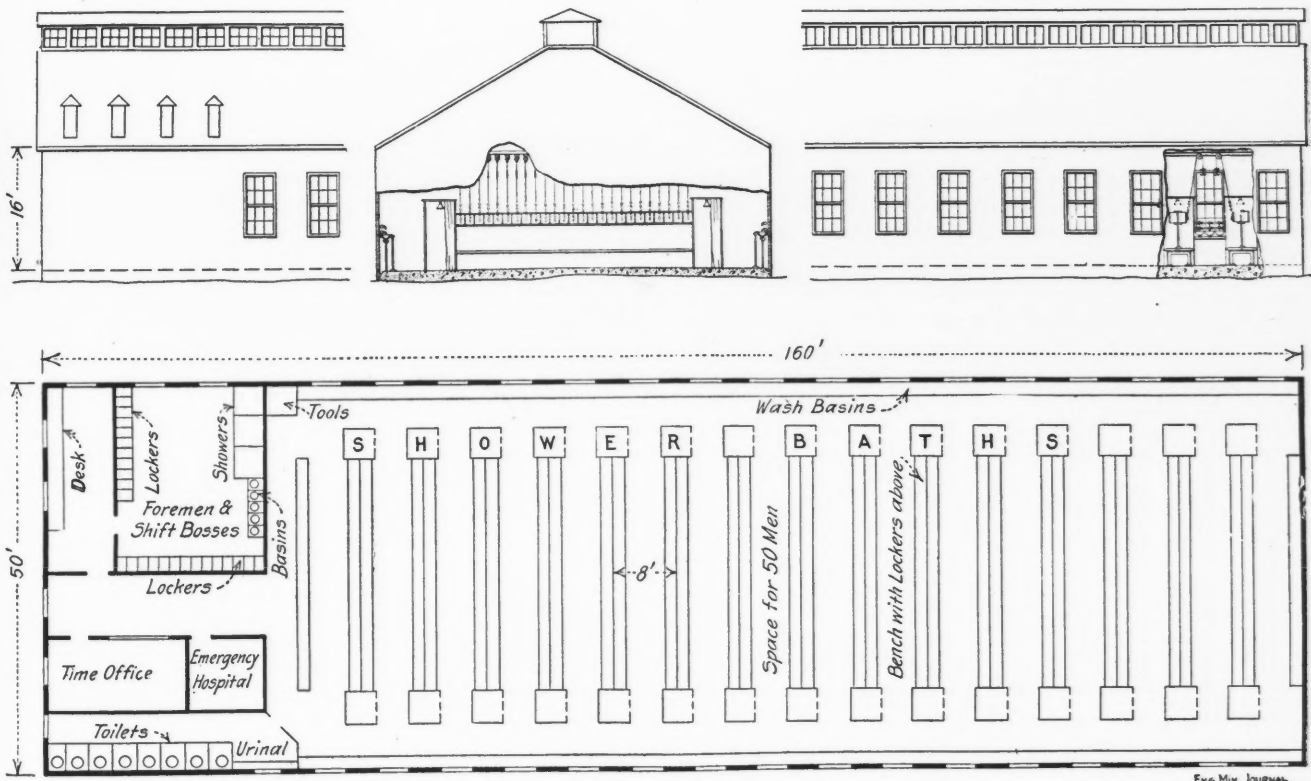
Two different methods of welding may be employed, using either graphite electrodes or metallic electrodes. The method employing the graphite electrode can be used for all kinds of welding, filling in, building up, cutting, etc. The welding metal is supplied from an outside source, either a separate rod of metal or as scrap material. This is reduced to a state of fusion and forms a homogeneous mass with the part under repair. A potential of 50 to 60 volts is required at the arc for this method and a current of 300 amp. or more. The method employing a metallic electrode is most available for closing cracks in large work, particularly on vertical or overhead surfaces. The metal of the electrode melts and forms the material for the weld; all of the metal is deposited on the work

and there are no drops of molten material to render overhead work dangerous. It is necessary to interrupt the work from time to time to insert new electrodes and it is important to maintain a uniform potential with this method, for slight voltage variations disturb the arc and produce an imperfect weld. This method uses a lower potential.

Theoretically, any direct current is suitable, but since the arc voltage is only from 10 to 60, it is evident that the utilization of an ordinary circuit by introducing resistance is wasteful. For this reason, as well as to maintain the proper potential and protect the line against short-circuits, an outfit has been devised, comprising a driving motor and a welding-current generator, an automatic controlling apparatus on a proper switchboard,

United Verde's New Change House

The old change house at the United Verde mine at Jerome, Ariz., is soon to be replaced by a modern steel change house embodying the latest ideas in sanitation and privacy, such as chain "lockers" of the Continental type and individual shower baths. This is in keeping with the present era of new construction and reëquipment of its plants, recently inaugurated by the company with a view to greater output and increased efficiency. The United Verde will be one of the few metal mines in this country to use the chain type of locker, suspending the miner's clothes near the ceiling of the change house where excellent ventilation is assured. This type of locker was adopted in the new change houses built by the Copper



CHANGE HOUSE OF THE UNITED VERDE, JEROME, ARIZONA

electrode holders and face and hand shields for the operator. These sets are stationary or are mounted on trucks so as to be portable and capable of transportation to any job where it is desired to apply them.

The electric-welding method should find a field in the mining industry, especially around metallurgical plants. One special application is to pipe bending and manipulation. The accompanying figure shows a job on a pipe in which two pieces were joined and welded and a branch nipple also welded in. For welding necks, flanges and joints, the system is said to be at least 50% cheaper and 75% faster than any other welding system.

It is claimed for the system that it gives an intense heat, which, while higher than necessary for melting, is applied so quickly as not to be conducted from the welding point, and thus dissipated and wasted; that it is simple to operate; cheap; and safe as compared to methods employing gas. The apparatus is marketed by the C & C Electric & Manufacturing Co., Garwood, New Jersey.

Queen at Bisbee and by the Butte & Superior at Butte; the new United Verde change house is based on the experience of the above two companies, but certain changes have been made to suit the local conditions and to increase individual privacy.

The building will be 50x160 ft. and will have accommodations for 800 miners and 25 foremen and shift bosses. It will have a steel frame with corrugated-iron sides and roof; the reinforced-concrete floor will be slightly elevated and supported on the steel frame so that the building may be leveled in case of subsidence of the ground. The site is at the mouth of the 50-ft. adit which on completion of the change house will become the main entrance to the mine for the miners.

The mine time office will be situated just inside the entrance to the change house, and adjoining will be an emergency hospital equipped with stretchers and other supplies for first-aid work. The foremen's office and change room will be opposite, and the remainder of the

building will be devoted to accommodations for the miners.

The main room of the change house will have a row of 15 double benches and two single benches at each end. The locker system will consist of the chain lockers already mentioned, supplemented by small metal lockers, 15x14 $\frac{3}{8}$ x12 in., for shoes, soap, etc. These small metal lockers will be fastened to the back of the benches within easy reach, and the chain suspending the clothes will be locked behind the hasp of the metal locker by a single padlock. The miner's clothes will be suspended from a cast-iron frame having six hooks. Between each of the double benches there is space for 50 men.

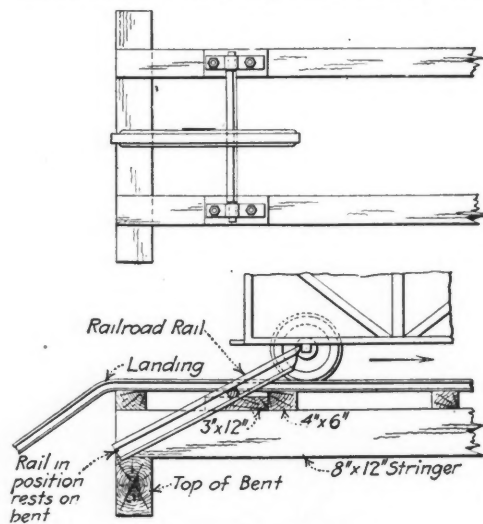
At the ends of the benches there will be shower baths with galvanized-iron sides and a canvas front curtain. Along the sides of the building there are 144 enameled-iron basins equipped with the usual rubber stoppers, and spring faucets to prevent waste of water, which is important here. The basins are arranged in batteries of nine and empty into a trough that serves an entire battery and discharges into a trapped drain pipe. The basins are hinged and may be swung back to permit the cleaning of the trough by an attendant after the miners have left. The concrete floor of this room will be 11 $\frac{1}{2}$ in. higher at the center and will have gutters along each side so that the floor may be flushed and readily cleaned.

The building will be provided with steam heat, and will be well ventilated through the monitor at the top of the building. There will be an attendant on each shift; these attendants will be trained in first-aid work and will also look after the emergency hospital.

✽

Automatic Car Catch at Incline Top

A safety stop for the top of an incline similar to one described in the *JOURNAL* of Mar. 8, 1913, is illustrated in the accompanying drawing furnished by George M.



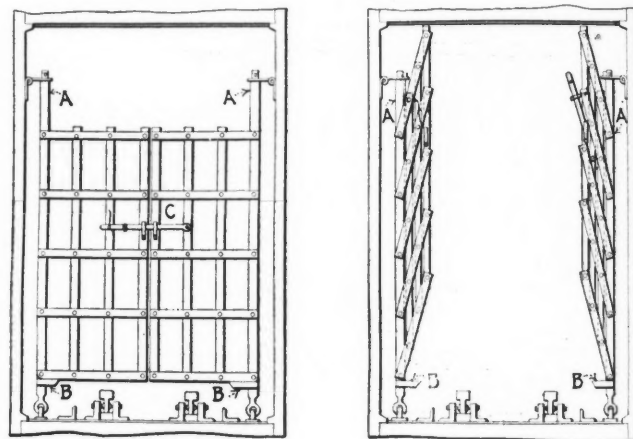
SIMPLE CAR CATCH

Brown (*Coal Age*, May 17, 1913). The arrangement needs little description. It consists of a square bar, thrust through a 7- or 8-ft. piece of scrap rail at a point above the center of gravity of the latter, and with its ends rounded so as to turn under two clamps set on timbers, as shown. If it is desired to permit the return of the cars down the same incline, a lever can be attached to the end of the bar.

Folding Cage Gate

A mine gate, used at an English colliery, is described in *Mining Engineering*, June, 1913. The gate was made in halves. Each half was attached to an upright piece *A*, which at its lower end was so hinged that it could not only turn about on a vertical center line, but could also be turned into a horizontal position so as to rest on the floor of the cage when not in use. The upper end was supported by a pair of hinged plates, one secured to the side of the cage, the other capable of being fastened to the upright *A*. This top bearing was obtained by machining down *A* to form a shoulder, on which the plate rested. A slot was made in the top of *A*, and an elongated link was secured by a pin which passed through *A* and the link. The width of the link corresponds to the diameter of *A*, so that when it was turned into a vertical position, the hinge might be lifted off. On the other hand, when the link was horizontal, the hinged plate could not be lifted.

Each half of the gate consisted of vertical and horizontal bars pivoted to each other at their points of intersection, as shown. When the gate was in a working posi-



COLLAPSIBLE AND RECLINING CAGE GATE

tion, the bars were held at right angles to each other by the lowermost bar resting upon a bracket *B*, projecting from *A*.

When not in use, the bars could be collapsed and forced into a small space. When the two halves were opened and brought into alignment with each other, they were secured by means of a pivoted catch *C* carried on one-half of the gate and engaging behind projections on the other half; the catch was provided with a hinged extension at its free end, which engaged with a staple and was fastened by a cotter pin.

This gate could be made to open inward and not outward, and to open both ways. When not at work, it was laid down on the floor of the cage deck between the rails and side of the cage, and was kept there by a holding-down clip. It was thus out of the way when sending timber down the shaft.

The height of the gate when working was 3 ft. 11 $\frac{1}{2}$ in.; width of each half, 1 ft. 4 $\frac{1}{2}$ in.; height of *A*, 4 ft. 3 $\frac{1}{2}$ in. When closed the total length was 4 ft. 11 $\frac{1}{2}$ in., and the width only 3 $\frac{1}{2}$ in. The weight of the gates for one end of a deck was 37 lb. The gates stood back in the cage 1 ft. 4 in.

DETAILS OF METALLURGICAL PRACTICE

Helping Out Bucket Elevators

BY CLAUDE T. RICE

Often in the life of a mill it becomes necessary to increase its capacity, and while space is generally available for the increase or can be readily made, increasing the capacity of elevators generally necessitates new installation. At the Silver King Consolidated mill, at Park City, Utah, J. W. Thompson, mill superintendent, has increased the capacity of the elevators at that plant in a highly ingenious manner.

The pulp that is to be handled by the elevator is first sent to a settling box and dewatered. The settled product is sent to the bucket elevator and the overflow from the settling box, which contains little that is coarser than 80 mesh, goes to a centrifugal pump which raises it to the level of the elevator discharge where it joins the under-

Some small holes are bored in the bottom of the buckets, the object being to let the coarser sand work through and drop on top of the load in the bucket below. In this way the coarse portion is kept from packing on the bottom. The holes must be of such size that the pulp will barely work through, the object being to keep the bottom sand in the bucket barely moving. No novelty is claimed for the use of holes in the buckets as it is a well known practice, the novelty being the use of a centrifugal pump to handle the thin pulp and an elevator to raise the heavy portion.

Solution Meter at the Belmont Mill

BY C. S. MCKENZIE*

The accompanying drawings show a tilt box in use at the Belmont mill, Tonopah, Nev., for measuring solution.

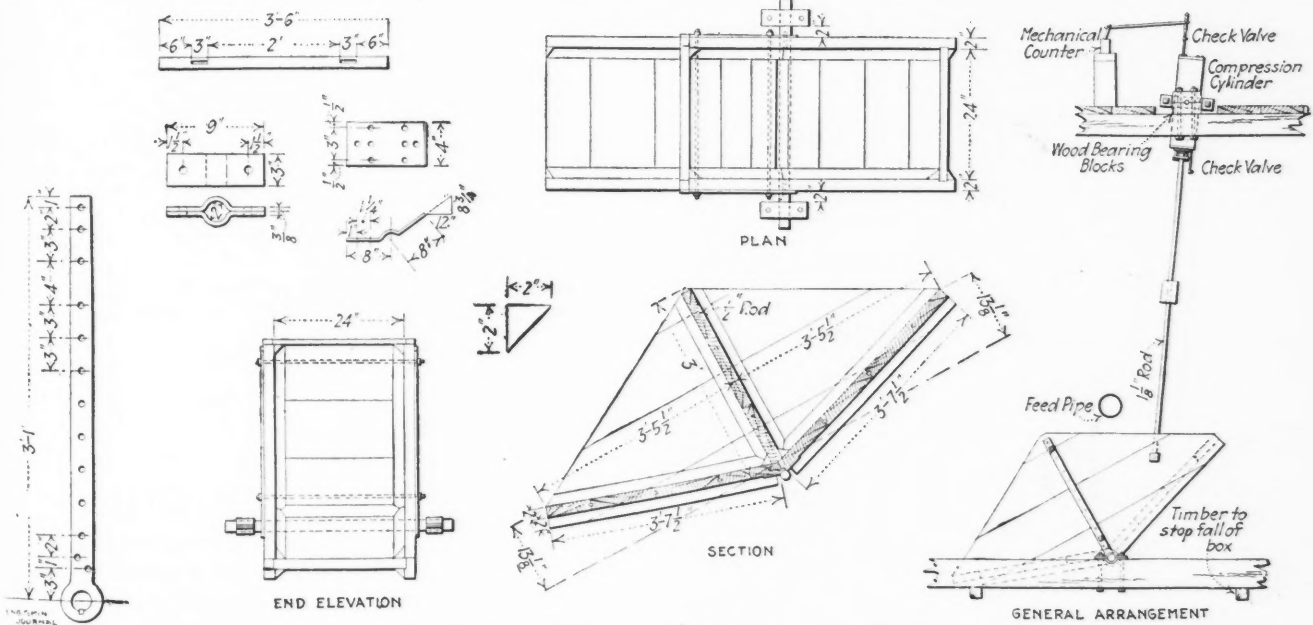


FIG. 2. DETAILS OF SOLUTION METER, BELMONT MILL

FIG. 1.

flow from the thickener. As the coarse product has all been removed from the overflow there is little wear on the centrifugal pump and it is often possible in this way not only to decrease the elevator repair bill, but to reduce the power consumed in raising the pulp, as the centrifugal pump can discharge the overflow at a somewhat lower point than is possible with the bucket elevator. Moreover, the fluid comes to the pump at a higher level than is the case with the elevator, owing to the depth of the boot. This method of aiding overloaded elevators has been used at the Silver King mill for over two years and is found to work admirably, decreasing the cost of upkeep on the elevators. The centrifugal pumps are used both to assist the elevators, and also to elevate the tailing before it is discharged.

Fig. 1 shows the general arrangement of the box with its retarding device, and Fig. 2 gives details.

The box is suspended on timbers over the tank into which it discharges, and is fed from a 6-in. pipe. In Fig. 1 it is in the position it assumes when the right side is filling. As this side becomes full, the weight is sufficient to overbalance the left side, and the box tips to the right, pulling down the piston rod and discharging into the tank.

As the piston rod is pulled down, it pulls the piston in the compression cylinder down, tending to form a vacuum in the upper half of the cylinder, and compressing the air in the lower half. This compression retards the falling box sufficiently to let it down gradually and

*Tonopah, Nev.

prevent jarring. Air is drawn through the upper check valve into the upper half of the cylinder as the piston goes down. This air is compressed as the piston is pushed up by the box filling and tipping to the left again, and more air is drawn through the bottom check valve into the lower part of the cylinder, etc.

To prevent the compression in the cylinder from becoming great enough toward the end of the stroke to stop the fall of the box before the latter has completely discharged, the check valves are allowed to leak enough air to make the rate of fall uniform. The amount of compression can be regulated by the amount of air admitted through the check valves.

As shown in Fig. 1, the compression cylinder is supported at the middle, and the ends travel through arcs as the box tips. A mechanical counter is attached by a rod to the top of the cylinder, and registers each tip. The apparatus was calibrated by counting the tips required to fill the tank beneath, and was adjusted so that it tipped when just full by raising or lowering the timbers which stop its fall.

The box is made of 2-in. Oregon pine lumber, and mounted on a piece of $1\frac{1}{2}$ -in. shafting. The compression cylinder is an old automobile cylinder, but could be made of a piece of pipe or casing. About 196 gal. of 1.2 sp.gr. solution are handled per minute, and after the intake of air to the cylinder was adjusted, the arrangement works smoothly and without attention.

⌘ Purifying Drinking Water Supplies

Any mining or metallurgical company considering the installation of a water system using the chlorination process of purification, is recommended to read a series of articles covering that subject, by John Sebroff, in *Industrial Engineering*. The experience of one city is recounted in the June number. It appears that a certain Canadian city, considering the installation of a chlorination plant, sent a committee to investigate the results obtained at a city in New York, where the process was in use. It was found that many people in the latter city refused to drink the water so treated; that a medical association had given its authority to the statement that the water had caused many cases of intestinal and kidney trouble and that it had a bad smell; that the corrosive effect of the water was so great as to ruin domestic piping systems in a year's time or less; and that for the fire engines rain water had to be collected in tanks. Apparently there is another side to the much exploited chlorination-purification process.

⌘ A Pulp Agitator

A new pulp agitator has been invented by A. W. Warwick, for which he has been granted U. S. patent No. 1,054,629, assigned to A. C. Shenstone, of New York, and now held by his executors.

The patent is based on a central lift pipe to be placed in a tank having a pointed bottom, the lift pipe being open at the bottom and closed at the top, but having holes or slits in the side of the pipe near the top for the escape of the elevated material. Air, centrifugal pump or propeller may be used to force the pulp to rise in the central pipe, the top of which is below the surface of the pulp. A perforated-pipe ring is placed in the cone

bottom of the tank in order to avoid settlement of solids, and an annular ring at the level of the top of the lift pipe may be used to form separate cones.

⌘ Separator for Dry Material

Many devices have been invented for the dry separation of ground ore, but up to the present time none of them has had any remarkable success. Another effort has been made by F. O. Stromberg, of Seattle, Wash., to devise an apparatus of this sort which is illustrated by the accompanying drawing.

The device consists of a fan, or other means of introducing an air blast, which passes through a conical-shaped connection into a box, the bottom of which is divided into separate cone-bottomed receptacles. A screen is placed at the entrance of the box, shown at A in the drawing, for the purpose of creating eddies which will permit the greater part of the material to pass through the central slot formed by the movable partitions B. These partitions are adjustable and removable, and both the front and rear edges of each partition may be vertically independently adjusted. The arrows in the sketch show that the wind delivered from the fan passes

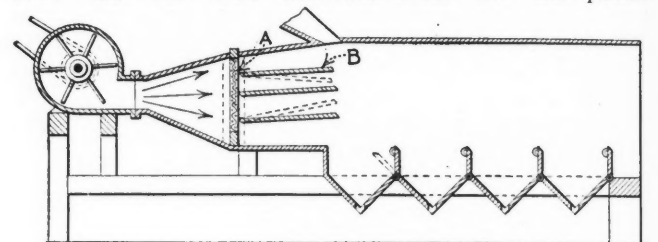


FIG. 1

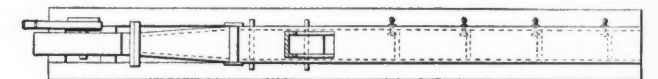


FIG. 2

DRY-MATERIAL SEPARATOR

into the inlet of the box and then expands slightly into strata or currents, the central one of which will pass along into and through the inlet without obstruction. Those currents which flow along the top and bottom of the box will set up eddies, as indicated by the fine arrows, and it is the purpose of these partitions to check the tendency to the formation of eddies and to deliver the blasts of air into the box in several strata moving horizontally, and at equal speed. If these screen-panels are used with different meshes, an important bearing will be had upon the amount of air admitted through the slot or opening covered by that particular screen.

Power is applied to the fan which sets up a blast of air through the trunk, the screen partition and throughout the length of the box to its outlet end. The material fed into the air-current encounters various strata of air which move at different velocities, according as the partitions have been set, and according to the mesh of the screen at the various openings, the larger pieces naturally offer more resistance to blasts of air than the smaller ones, and, therefore, the large pieces will fall into the hopper nearest to the entrance of the long box, while the finer particles will fall into successive hoppers further along until the finest are discharged at the end of the box in the form of dust. This device has been granted U. S. pat. No. 1,042,846.

NOTES FROM CURRENT LITERATURE

Mechanical Analysis for Corundum

In an attempt to analyze a hard, crystalline gneiss for corundum, it was realized that chemical analysis was not available, since it would be impossible accurately to re-cast the quantities of oxides present into the various minerals comprising the gneiss, including quartz, mica, feldspar, garnet and corundum. The method of overcoming the difficulty, as described by W. Spencer Hutchinson ("Bull. A. I. M. E.," June, 1913), consisted of a series of mechanical separations. A sample was first crushed on an iron plate with a hammer, and a portion weighing 500 grams was taken and after adding water, scoured around in an iron bucket with a wooden block to loosen pieces of mica adhering to the corundum. The bucket was repeatedly filled with water and much of the fine, light mica floated off. The remainder of the sample was dried and screened to six sizes, between 4- and 14-mesh. Each portion was then picked over by hand to remove the pure corundum crystals, which were weighed. The reject was reunited with the fine portion of the sample and everything was crushed to 30-mesh. This was panned in a gold pan to produce a garnet-corundum concentrate. The tailing was panned repeatedly until only a negligible amount of concentrate was recovered. This concentrate still contained a small proportion, about 20%, of quartz and feldspar. It was put under an electromagnet, which took off the garnet but left the quartz and feldspar. These latter minerals were finally removed by floating in a heavy solution, of 3.1 sp.gr., made up of potassium and mercuric iodides. The percentage of corundum ranged from 0.4 to 8.6 in various samples thus treated.

❖

Unusual Carbonaceous Deposit

A deposit of carbonaceous material which proved baffling to many chemists is described by William Foster (*Econ. Geol.*, June, 1913). The material is found in northwestern New Mexico, about 15 miles northwest of Putnam, and is marked on the old map, Pueblo Bonita. It occurs a few feet below the surface of the undulating country, sometimes liquid, sometimes in a gelatinous condition. Its thickness is unknown, but at one point it was dug through to a depth of 10 or 12 ft. without reaching the bottom; it is sometimes overlain by a stiff white clay.

Analysis shows the stiffly gelatinized material to contain between 53 and 54% of water. After drying it is black, hard and brittle, resembles coal dust when ground. The dry material on analysis shows about 54% of ash, 26% of carbon, 3% of hydrogen, 1% of nitrogen, 16% of oxygen. The ash contains about 53% of silica, 31% of alumina, 9% of soda and 3% each of ferric oxide and calcium oxide. When the material is shaken up with water, a part of it apparently forms a dark-colored solution. However, this is precipitated by adding small quantities of various electrolytes, showing that it is merely a

colloidal solution. It is almost insoluble in various organic solvents, which shows that it is not in the nature of an asphalt mineral. No carbohydrates are discovered on test.

It is concluded that the deposit is a mixture of peaty material of vegetable origin so finely divided as to form the colloidal solution with water and of finely divided inorganic material, probably a silicate of aluminum and sodium.

❖

New Tin Mines in South China

A company with \$375,000 capital is to be formed to acquire an area of 1 square mile in the new British territory, the Kowloon extension, for the purpose of working the tin deposits which have been known for some time to exist there, says Vice-Consul General A. E. Carleton, of Hongkong, in *Daily Consular and Trade Reports*, Mar. 27, 1913. Some 40 shafts have been sunk, and tin has been obtained from every one of them in quantities, it is claimed, that leaves no doubt of the remunerative nature of the enterprise. Samples have been sent to the Straits Settlements and elsewhere for analysis, and the results have been entirely satisfactory--in fact a Straits company is prepared to take any quantity of the unsmelted metal at about \$735 per ton.

The mining district is in the valley of Unlong, close to Deep Bay, and the company will not have the question of transportation to face, as junks can approach to within 2 miles of the property. It is thought that by June the extension of the Kowloon-Canton railway will be completed, and this will approach much closer to the concession. In any case the transportation to Hongkong will not cost more than \$5 gold per ton, which will make it possible to export tin to Europe and America at a rate with which the other tin mines in Asia can not possibly compete.

The engineers report that there is no doubt as to the richness of the deposits, and say that as they are alluvial they can be worked cheaply. The surface of the paddy fields yields cassiterite in fair quantities, and at the depth of a few feet it has been proved as heavy as 8 lb. per sq. yd. of earth. The main shaft has been sunk to a depth of 41 ft., and the richness of the soil in tin increases with its depth. As soon as the company is formed a dredge to suit the ground will be purchased, and a concentrating table to extract the ore from the sand without the labor of washing will also be installed.

Consul General F. D. Cheshire, of Canton, states that the tin mines at Kochiu in the Province of Yunnan, are owned and worked by Chinese, but the smelting department connected with the mines is under a German engineer who has a German assistant. It is said that a railway connecting the mines will be built by the French. A gentleman who has visited the mines says that the smelting plant is being operated and that about 107,000 lb. of tin are being supplied annually from the mines,

all of which is exported. The railway line to connect the tin mines will be built from Mengtze, a distance of about 20 miles.

⌘ Tungsten Milling in Nova Scotia

In the central part of Halifax County, Nova Scotia, is situated a scheelite deposit which is the only tungsten mine in Canada. The milling at this point is described by Victor G. Hills, in the *Industrial Advocate*, March, 1913. In the mill every possible inexpensive device to prevent sliming is taken advantage of. The ore is dumped over a grizzly before going to the crusher. The roll feed is washed by a spray so that only the clean, coarse material goes to the coarse rolls, which are used for crushing as being probably better than any sort of screen-face pulverizing mill to avoid sliming. While scheelite is more friable than either the quartz or the ankerite gangue, so that, as is usual in the concentration of tungsten ores, the main loss is in the sliming tailing, yet the loss with the Nova Scotian ore is less than with the Colorado black ore. The walls of the vein are slate, which makes a large amount of slime and adds to the difficulties of handling this portion of the material. The vein matter, in addition to the quartz and ankerite and scheelite spoken of before, consists of arsenopyrite with a little pyrite and calcite. The specific gravity of scheelite and arsenopyrite are about the same, and together form the concentrates from the tables. The raw concentrate contains about 45% of arsenopyrite. To get rid of the arsenic it was necessary to roast and treat with a magnetic separator. A Wilfley revolving furnace was used for roasting. The arsenopyrite was prepared for magnetic separation by a high temperature and short exposure. For instance, 1500° for 50 sec. gave better results than 1100° for 90 sec. The best separation of the arsenic can be made by the least possible roasting that will render the iron magnetic, and it is a mistake to attempt to burn off the arsenic. A Ding single-magnet separator was used for the final separation. The magnetic parts carried on an average of 0.72% WO_3 , with some lots as low as 0.42%. The nonmagnetic products carried 0.34% arsenic. The separator operated at 8 amperes. The mill saving was about 86.8% on a 70% WO_3 concentrate.

⌘ Electrolytic Nickel Deposition

Heretofore it has been difficult to obtain satisfactory deposits of nickel by electrolysis, the plating being usually thin, brittle and easily scaled off. The bath in which this deposition has been carried on consists of the double sulphate of nickel and ammonium. A newly patented process, however, according to *Metaux et Alliages*, May., 1913, produces a thick, compact deposit by using a hot bath of an acid solution of nickel sulphate.

Employing nickel anodes in this process, the tension should be greater than 3 volts with a density of 2 to 4 amp. The inventor recommends an acid bath of 10 to 15° B. The nickel thus obtained is homogeneous and its malleability and strength are greater than that formed in the ordinary way.

Nickel tubes may be formed by depositing on hollow mandrels of aluminum, burnishing during the deposition, and afterward dissolving the aluminum base in caustic potash.

The Antimony Ores of Central Hu-nan, China

According to A. R. Schoeller, in "Journal of the Society of Chemical Industry," May 31, 1913, the Siang-kiang appears to form the eastern boundary of the antimony belt. The district situated between that river and the Yuen-kiang and of which the city of Sin-hoa may be said to be the center, produces the purest and richest stibnite ore, a typical ore assaying 57.64% Sb, and 0.127% As, with traces of Pb and Cu. However, the arsenic is usually well below 0.1%. The gangue amounts to about 15%, and consists of quartz, occasionally mixed with schistose rock. The mineral is most frequently coarse crystalline, showing long, stout prisms, of strong luster. Massive stibnite is not uncommon, and the richest ores are of this variety, with an antimony content of 60 to 65%.

With the exception of one or two mines owned by the Hua-Ch'ang Co., of Chang-sha, there are no mines in the European sense of the term. The workings are merely manholes made in the mountainside; as soon as a certain depth is reached, ground water or the want of ventilation make work impossible, and another hole is dug near-by. In this manner only the surface of the orebody is scratched. The miners sell the ore by the picul to local dealers, who send it to the nearest river, whence it reaches Chang-sha or Yi-yang. At both these places the ore is liquated for crude antimony, while regulus is also made at Chang-sha and Han-yang. The liquation residues, containing 20 to 30% of metal, have accumulated since smelting began, but are being used of late in the manufacture of regulus by the volatilization process. As the antimony sulphide in the residues coats the gangue and forms a glaze after solidification, it is not possible to concentrate them by mechanical means, as the brittle sulphide slimes after crushing. The slimes from a 27% residue assayed 56.4 per cent.

To the north of the Sin-hoa district the deposits become poorer; near An-hoa there occur ores averaging 48% Sb, with 0.06% As and negligible quantities of lead, copper and zinc. They are of granular texture and present a dull lead-gray appearance. Low-grade ores are also known to occur.

Passing into southwest Hu-nan, the ore deposits show an increased proportion of arsenic, a sample giving 51.75% Sb and 0.43% As. The same may be said of stibnite and crude from the province of Kweichow, some of which finds its way down the Yuen-kiang. Specimens were examined with the following results:

Ore. Sb 62.99%—As 0.846%—Pb 0.18%—Cu, Zn : traces.
Crude. Sb 69.85%—As 0.46%.
Crude. As 0.303%.

The export of stibnite and crude antimony dates back about eight years, when the inflated price of the metal made mining very profitable.

⌘ Tonopah—Belmont

The Tonopah-Belmont Development Co. and the Belmont Milling Co. report for the quarter ended May 31, 1913, receipts from sales of ore, bullion, etc., \$925,885, and mining, milling and administration expenses, \$444,053, leaving net earnings of \$481,832. Miscellaneous income was \$11,875, making a total net income of \$493,707 for the quarter.

Historical Note on Smelting Lead and Silver

SYNOPSIS—Hoover concludes that the amount of silver owned by the ancients points to a knowledge of reduction of silver and lead ores together, with subsequent separation of the metals. Pliny displays a knowledge of lead metallurgy not again equalled until Agricola's time.

∴

The history of lead and silver smelting is by no means a sequent array of facts. With one possible exception, lead does not appear upon the historical horizon until long after silver, and yet their metallurgy is so inextricably mixed that neither can be considered wholly by itself. As silver does not occur native in any such quantities as would have supplied the amounts possessed by the ancients, we must, therefore, assume its reduction by either (1) intricate chemical processes, (2) amalgamation, (3) reduction with copper, (4) reduction with lead. It is impossible to conceive of the first with the ancient knowledge of chemistry; the second does not appear to have been known until after Roman times; in any event, quicksilver appears only at about 400 B.C. The third was impossible, as the parting of silver from copper without lead involves metallurgy only possible during the last century. Therefore, one is driven to the conclusion that the fourth case obtained, and that the lead must have been known practically contemporaneously with silver.

ONE LEAD RELIC ANTEDATES 1500 B.C.

There is a leaden figure exhibited in the British Museum among the articles recovered from the Temple of Osiris at Abydos, and considered to be of the Archaic period—prior to 3800 B.C. The earliest known Egyptian silver appears to be a necklace of beads, supposed to be of the XII. Dynasty (2400 B.C.), which is described in the 17th Memoir, Egyptian Exploration Fund (London, 1898, p. 22). With this exception of the above-mentioned lead specimen, silver articles antedate positive evidence of lead by nearly a millennium, and if we assume lead as a necessary factor in silver production, we must conclude it was known long prior to any direct (except the above solitary possibility) evidence of lead itself. Further, if we are to conclude its necessary association with silver, we must assume a knowledge of cupellation for the parting of the two metals.

Lead is mentioned in 1500 B.C. among the spoil captured by Thotmes III. Leaden objects have frequently been found in Egyptian tombs as early as Rameses III (1200 B.C.) The statement is made by Pulsifer (Notes for a History of Lead, New York, 1888, p. 146) that Egyptian pottery was glazed with lead. We have been unable to find any confirmation of this. It may be noted, incidentally, that lead is not included in the metals of the "Tribute of Yü" in the Shoo King (The Chinese Classics, 2500 B.C.?), although silver is so included.

After 1200 or 1300 B.C. evidences of the use of lead become frequent. Moses (Numbers xxxi, 22-23) directs the Israelites with regard to their plunder from the Midianites (1300 B.C.): "Only the gold and the silver, the brass [*sic*], the iron, the tin, and the lead. Every-

thing that may abide the fire, ye shall make it go through the fire, and it shall be clean; nevertheless, it shall be purified with the water of separation, and all that abideth not the fire ye shall make go through the water." Numerous other references occur in the Scriptures (Psalms xii, 6; Proverbs xvii, 3; xxv, 4, etc.), one of the most pointed from a metallurgical point of view being that of Jeremiah (600 B.C.), who says (vi, 29-30): "The bellows are burned, the lead is consumed of the fire; the founder melteth in vain; for the wicked are not plucked away. Reprobate silver shall men call them because the Lord hath rejected them."

From the number of his metaphors in metallurgical terms we may well conclude that Jeremiah was of considerable metallurgical experience, which may account for his critical tenor of mind. These Biblical references all point to a knowledge of separating silver and lead. Homer mentions lead (Iliad xxiv, 109), and it has been found in the remains of ancient Troy and Mycenæ (H. Schliemann, "Troy and Its Remains," London, 1875, and "Mycenæ," New York, 1877). Both Herodotus (i, 186) and Diodorus (ii, 1) speak of the lead used to fix iron clamps in the stone bridge of Nitocris (600 B.C.) at Babylon.

EARLY GREEK OPERATIONS

Our best evidence of ancient lead-silver metallurgy is the result of the studies at Mt. Laurion by Edouard Ardaillon ("Mines du Laurion dans l'Antiquité," Paris, 1897). Here the extensive old workings and the slag heaps testify to the greatest activity. The reopening of the mines in recent years by a French company has well demonstrated their technical character, and the frequent mention in Greek history easily determines their date. These deposits of argentiferous galena were extensively worked before 500 B.C., and while the evidence of concentration methods is ample, there is but little remaining of the ancient smelteries. Enough, however, remains to demonstrate that the galena was smelted in small furnaces at low heat, with forced draught, and that it was subsequently cupelled. In order to reduce the sulphides the ancient smelters apparently depended upon partial roasting in the furnace at a preliminary period in reduction, or else upon the ferruginous character of the ore, or upon both.

Theognis (6th century B.C.) and Hippocrates (5th century B.C.) are frequently referred to as mentioning the refining of gold with lead; an inspection of the passages fails to corroborate the importance which has been laid upon them. Among literary evidences upon lead metallurgy of later date, Theophrastus (300 B.C.) describes the making of white-lead with lead plates and vinegar. Diodorus Siculus (1st century B.C.), in his well known quotation from Agatharchides (2d century B.C.) with regard to gold mining and treatment in Egypt, describes the refining of gold with lead. Strabo (63 B.C., 24 A.D.) says (iii, 2, 8): "The furnaces for silver are constructed lofty in order that the vapor, which is dense and pestilent, may be raised and carried off." And again (iii, 210), in quoting from Polybius (204-125 B.C.): "Polybius, speaking of the silver mines of New Carthage, tells us that they are extremely large,

Note—This is one of the footnotes from Book IX of Hoover's translation of Agricola.

distant from the city about 20 stadia, and occupy a circuit of 400 stadia; that there are 40,000 men regularly engaged in them, and that they yield daily to the Roman people (a revenue of) 25,000 drachmæ. The rest of the process I pass over, as it is too long; but as for the silver ore collected, he tells us that it is broken up and sifted through sieves over water; that what remains is to be again broken, and the water having been strained off it is to be sifted and broken a third time. The dregs which remain after the fifth time are to be melted, and the lead being poured off, the silver is obtained pure. These silver mines still exist; however, they are no longer the property of the State, neither these nor those elsewhere, but are possessed by private individuals. The gold mines, on the contrary, nearly all belong to the State. Both at Castlon and other places there are singular lead mines worked. They contain a small proportion of silver, but not sufficient to pay for the expense of refining" (Hamilton's Trans.).

PLINY'S KNOWLEDGE OF LEAD METALLURGY

Dioscorides (1st century A. D.), among his medicines, describes several varieties of litharge, their origin, and the manner of making white-lead, but he gives no very tangible information on lead smelting. Pliny, at the same period, in speaking of silver (xxxiii, 31), says: "After this we speak of silver, the next folly. Silver is only found in shafts, there being no indications like shining particles as in the case of gold. This earth is sometimes red, sometimes of an ashy color. It is impossible to melt it except with lead ore (*vena plumbi*) called *galena*, which is generally found next to silver veins. And this the same agency of fire separates part into lead, which floats on the silver like oil on water." (We have transferred lead and silver in this last sentence, otherwise it means nothing.) Also (xxxiv, 47) he says: "There are two different sources of lead, it being smelted from its own ore, whence it comes without the admixture of any other substance, or else from an ore which contains it in common with silver. The metal, which flows liquid at the first melting in the furnace, is called *stannum* that at the second melting is silver; that which remains in the furnace is *galena*, which is added to a third part of the ore. This being again melted, produces lead with a deduction of two-ninths."

We have, despite some grammatical objections, rendered this passage quite differently from other translators, none of whom have apparently had any knowledge of metallurgy; and we will not, therefore, take the several pages of space necessary to refute their extraordinary and unnecessary hypotheses. From a metallurgical point of view, two facts must be kept in mind—first, that *galena* in this instance was the same substance as *molybdaena*, and they were both either a variety of litharge or of lead carbonates; second, that the *stannum* of the ancients was silver-lead alloy. Therefore, the metallurgy of this paragraph becomes a simple melting of an argentiferous lead ore, its subsequent cupellation, with a return of the litharge to the furnace.

Pliny goes into considerable detail as to varieties of litharge. The Romans were most active lead-silver miners, not only in Spain, but also in Britain. There are scores of lead pigs of the Roman era in various English museums, many marked "*ex argent.*" Bruce (The Roman Wall, London, 1852, p. 432) describes some

Roman lead furnaces in Cumberland where the draught was secured by driving a tapering tunnel into the hills. The Roman lead slag ran high in metal, and formed a basis for quite an industry in England in the early 18th century (Hunt, British Mining, London, 1887, p. 26, etc.). There is nothing in mediæval literature which carries us further with lead metallurgy than the knowledge displayed by Pliny, until we arrive at Agricola's period.

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Proposed Changes in Metal Tariff

WASHINGTON CORRESPONDENCE

The tariff bill, as reported by the Senate Finance Committee to the Senate on July 11, contains the following new paragraphs relating to steel and iron, which make the additions shown to the free list; iron ore was free by the House bill also:

Iron ore, including manganiferous iron ore, and the dross or residuum from burnt pyrites; iron in pigs, iron kentledge, spiegeleisen, wrought iron and scrap and scrap steel; but nothing shall be deemed scrap iron or scrap steel except second-hand or waste or refuse iron or steel fit only to be re-manufactured; ferromanganese; iron in slabs, blooms, loops or other forms less finished than iron bars, and more advanced than pig iron, except castings, not specially provided for in this section.

Steel ingots, cogged ingots, blooms and slabs, die blocks or blanks, and billets, if made by the bessemer, Siemens-Martin, openhearth or similar processes, not containing alloy, such as nickel, cobalt, vanadium, chromium, tungsten, or wolfram, molybdenum, titanium, iridium, uranium, tantalum, boron, and similar alloys.

Other changes in the bill as reported make reductions varying from 3 to 10% on steel plates, wire and a number of other products. Iron pipe is placed on the free list.

Changes in the proposed metal tariff include the following: Aluminum ingots from 25% to 2c. per lb.; aluminum sheets, etc., from 25% to 3½c. per lb.; miscellaneous manufactures of metal from 25 to 20% *ad valorem*. On the other hand, duties on lead in ore are increased from 0.5c. to 0.75c. per lb.; on zinc ore from 10 to 12.5%; on pig zinc from 10 to 15% *ad valorem*.

❖

Reported in New York

The stock of refined electrolytic copper in the hands of American refiners at the end of June was only 28,750,000 lb., which is only about the normal production of seven days. It is commonly reckoned that about 10 days are required to fill specifications for shapes. If consumers were not ordering, of course, the refinery stock might run down to *nil* without causing any inconvenience.

The JOURNAL'S statistics of the smelters' production of copper in May, 1913, are 142,559,004 lb., compared to 136,989,739 lb. in April. The refiners' statistics for the same months were 141,319,416 lb. and 135,353,402 lb. respectively.

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Leadville's Production during 1912, surpassed that of any other mining camp in Colorado, both in tonnage and value. Leadville produced \$1,132,508 in gold, \$1,812,573 in silver, \$1,105,980 in lead, \$461,272 in copper, and \$6,757,360 in zinc ore, sulphide, carbonate and silicate. Cripple Creek's output was mainly in gold and totals \$11,055,175 the silver produced being only \$40,408 of this. The total production from Leadville was \$214,517 more than that of Cripple Creek.

The Situation in Mexico

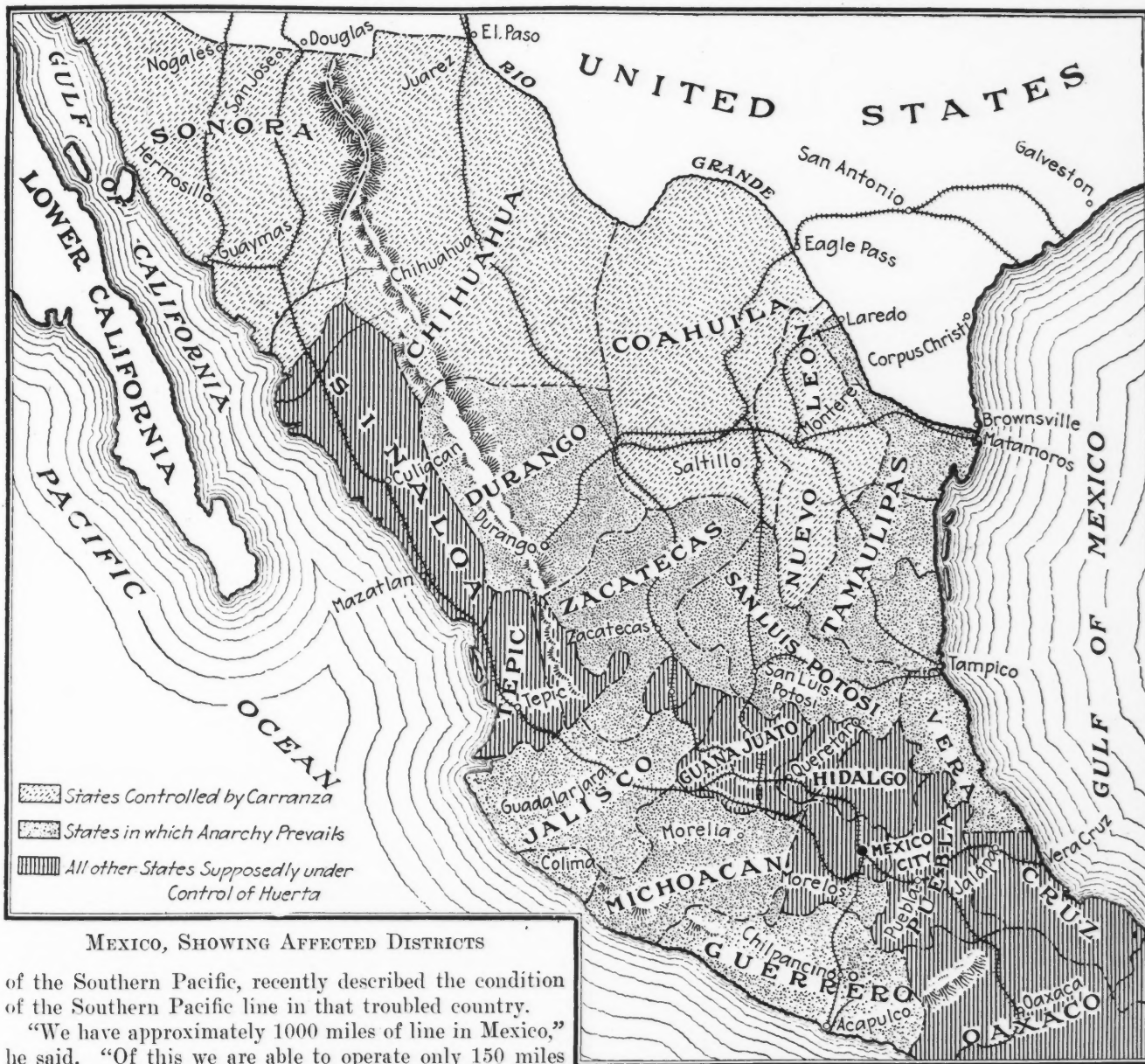
The accompanying map, which is redrawn from one that recently appeared in the *New York Sun*, gives an approximate idea of how things stand in Mexico. No one, not even our Department of State, seems to know all about the situation. About all authorities are agreed, however, that things in Mexico have never been worse than now.

Julius Kruttschnitt, chairman of the board of directors

possible to operate trains over any but the 200 miles I have mentioned.

"At Empalme, on the coast, we have shops. There are gunboats in the harbor, and whenever they see a locomotive stir out they take a crack at it. So the result is that not many locomotives are seen.

"We are unable to estimate the loss to the line. They have burned trestles several times over after replacement.



MEXICO, SHOWING AFFECTED DISTRICTS

of the Southern Pacific, recently described the condition of the Southern Pacific line in that troubled country.

"We have approximately 1000 miles of line in Mexico," he said. "Of this we are able to operate only 150 miles of line from the border south to the capital of Sonora province and another short branch line of 50 miles from the border to the mines of Cananea—in all 200 miles of operated line out of 1000. The conditions have been this way for the last four or five months.

"The constitutionalists, the insurrectionists and the Federalists are dividing the rest of the line between them to all practical purposes. They have cut the line in two 150 miles south of the border. They have taken the shops and terminals of the line, so that though they do not actually hold all the remaining parts of the line, it is im-

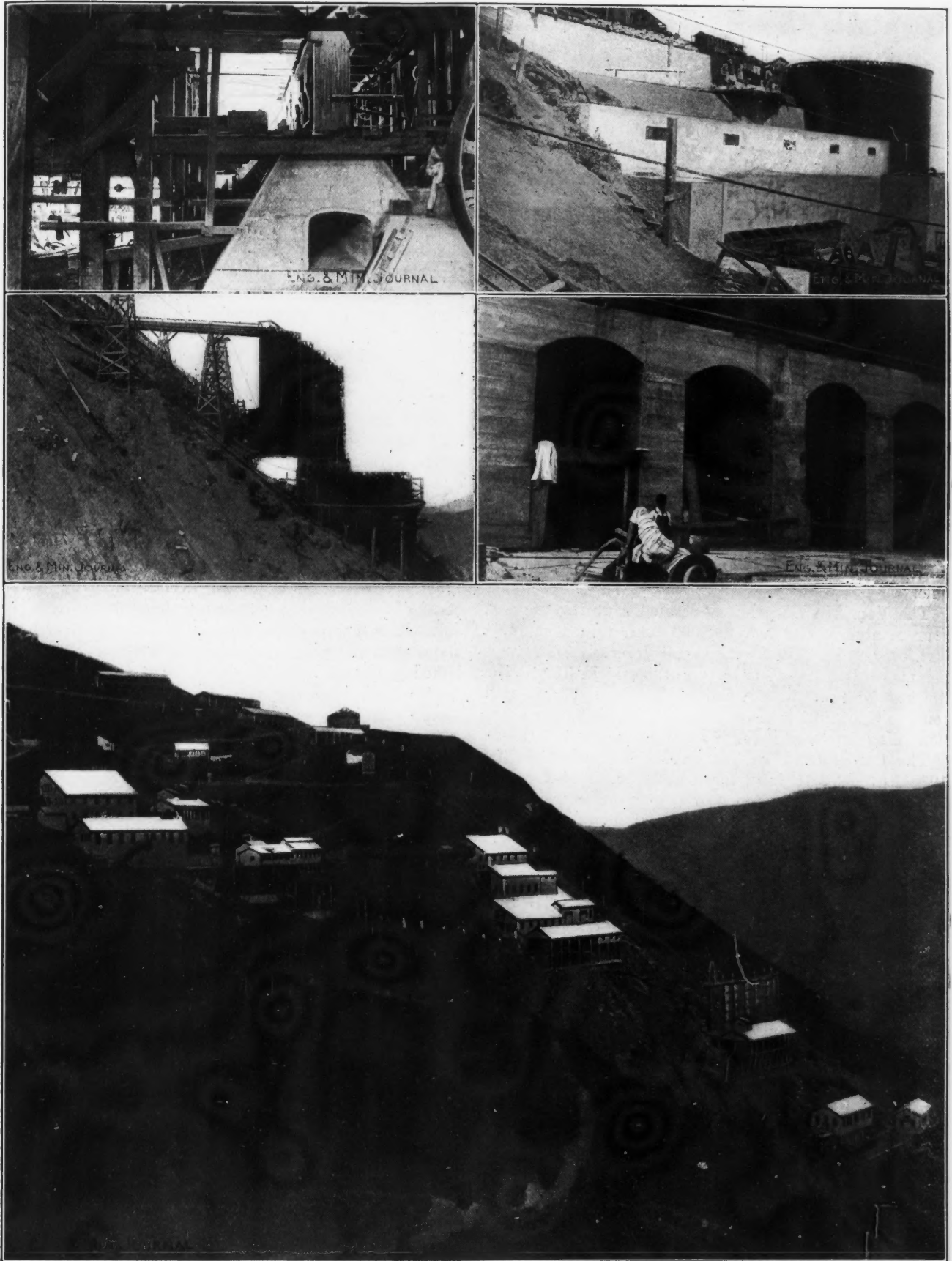
In all cases of destruction we have communicated with the State Department and received letters of acknowledgment."

The loss to the National Railways of Mexico has been enormous. Only 47% of its mileage is under operation. In June gross receipts decreased nearly \$2,000,000 Mexican currency. For the first week in July gross receipts were only \$500,000, Mex., half of what they were two years ago, and less than enough to pay running expenses.

PHOTOGRAPHS FROM THE FIELD



KENNETT, CALIF., SMELTING PLANT AND NEAR-BY GARDENS AND LAWNS
 (The Grove is one-half mile distant. Luncheon is being served to the Mining Congress by the Women of Woodcraft.)



NEW MILL, NEW YORK & HONDURAS ROSARIO COMPANY, SAN JUANCITO, NEAR TEGUCIGALPA, HONDURAS

Johannesburg Notes

SPECIAL CORRESPONDENCE

I have already referred to the prevalence of pneumonia among tropical natives working on the Rand, which caused the government to prohibit further importations. Last year the famous bacteriologist, Sir Alworth Wright, was called in. He prepared a pneumococcal vaccine for inoculation. Results on the Rand have so far been inconclusive, but on the Premier Diamond Mine its use has reduced the death rate per 1000 from pneumonia from 32.08 to 15.84 and the general death rate from 51.11 to 34.83. If similar results can be obtained on the Rand, tropical labor may again become available.

Development is still rapidly pushed in all mines, though there are some 87 million tons of ore developed. The mines on the Rand accomplished 90,098 ft. of development for the month of April and there were employed regularly some 6200 rock drills out of a total of nearly 9000 in commission.

The No. 4 shaft of the government gold-mining areas (Modderfontein) recently struck the reef over a mile east of the Brakpan Mines at a depth of 3580 ft. The reef was slightly faulted, half assaying 16.8 dwt. over 65.3 in., and half, 16.1 dwt. over 45.5 in. The recent strike of 11 dwt. over 38 in. in a bore hole at a depth of 3660 ft. from the bottom of the south shaft of the Springs Mines is some five miles from the nearest mines to the west and north and opens up the prospect of a large area of reef in the East Rand basin proving payable.

The Van Ryn Deep Mines developed during the first four months of the year 231,000 tons, valued at 12.54 dwt. over 48 in. The 80-stamp mill to crush 40,000 tons per month is expected to start work early in July. The ore reserves were at the end of March, 1,263,000 mill tons, valued at 8.9 dwt. per ton, and the higher-grade ore now being developed is further raising the average values.

The Consolidated Langlaagte Mines crushed during 1912-1913 295,072 tons, for a gross profit of £123,938 19s. The new 100-stamp mill is now, however, dealing with 45,000 tons per month, with a monthly profit of £22,250. The ore reserves are estimated at 2,069,630 tons, with an estimated recovery value of 6.4 dwt. Owing to the indistinct character of the South Reef, it is possible to do very little sorting. Residues are 0.218 dwt. or 11d. per ton, but the figure has been reduced in the Princess Estate plant, where 60% of the ore is slimed to 0.157 dwt., which is surely a metallurgical record for ore averaging about 26s. per ton.

Much anxiety is being caused by a strike which has broken out at the New Kleinfontein Mine. The directors of the group controlling this company had to shut down the Apex Mine for want of funds to proceed with development. They had engaged a manager for several years at a high salary and to utilize his services, they instantly dismissed the popular manager of the Kleinfontein Mine, though his results were excellent and costs were low. The new manager and underground manager caused friction by altering the usual working hours of some underground mechanics and dismissed them when they protested. All the workers of the mine, irritated by this, ceased work. This time the engine drivers also struck work, which they had never done before, and apparently without leave from the heads of their union

which has a specially favorable agreement with the Chamber of Mines. The reduction workers also struck. After some slight delay the company offered to reinstate all strikers and to return to the preëxisting hours, but by this time outside agitators had come in and persuaded the miners to demand an eight-hour bank-to-bank working day with Saturday afternoon half holiday. In connection with this demand it must be remembered that the white miner does not perform the actual work, but acts as a supervisor to natives and that in some of the mines it takes nearly an hour to reach the working faces, so that the demand is something different to that put forth in other mining districts where six or seven hours of actual physical exertion is as much as men can fairly be asked to perform. The company also refuses to recognize any of the strike committee who are not employees of the company and they refuse to recognize the unions. The strikers' idea at present is to confine the strike to this one mine and get the workers on other mines to support them, but as the New Kleinfontein Company is naturally receiving the support of all the other mines, they can do little unless they call for a general strike. The general feeling about the reef is that a general strike is the last thing the men want or are prepared for.

The strikers are now breaking the Arbitration Act and the government will shortly be forced to intervene as some of the leaders are inciting the men to acts of sabotage and violence. The whole incident is an eloquent commentary on the insecurity of tenure of men in all grades even when doing good work, and on the strange ignorance of Rand magnates in not realizing that a state of good feeling between manager and men is a valuable asset not to be lightly thrown away. On the Rand if a manager is liked by his men and has established good relations with them, he is liable, no matter how low his costs may be, to become an object of suspicion and to be supplanted in favor of someone with a reputation for stirring things up. This policy is a short-sighted one and ignores the chief elements of human nature.

It is hard at the present time to predict what will happen, as the engine drivers can, if they strike, hold up all the mines of the Rand.

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Montana Mining Co., Ltd.

The Montana Mining Co., Ltd., of London, operating properties at Edgemont, Nevada, and in Montana, reports that it has settled the litigation which has harassed it for years, by paying £8250 to the St. Louis Co. in full liquidation of all claims. Development and exploitation of the property will be undertaken at once and it is believed that profitable results will follow. The gross production of the property for the 5-year period preceding suspension on account of litigation, was £123,862, yielding a profit of £27,366. This company includes in its property the old Drumlummon mine in Montana, a former famous gold-silver producer.

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The Next Nitrate-Land Auction will be on Nov. 17, 1913. The lands to be sold are known as the Santa Laura de Wendel property, and it is estimated to contain 15,000,000 metric quintals of nitrate. It is situated in the Province of Tarapaca. The Government reserves the right to divide the property into two lots if desired. The sale will be held before the Junta de Almoneda in Santiago under the usual terms and conditions.

CORRESPONDENCE AND DISCUSSION

The Forest Service and the Prospector

My attention has been called to an article in the JOURNAL of June 21, p. 1255, by J. C. Kennedy, of Manhattan, Nev. Misunderstanding of the Forest Service policy with reference to mining upon the National Forests has become so widespread through repeated misstatements that it appears advisable to inform the public of the facts in the case discussed by Mr. Kennedy.

From the statement made it would appear that instructions published in the "Forest Service Manual" are not universally carried out. This idea is contrary to fact. The regulations, however, must be elaborated as new conditions are encountered and amendments and explanations are made from time to time through the medium of circular typewritten letters. By such a letter, dated Mar. 16, 1912, the forester authorized a modification of the existing procedure with reference to the expert examination of mining claims, under which such examinations could thereafter be made by employees who are qualified through education, experience, and practical knowledge to do the work. This modification was made from a desire to promote the interests of the miners by avoiding delay. Employees considered qualified thereunder are to be made use of only when a mineral examiner is not available. There is nothing secret or confidential about this practice and all correspondence may be seen in the files of any office of the service. It is conceded that not all forest rangers have a knowledge of mining sufficient to qualify them for expert examinations, but it must not be concluded that this is usually the case. Many men of practical mining experience enter the Forest Service as rangers, although this is not one of the qualifications required. Naturally, as in any other business, they are applied on the kind of work to which they are best adapted.

In the case under discussion, the examination was made by Deputy Supervisor R. G. Steele, who is considered fully qualified through experience and practical knowledge to make the investigation. In his report, it is shown that upon one of the claims, viz., the Morning Glory, an expenditure of only \$225 has been made. The balance of an alleged expenditure of \$14,720 was made upon the adjoining claim. Although claimed to apply in the development of the Morning Glory, this improvement cannot by any honest process of reasoning be construed to develop that claim. This fact alone would prevent the issuance of title to the Morning Glory. The tunnel which the claimant seeks to apply as a common improvement is located on the Pine Nut No. 2 and extends directly opposite from the Morning Glory claim, and nothing in the shape of a ledge disclosed in the tunnel can be found to exist within the limits of the Morning Glory. Drift No. 1 of this tunnel, which is the only portion of the tunnel extending in the general direction of the Morning Glory, would if continued at its present level run out of the hillside approximately 300 ft. from the west-end line

of that claim and across a gulch. It cannot, therefore, be considered as tending to develop the Morning Glory claim.

It is not the intention to initiate a contest upon slight technical noncompliance with the law but in this case failure to make one-half the expenditure upon improvements required by law is such a clear indication of bad faith when considered in connection with the lack of discovery that the disregard of the mining laws could not be overlooked.

In applying the instructions, the officer reporting upon this application wisely concluded that so flagrant a disregard of the law warranted a rejection of the application for patent. The suggestion in the instructions that good faith almost necessarily exists when claims are located on untimbered and unwatered lands which control no means of access or rights-of-way, was not accepted by the examining officer in the face of the preponderance of evidence of bad faith manifest through lack of both development work and discovery. It would be difficult to conceive of better proof of discretion lodged in officers of the service or of its exercise.

In this locality mining claims have been located and are being held for a good many purposes other than those contemplated in the mineral laws. Many claims in the vicinity are commonly conceded to have little actual value for mining purposes, others none at all, and some are covered by towns and occupied by business buildings, devoted to various occupations, including hotels, saloons, business offices, shearing plants and dipping vats. It would be difficult to presume good faith on claims in a region where this condition exists when an expenditure has not been sufficient to satisfy the requirement of law and no discovery of mineral has been made.

Free-use permits have not been discontinued as stated, on the Toiyabe National Forest, but the free-use regulations are closely enforced, that is, free-use permits for timber are denied those who may reasonably be required to purchase or have on their own lands or claims, or on lands controlled by them, a sufficient or practically accessible supply of material suitable for the purpose named in the law.

The sort of criticism made by Mr. Kennedy seldom comes from a *bona fide* actual miner or prospector and could never be made by one who had fully informed or honestly tried to inform himself.

In this connection, the following quotation from Vol. 38, "Decisions of the Interior Department Relating to Public Lands," p. 289, may be of interest to the readers of the ENGINEERING AND MINING JOURNAL:

MINERAL SURVEYOR-REVOCATION OF APPOINTMENT-AUTHORITY OF SURVEYOR-GENERAL

James C. Kennedy

... By the record now before the Department it is disclosed that on Jan. 9, 1909, the Surveyor-General cited the appellant to show cause why his appointment should not be revoked, stating that the "action is taken for the protection of the mining claimants of this state, and in the interests of good administration" and reciting not only that four specified

surveys, executed by appellant, "have been found seriously in error," as shown by the appellant's report of errors thereon, but that the field notes thereof had been returned, in the various cases, from two to five times for correction, so "that much valuable time of the force of this office was consumed in checking and rechecking this work." Further, an utter lack of scruple on appellant's part "in reporting in error lines of approved official surveys where the same are correct, to correspond and agree with your own erroneous work," in which connection three cases are cited.

It is the opinion of the Department, after a full examination of the record, that the pending case is one for the application of that rule; and the decision of your office is accordingly affirmed.

The Forest Service welcomes honest constructive criticism from whatever source. It could afford to disregard all of the unjust attacks made upon its methods and personnel were it not for the fact that where so much pure mud is thrown, some is liable to stick. But there comes a time when patient submission to abuse ceases to be either virtuous or wise.

S. RILEY,

District Forester.

Denver, Colo., July 19, 1913.

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The "Practical" Mining Man and the Mining Geologist

Professor Wadsworth's letter in the JOURNAL of June 28 impels me to ask you to allow me a little space in which to state that I did not intend, in my presidential address to the Colorado Scientific Society, to re-hash the old contention as to the relative merits of the "practical" mining man and the trained geologist. Certainly it was as far as possible from my purpose to slight the latter. I did emphasize the value of continuous study of geological phenomena as developed underground, but at the same time I dwelt on the desirability of geological training for the observer.

May I disclaim, at the same time, any desire to "foul my own nest" by disparaging consulting engineers? No doubt some consulting engineers are incompetent, and others do not keep in touch with developments frequently enough, but this does not justify us in condemning the entire class.

Is it too much to ask those who may be interested in my views on these subjects to refer to the address, and read what I actually did say?

GEORGE E. COLLINS,

Denver, Colo., July 16, 1913.

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Canadian Lead Bounties

The JOURNAL has been misinformed concerning Canadian lead bounties, to which reference was made in the issue of June 21. Some of the figures given are altogether erroneous. The total amount to be paid, authorized in 1903, was not to exceed \$2,500,000 (not \$6,000,000). The first Act provided for payment of bounty for a period of 5 years, "the sum to be paid as such bounty shall not exceed \$500,000 in any fiscal year;" also that the payments should cease on June 30, 1908. Just before the expiration of the first 5-year-period another Act was passed authorizing payment for another period of equal time, and making the London price of lead at which payment of bounty should cease, a higher

one. At the close of the 10-year period, on June 30, 1913, approximately, \$1,900,000 of the amount originally voted had been paid or was payable, leaving \$600,000 still available for bounty payments under the third-period extension lately granted. I have not my table at hand just now, but my impression is that the bounty ceases when the price of lead in London is £17 18s. 9d. As the London price goes down the rate of bounty increases until a maximum allowance of 75c. per 100 lb. is reached. On exhaustion of the \$600,000 bounty, payment will cease under the present authorization.

E. JACOBS,

P. O. Box 645, Victoria, B. C., July 2, 1913.

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Making Copper Wire by Electrodeposition

I am reminded by William E. Gibbs' patent, described in the JOURNAL of July 12, 1913, p. 72, of experiments I knew of several years ago to produce copper wire directly by electrolysis. The copper was deposited on a mandrel as cathode, on which was a spiral ridge. The idea was to strip off the copper in a long strip which was then drawn to wire, thus avoiding melting down the deposited copper cathodes and drawing the wirebars into wires. This process was covered by the Dnmoulin patents, I believe.

What I have never seen commented on in the technical journals is that the wires thus produced had a higher conductivity than wirebars made from similarly deposited cathodes, but every now and then the wire would snap short, and it proved impossible to draw long enough strands to be useful. These weak places in the wire were apparently due to small particles of impurity, slime, or extraneous dirt in the electrolyte. At any rate, it proved impossible to eliminate them, and experiments were eventually given up. Mr. Gibbs would appear to avoid this rock.

I have been told that wires drawn from the native masses of Michigan copper will also give a higher conductivity than wire from bars obtained by melting them, a phenomenon analogous to that with the wire from cathodes.

H. A. T.

Newark, N. J., July 19, 1913.

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Questions and Answers

THE LONDON PRICE FOR LEAD

If the price for pig lead at London be £20 per ton, what is the equivalent in United States currency? What would it cost to bring lead from London to New York?

J. L. F.

The price for pig lead as quoted on the London Metal Exchange is subject to discounts, which in the aggregate amount to about 4%. Thus, if the rate of exchange causes the quotation of £20 in London to be equivalent to 4.35c. in United States currency, the net cash equivalent would be 4.17c. The cost of carrying lead from London to New York, or *vice versa*, would probably be about 15@20c. per 100 lb., varying from time to time according to ocean freight rates.

EDITORIALS

Wages in Mexico

As the result of an exhaustive official examination of the books of a leading mining company, whose activities are in northern Mexico, figures can be presented as to labor data that show changes in rates and efficiency during a period of six years, as well as relative rates paid to natives and foreigners. This space of time covers the era of unrest culminating in the Madero revolution and the subsequent debacle in the political affairs of the Republic; a series of strikes, due to attempted organizations of unions among the laborers, and the duration of a gradual but notable change in the proportion of native to foreign labor.

The figures show, moreover, deductions from wages on account of purchases at the company stores, and are of especial interest in this connection as indicating the percentage of its wage roll that is returned through the medium of the stores. The small proportion so coming back will probably be a surprise to those that have supposed mining companies in Mexico can gage the real cost of labor by the wholesale price of goods in their stores. Of course, the case presented is but one, and cannot be presumed to tally with those of companies operating in small and outlying camps where the company store is almost the only outlet for employees' money.

Labor efficiency has decreased during the six-year period by about 20%, due to political unrest, agitation, and similar causes. But the scale is practically the same as in 1906; some few items have been increased by, say, 25 to 50 centavos, and this is especially true of the underground divisions, while others have been diminished by about the same amounts. In percentages, these changes vary from 6 to 12% either way. The hours of work have been lessened by about 6% in the same time, without any compensating increase of efficiency during the period of labor, i. e., a man working 8.5 hours now will not do as much work as he did six years ago, when he was working nine hours per diem. He does not speed up in Mexico on account of decreased hours, any more than the laborer in the States speeds up when his time is cut, in spite of all the array of arguments that has been adduced to the contrary.

At all its works, and in the various branches of its own and subsidiary enterprises, this company has had from 3500 to 5000 men on its payrolls more or less continuously. Prior to 1906 it employed a proportion of foreigners, chiefly Americans, amounting to from 38 to 40%. In 1906 this proportion was reduced to 34.2%. From that time on there has been a marked and steady diminution in the proportion of foreigners employed in the various activities of the company, beginning in 1907, when it was reduced to 28%. In 1909 the percentage varied from 18.4 to 15%; in 1910 it was from 16.5 to 12.5%; in 1911 from 15.5 to 14.6%; and in 1912 it varied from 13.8 to 12.9%. At the present time the proportion of native labor employed in all departments, and including all

classes of employees, is about 87% of the whole. This is a change that the Mexican government looks upon with considerable complacent satisfaction, no doubt.

During the same period the average earnings of native laborers have increased and those of foreigners have shrunken, not relatively, but actually, so that the proportionate employment, measured in terms of dollars, has shown a greater difference than the mere proportion of men employed among natives and foreigners will indicate. The average yearly earnings of natives, prior to 1906, was 1298 pesos per year, while that of foreigners was 3458 pesos. Today these averages are 100 pesos higher for the natives and 100 lower for the foreigners.

Generally speaking, the wage scale for foreigners is a trifle under the same figure, in gold, as that for natives, in Mexican silver. That is to say, that where foreign workers in certain occupations are getting, we will say, from 6 to 7 pesos per day, natives in corresponding occupations are earning from 3 to 3.50; machinememen compare at from 8 to 6.50 with 4.25 to 3.50. But, while there is this difference in the rate of pay, the work done differs in the same proportion. Thus, the company has native and American watchmen. The natives receive 3.50 to 4 pesos per day, and the Americans \$3.50 to \$4. But the responsibility of the two classes varies as widely as the results secured, and it is well known that the American watchmen really watch, while the Mexicans, like Brer Rabbit in the Uncle Remus tale, simply look on, and make little or no objection if some friend spends his night in lugging off coal or providing lumber for repairs to his house.

This company employs no American miners except as foremen, and no comparison is possible between the pay of natives and foreigners in this occupation.

A rather interesting and illuminating fact is this: That of the corps of mining engineers employed, the average monthly pay is but \$160 (gold) while one so classified receives but \$100. In the geological corps the average is but \$140 per month. These are all foreigners, and mostly Americans. Their pay scale does not present as alluring a picture as many of our mining-school undergraduates, themselves anxiously awaiting calls to similar occupations, would hope to be able to paint. The matron of the rental department, or the manager's chauffeur, or the timekeepers, get as high salaries as the average of these engineers. And almost as much earn the *vaquero* rangers, riding from the company corral in the free life of the brilliant, windswept hills! Telephone-switchboard operators are receiving as high pay as some of the engineers. However, in this connection, one must note that the average of pay to mining engineers is reduced by the fact that several of these men are undergraduates of engineering schools, who are receiving their training and "breaking in."

Chinese inexpert labor, which is all the time increasing in its proportion of the whole, earns from 2.50 to 3 pesos per day, while a Chinese printer, employed in making out

carteras and *boletas*, and other matter, gets 3.50 against the 6 pesos that is drawn down by his Mexican associate. Mexican machinists, molders, pattern makers, etc., earn 7.50 pesos, and foreigners under the same designations, get the same.

And so the comparison run, through a long and complicated list, covering almost every line of mining and mechanical activity. It will be useless to detail them further. But it must not be forgotten, in connection with these various relative rates, that the foreign and native workman, though classed identically, may be working under diverse responsibilities, and that the foreigners may be giving more return for his \$5 than the native for his 5 or 6 pesos. One may be sure that the very presence of the foreigner on the payroll indicates that he is giving fully as much as he gets in addition to the rate paid his Mexican associate, or he would not be there at all.

In the last three years store deductions from gross wages earned, that is, the proportion of wages that are turned in to the office to be collected against the employee on account of his store purchases, have been as follows:

	1910	1911	1912
Average number natives employed.....	3058	2815	3760
Average number foreigners employed....	573	494	555
Average yearly earnings, natives, pesos..	1,298	1,355	1,382
Average yearly earnings, foreigners, pesos	3,458	3,440	3,357
% company sales to earnings, natives....	20.0	19.5	17.1
% company sales to earnings, foreigners..	17.6	17.6	16.0

In addition to these payments to the company stores, are certain small charges by hospital, for public service (water and the like) amounting to about 5% of the wages.

In connection with this entire matter it is interesting to note the fact that the gradual weeding out of foreign labor began immediately after a well remembered Mexican mining strike in 1906, and that its first effect was to eliminate from the camp a number of agitators and organizers of the Western Federation of Miners, who had been active for some time previous.

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The Forest Service and the Miners

The reply of Mr. Riley, district forester, published in this issue of the JOURNAL, to a communication by J. C. Kennedy, which was published in our issue of June 21, is right to the point and consequently effective.

We have published a lot of discussion respecting the quarrel between the foresters and the prospectors; and we have heard a lot more than we have published. Let us give our own conclusions:

1. We believe that the foresters mean well and in general act well. Miners in whom we have complete confidence have informed us that not only have they experienced no obstruction from the foresters, but, on the contrary, have had their friendly coöperation.

2. We believe that the complaints against the foresters emanate largely from persons who have been checked in their attempts to evade some laws, in which the foresters have simply done their duty. If the complainants don't like the laws, they ought to agitate to get them changed.

3. There are probably some cases, relatively few, of vexatious and perhaps unfair actions on the part of the foresters, arising no doubt out of ignorance, misunderstanding and officiousness on one side or the other. Such

cases ought to be capable of straightening out with no great trouble.

The Forest Service is manifestly irritated and indignant over the abuse that has been directed at it; unjustly to a great extent. For this, however, itself is probably to blame; and the remedy lies in its own hands.

Let complaints receive prompt attention and full investigation. Let it be advertised that such will be the practice. Let red tape be abolished, and bureaucratic insolence, indifference, etc., along with it. Let subalterns, and even heads of departments, who do not conform to these rules of policy be fired as promptly as Civil Service rules will permit.

"But," our friends of the Forestry Service will say, "We do all of that, or most of it, right now."

That may be so, but we suggest the question, "How do you do it?" Manifestly not in the right way, else there would not be so much vociferation. We have seen bureaucratic correspondence, which, to our mind, was ample justification of clamor, although the gentlemen who indited it in Washington may have been technically correct. Let the foresters avoid that, let them expose two or three of the greedy grabbers who try to pull wool over their eyes in attempting to locate timber under the guise of an alleged mining claim, let them do these and other things and the people will be with them, as, no doubt, they ought to be.

Insofar as our own columns are concerned, we are going to consider the discussion of this subject as a closed book, the reopening of which will require some very interesting case.

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Developments at Jerome, Arizona

Some substantial development work is being done on outlying properties in the Jerome district in Arizona and the camp is now having an opportunity to prove whether it can develop another United Verde, or even other mines of more modest producing qualities. For a number of years after the wonderful production of the United Verde mine became common knowledge, the activity in the Jerome district was largely in connection with stock-selling schemes, the promoters of which dilated upon the other "United Verdes" they expected to find. The brokers' circulars disclosed dazzling mathematical calculations of wealth, but as usual most of the wealth was transferred to the promoters' pockets and as comparatively little of it went into the ground, no other United Verdes were found. After "biting" freely for a number of years, the public gradually assumed that Jerome was a one-mine camp, though few districts have been left with less actual development than the one containing the United Verde mine.

Recently an era of different character has been inaugurated and some earnest development is now in progress. The work of local people of the district has in the past been handicapped by lack of funds and has been largely confined to representation work to hold or patent their claims. While many properties had good indications and in most cases some oxidized ore, there was little work done at depth to determine whether the upper showings would develop into commercial orebodies. Development operations are at present being directed toward sinking and exploration at depth. It is important to note in this connection that a group of the successful

mine operators of the Southwest have gone into Jerome and decided to sink a shaft 1600 ft. or more. Other companies are sinking and it now seems assured that the district will have a thorough prospecting at depth.

With the building of the new smelting plant at Clarkdale the United Verde company will be in a position to treat more custom ore and it is expected that the developing properties of the district will be greatly assisted by having an outlet for such ore as they are able to produce. Development of a substantial nature is now in progress at a number of properties in the district and never before has the camp had such well based hope of finding more mines, which we trust will eventuate.

The article by Mr. Eddy, the California representative of the editorial staff of the JOURNAL, on the smoke situation, which appears in this issue, is first-hand evidence. Mr. Eddy, who is a competent observer, went to Shasta County and saw with his own eyes. What he saw is told by himself and need not be repeated here. We may remark, however, that the reports of alleged damage from the smelters' smoke in California have undoubtedly been exaggerated, just as they were in Utah and Montana. In most of the cases the farmers have simply tried to "put one over" on the smelters.

The Butte meeting of the American Institute of Mining Engineers promises to be the most successful in the history of that organization.

The index of the ENGINEERING AND MINING JOURNAL, for the period from January to June, 1913, is ready. It will be sent to any address on receipt of a post card requesting same.

BY THE WAY

The St. John del Rey Mining Co., of Brazil, is trying an interesting labor experiment, having imported 107 Japanese recruited from the mines and quarries of Japan. The operations of the company have lately been retarded by deficiency of miners in Brazil.

Thomas E. Rush, attorney in inheritance-tax matters, for the State of New York, has given permission to the executors of the estate of J. P. Morgan to release various securities for transfer and removal. The list comprises only two mining items, viz., \$268,000 of Cerro de Pasco bonds and 5500 shares of the Cerro de Pasco Investment Co.

A partner in a mining stock exchange firm which usually carries from 200 to 500 accounts on its books was lunching with a friend, says the *Boston News Bureau*. The broker ordered an elaborate meal, remarking that he didn't care how long he stayed away from the office. "How's that?" his companion asked. "Oh, our customer is sick!"

In the year 1900 the sulphur consumption of the United States was made up of 98% imported and 2% domestic material. In 1912, the domestic production supplied 91% of the demand for brimstone and imports

9%. Moreover these imports were nearly all of Japanese sulphur on the Pacific Coast. Louisiana sulphur has practically replaced the Sicilian, so that the arrival of a cargo from Sicily is an event unusual enough to cause comment.

Towns on the Minnesota iron ranges may count on preserving their names but not always their local habitations. Iron ore must be taken out whether there is a town over it or not. Sparta and Eveleth are examples of towns which have been moved, the latter twice; and we believe Biwabik also has done some migration. Now it is Hibbing, a place of 12,000 people and the largest town on the Mesabi, which will have to give place to the steam shovel before long.

At Mine La Motte, Mo., in the early days, a few "Cousin Jacks" were employed. The mine captain contracted the driving of a drift to a little "Cousin" who stood about 4 ft. 6 in. He started to work, but the captain did not go near the drift for a week or so. When he did go he had to bend nearly double to enter the drift. He then proceeded to jack the miner up, telling him that he was supposed to cut the drift man high, to which the "Cousin" replied: "Ell wot ee' kickin about? Hits man igh now."

In the course of a somewhat enthusiastic advertisement offering for sale the stock of a mining company in northern Minnesota, the president of the company says: "The famous Mallman wrote very high of this half section. He said 11 years ago that the company's property was selected years ago and that such a rich selection could not be made now; that the company's island has the same iron indications as was over the Pioneer, Zenith, Savoy and Sibley mines, and could be mined just as cheaply as those because the rock is a felt rock and will not leak." Also that the four mines above mentioned have 300,000,000 tons of ore, worth \$1.75 a ton, add it up, and it makes \$525,000,000, which is adjacent to the east line of the — Steel Co.'s property now for sale at \$1 per share.

The Arizona Venture Corporation, which says that it owns mining property in Arizona, has been inviting subscriptions to its stock in a circular in which it presents a "report from a mining expert who knows his business." Of course, an expert ought to know his business, but there are many so called experts who do not know what they profess. The Arizona Venture Corporation's expert is B. F. Holcomb. He describes a mine opened by a tunnel 150 ft. long, attaining a maximum depth of about 120 ft., which shows 5 ft. of ore in the breast, the value of the ore, "as determined by numerous conservative samplings," being \$38.48 per ton. Mr. Holcomb says: "Cut this to one-half and there is a handsome average value left to pay handsome profits." He remarks, furthermore, that "By extending the tunnel about 80 ft. further there should be encountered . . . a tremendous body or 'chamber' of ore of unusual richness, fully 20 ft. wide." An expert who is able to see into the ground undoubtedly possesses valuable gifts, even if he assists himself with a Spanish needle, a goldometer, or just a plain dowsing rod.

PERSONALS

R. E. Fishburn, of Tucson, Ariz., is in Kansas City.

Frank Davis has returned to Nogales from a trip into Sonora.

Robert Linton is in Lander County, Nevada, on professional business.

J. T. O'Hara, of Los Angeles, is confined to the St. Mary's Hospital in Tucson, Arizona.

Hallett R. Robbins has been making examinations at Butte, Mont., for the past three weeks.

P. D. Vonfield, interested in mining at Fairbanks, Alaska, was a recent visitor in San Francisco.

John T. Reid, after a stay of about 10 days in New York, left July 21 for home in Lovelock, Nevada.

H. Mortimer Lamb, of Montreal, secretary of the Canadian Mining Institute, has been on a visit to England.

General Manager P. G. Beckett, of the Old Dominion Copper Mining & Smelting Co., is on the Pacific Coast.

Chas. M. McKean has assumed charge of the supply department of the Calumet & Arizona at Bisbee, Arizona.

M. K. Rodgers, mine operator of Guadalajara and Guanajuato, Mexico, is at the Park Ave. Hotel, New York.

Peter B. Scotland is now general superintendent of mines of the Arizona Copper Co., Ltd., with offices at Morenci, Arizona.

Dr. John Maxson Stillman, professor of chemistry, has been chosen vice-president of Johns Hopkins University at Baltimore.

J. M. Nibblett, Jr., is in charge of the mining operations of the East Texas Iron Ore Development Co. in Cass County, Texas.

Frank H. Probert, Los Angeles, Calif., is visiting the East on business matters, and will probably be there about six weeks.

Dr. Stewart W. Young, of Stanford University, has been visiting New York in connection with business of the Thloggen company.

Sr. Richard McBride, premier and minister of mines of British Columbia, will shortly proceed to England on an official visit.

James Buchanan, superintendent of the Consolidated Mining & Smelting Co.'s smeltery, at Trail, B. C., is in Scotland on a visit.

Otto C. Burkhart, professor of mining at the Virginia Military Institute, Blacksburg, Va., has been in New York this week.

Edwin F. Gray, general manager of the Consolidated Coppermines Co., recently arrived at Ely, Nev., on his return from a trip to Alaska.

F. Bergen, formerly at the Morning mine, Mullan, Idaho, has been appointed superintendent for the Atlas Mining Co., White Horse, Alaska.

Charles G. Gates, of Minneapolis, Minn., son of the late John W. Gates, is on a visit of inspection to some of his mining properties in Alberta.

Charles W. Newton, general superintendent of the Butte & Ballaklava Copper Co. and the Butte & Zenith City Mining Co., Butte, Mont., is in the East on business.

D. A. Cavagnaro, formerly superintendent of the Channel Mining Co., at San Andreas, has been appointed superintendent of the Wisconsin mine at Forest, Sierra County, California.

Algernon Del Mar has resigned as superintendent of the Bishop Creek Milling Co., at Bishop, Calif., and is now open for professional work as erector of mill and mine structures.

H. T. Nelson, of Lebanon, Penn., has been appointed general manager of the Schuylkill Haven Rolling Mills, Pottsville, Penn., which recently resumed after two years of idleness.

F. N. Flynn, metallurgist for the Arizona Copper Co., has returned to Clifton after a three months' absence. When the new smelter is blown in he will be general superintendent of the plant.

Jos. Trethewey, a well known mine owner, of Cobalt, Ont., has been investigating the mining prospects of the newly opened silver-lead district about Hazelton, Skeena district, of British Columbia.

H. C. Ray, assistant professor of metallurgy of the School of Mines, University of Pittsburgh, Pittsburgh, Penn., is with the Butte & Superior Copper Co. in the experimental department for the summer.

E. B. Tinker, who has been in charge of the Keystone mine at Miami, Ariz., under the general direction of B. B. Gottsberger, has resigned that position in order to become manager of the Superior & Boston company.

Prof. Heinrich Ries, of Ithaca, N. Y., has resumed his investigations of the clays of western Canada, for the Canada Department of Mines, commencing this year's field work in the Boundary district of British Columbia.

Hon. Louis Coderre, secretary of state and minister of mines for Canada, has arranged to accompany next month one of the International Geological Congress excursion parties to British Columbia and the Canadian Yukon.

George W. Heintz, of Salt Lake City, general manager of the United States Smelting, Refining & Mining Co. was a recent visitor in San Francisco. Mr. Heintz predicted much new development in California mines in the next two years.

D. A. Mitchell, for five years past with the Republic Iron & Steel Co., at Virginia, Minn., has been appointed assistant to F. A. Wildes, Jr., State Mine Inspector. He will have charge of the mines about Kinney and Mountain Iron.

General Manager B. Britton Gottsberger, of the Miami Copper company, has returned from a three months' absence and has resumed his duties at Miami, Arizona. President W. G. Rice, of the Superior & Boston, is at Globe, Arizona.

Frank J. Whitgrove has been appointed general superintendent of the Dekalb, Ill., works of the American Steel & Wire Co. He was transferred from the Lincoln works of the same company, where he is to be succeeded by Louis Booth.

N. C. Titus has resigned as consulting engineer of the Mabry properties at Republic, Wash. He has accepted a position as consulting engineer for a New York syndicate owning a gold property in Argentina, and will have his headquarters at Buenos Aires.

O. E. LeRoy, of the Geological Survey of Canada, Ottawa, is in West Kootenay, British Columbia, making preliminary arrangements for the visit to that district next month of a number of delegates to the International Geological Congress to be held in Toronto.

D. M. Carman, a former resident of San Francisco, has just returned to the States after a residence in the Philippines of 15 years. He is president of two mining companies in the islands of Luzon and Mindanao and is now in San Francisco to purchase new mining machinery.

Albert S. Bigelow, formerly president of the Osceola Consolidated Copper Mining Co., and active in several other Lake companies, is before the United States District Court, at Boston, in bankruptcy proceedings begun against him by the Columbia-Knickerbocker Trust Co., of New York.

George Flint, treasurer of the Radium Company, of America, Sellersville, Penn., sailed from New York for Europe, July 16, to confer, by engagement, with some noted scientists relating to the product of the company. Mr. Flint's address is Care London City & Midland Bank, London, England.

B. B. Thayer left New York on July 17 for Butte, Mont., on his annual summer tour of inspection of the Anaconda operations. Mr. Thayer will remain in Montana until after the meeting of the American Institute of Mining Engineers, in the promotion of which he has been greatly interested.

J. P. Hutchins, of St. Petersburg, was recently in Southern Russia looking at anthracite mines and also had a visit of three weeks in London. He expects soon to go to the Urals according to press despatches, has invented a new form of and thence to the Lena mines for the rest of the summer.

Francis Church Lincoln has resigned his position as professor of mining engineering at the University of Illinois in order to enter upon the duties of resident engineer of the Bolivian Development & Exploitation Co., with headquarters at La Paz, Bolivia. Professor Lincoln is now on his way to Bolivia.

George S. Rice, chief engineer of the U. S. Bureau of Mines, hoisting cage designed especially for use in mine-rescue work. One of these cages has already been installed on one of the Bureau's rescue cars and was used advantageously at Banner, Ala., in connection with a recent mine disaster there. It is reported that other cars are to be equipped similarly.

Samuel L. Hoyt has been appointed assistant professor of metallurgy at the Minnesota School of Mines. Mr. Hoyt graduated from this school of the University of Minnesota in 1909, after which he pursued graduate work in metal-

lography at Columbia, 1909-11, and later studied Continental methods at the Königlische Technische Hochschule, Charlottenburg, and at the University of Berlin.

Ira A. Williams, associate professor in charge of ceramic engineering in the Department of Mining Engineering of Iowa State College, has just been appointed to the chair of ceramics at the School of Mines of the Oregon Agricultural College. He is also to have charge of the ceramic investigations of the new Bureau of Mines and Geology for the state. In that capacity he is to make a survey of the clay and cement resources of the state, supplementing it with laboratory investigations.

John O'Keefe, who recently retired as superintendent of the American Steel & Wire Co.'s works at Farrell, Penn., was connected with the company and its predecessors for 40 years, and is eligible to the highest pension granted by the United States Steel Corporation. Mr. O'Keefe was placed in charge of the Washburn-Moen Co.'s wire mills at Worcester, Mass., in 1873. He was transferred to the Salem, Ohio, works of the American Steel & Wire Co. in 1902, took charge of the Cleveland mills in 1905, and went to Farrell in 1909. He has been succeeded as superintendent at Farrell by August Mann, late at the Anderson works.

OBITUARY

Hugh S. White, superintendent of the Duncannon Iron & Steel Co., was accidentally killed at Duncannon, Penn., July 7, by falling from a railroad car.

Thomas G. Proctor, a prominent mining man of the Kootenay country, was killed in Victoria, B. C., July 10, by being accidentally struck by an automobile.

Peter A. Burch, of Los Angeles, Calif., known as a mine operator in Nevada, was overcome by the heat and died July 6, near Skidoo, Nev., while on his way from Los Angeles to Rhyolite in his automobile.

James McGregor, of Salt Lake City, a well known operator in Utah mines, is reported missing from Terre Haute, Ind., where he was on a visit, and it is believed that he had been drowned in the Wabash River.

Arthur B. Canfield, an owner and operator of oil wells in the Taft district, was killed in a collision of his automobile with an electric train at Pasadena, Calif., on July 3. The Pacific Electric Co. claims that the accident was directly due to an ordinance which prohibits cars from whistling at crossings within the limits of South Pasadena.

Ephriam Bayard, of Donora, Penn., died at Pittsburgh, July 20, aged 45 years. Born in Pittsburgh he began work in a steel mill at an early age, and had worked in Pittsburgh and Cleveland ever since, rising to responsible positions. For three years past he had been superintendent of the Donora Steel Co. He was active in philanthropic work, and took an especial interest in aiding boys.

Lewis James Hanchett died at Oakland, Calif., July 3. He was 81 years old. Mr. Hanchett left his birthplace in Michigan in 1851 and went to California during the gold excitement, traveling by way of Cape Horn. He was engaged in mining in California and Nevada and acquired a large fortune. In later life he raised blooded horses and engaged in farming. He built the first private car for shipment of race horses to the East.

SOCIETIES

Minnesota School of Mines—Elting H. Comstock and Peter Christianson, of the faculty of this school, are at Globe, Ariz., for a few weeks, with members of the Junior class who will spend the remainder of the summer working in various mines in the Globe district.

Oregon Agricultural College—Mining students must now work two months, underground in a mine, or in the employ of a mining and smelting company, or in similar technical mining work before they can enter the senior year's work. This work has not been required heretofore.

Iron Country M. C. M. Club—This organization of former students of the Michigan College of Mines will hold its annual meeting Aug. 9 and 10 on the Marquette range. Delegations from the Gogebic, Menominee and Marquette ranges will attend. Trips will be made to the Negaunee Mine of the

Cleveland-Cliffs Iron Co., the new hydro-electric plant of the same company near Marquette, and to the new steel and concrete ore dock of the Lake Superior & Ishpeming Railway.

International Geological Congress—On July 16 a fine bronze tablet to the memory of Sir William Edmond Logan, K. T., L.L.D., F. R. S., founder of the Geological Survey of Canada, was unveiled at Perce, Gaspé County, Quebec, where his first work was done. The tablet, which is suitably inscribed and bears an effective impression of the face of Sir William, was erected by the Twelfth International Geological Congress and affixed to a natural rock wall. The ceremony of unveiling was conducted by Dr. K. M. Clarke in the presence of a large party of members of the congress now touring Quebec, and the tablet was accepted on behalf of the municipality by Mayor Charles Lamb.

NEW PATENTS

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

AMALGAMATOR. William W. Guest, Alameda, Calif. (U. S. No. 1,067,023; July 8, 1913.)

CYANIDING—Agitating and Mixing Apparatus. Whitman Symmes, Virginia City, Nev. (U. S. No. 1,065,852; June 24, 1913.)

EXTRACTION of Precious Metals from Sands and Ores. William W. Guest, Alameda, Calif. (U. S. No. 1,067,022; July 8, 1913.)

PLACER-MINING MACHINE. Clinton A. Desmond and William T. Henley, Winnemucca, Nev. (U. S. No. 1,067,098; July 8, 1913.)

BLAST FURNACES—Device for Utilizing the Waste Heat of the Cowper Apparatus in Blast Furnaces. J. Pregardien, Coln-Lindenthal, Germany. (Brit. No. 1169 of 1913.)

ELECTRIC STEEL FURNACES—Thermal Treatment of Metal in Electrically Heated Furnaces. Paul Girod, Ugines, France. (U. S. No. 1,066,810; July 8, 1913.)

SMELTING—Method of Smelting Aluminiferous Iron Ores. Francis Mitchell McClenahan, Maryville, Tenn. (U. S. No. 1,066,833; July 8, 1913.)

LEAD AND ZINC—Process for the Separation of Complex Ores. William Morley Martin, Redruth, England. (U. S. No. 1,066,828; July 8, 1913.)

ZINC—Process of Producing Zinc from Blue Powder. Warren F. Bleecker, Canonsburg, Penn. (U. S. No. 1,066,787; July 8, 1913.)

ZINC SULPHATE—Production of Zinc Sulphate. Anson G. Betts, Troy, N. Y. (U. S. No. 1,066,245; July 1, 1913.)

BLASTING TUBE. George H. Crosby and Charles H. Jones, Duluth, Minn. (U. S. No. 1,065,664; June 24, 1913.)

ELEVATOR. George Henry Hulett, Cleveland, Ohio, assignor to The Wellman-Seaver-Morgan Co., Cleveland, Ohio. (U. S. No. 1,066,113; July 1, 1913.)

MINE-CAR BUMPER. George S. Greene, St. Clairsville, Ohio. (U. S. No. 1,066,603; July 8, 1913.)

CRUSHER. Ray C. Newhouse, Milwaukee, Wis., assignor to Allis-Chalmers Co., Milwaukee, Wis. U. S. No. 1,066,218; July 1, 1913.)

ORE SEPARATOR—George Chandler Kidder, Salt Lake City, Utah. (U. S. No. 1,066,918; July 3, 1913.)

PRECIPITATION OF ORE VALUES from the Effluent waters of Ore-Crushing and Concentrating Plants, Treatment for the. Andrew Gordon French, Nelson, British Columbia. (U. S. No. 1,065,678; June 24, 1913.)

INDUSTRIAL NEWS

The Yuba Construction Co., of San Francisco and Marysville, Calif., completed or contracted for a number of important dredges during the last year as follows: Two 15-cu-ft. steel-hull gold dredges (Natoma No. 8 and Natoma No. 10) and one 9-cu-ft. steel-hull dredge (Natoma No. 7) for Natomas Consolidated of California; a 9-cu-ft. steel-hull dredge for Oroville Dredging, Ltd., for use on its Pato mine in Colombia, S. A.; a 9-cu-ft. wooden-hull dredge for the Powder River Gold Dredging Co., at Sumpter, Ore.; a 6-cu-ft. wooden-hull gold dredge for the Pabst Brewing Co. interests (now building in Idaho); a 5-cu-ft. wooden-hull gold dredge for Ingersoll & MacDonald (now building on the Malaguit River in the Philippines). The company has also built during the last year several suction dredges among which were a 20-in. electrically operated steel-hull suction dredge for the West Sacramento Land Co., to operate on the Sacramento River; also a 20-in. steam-operated steel-hull suction dredge, to be used by Natomas Consolidated in building levees along the Sacramento River.

EDITORIAL CORRESPONDENCE

SAN FRANCISCO—July 19

The Hall Sulphur-Recovery Plant for experimental purposes at the Balaklala smeltery at Coram, Shasta County, will be installed immediately. F. W. Leland is the new manager of the First National Copper Co., which will undertake the experiment with a view of ultimately reopening the Balaklala mine and resuming operations at the smelting plant. H. F. Wierum is in charge of the construction and installation of the plant, but he is here solely to make the experiments upon which will probably depend the starting of the plant on a commercial basis, and not to reopen the works. There are four McDougall roasters at the Balaklala plant. Two of these will be rigged up by Mr. Wierum for these experiments. One of them will be provided with oil burners, the other will be rigged for burning a fixed oil gas as fuel. The exact question of what kind of fuel can be used most effectively and economically has not been decided. It is known that fixed gas is by all odds the most desirable, but the employment of oil burners and the use of oil fuel will, it is thought, also produce the conditions for distilling the sulphur and avoiding SO_2 in the final gas except as traces. The oil burner will be of a type which atomizes the oil with compressed air instead of steam and which has a very sensitive adjustment for the atomization of air combustion, all of which cannot be furnished by the atomizing air. The selection of an oil burner has not been definitely decided. Just at present Mr. Wierum's stay in San Francisco is for the primary object of deciding upon the selection of a gas producer. He has in mind one new type of gas producer, manufactured in Philadelphia, which he will probably install in the form of one unit big enough to operate one McDougall furnace. But in order to have no chance of failure in the gas supply he will also try to close negotiations for a producer that is made in San Francisco, or on this coast, or one that he can have manufactured if he can be supplied with the plans. When I talked with Mr. Wierum on July 15 he was not prepared to name the make of the producer. However, it is the purpose to employ two gas producers, one that will produce a high B.t.u., say 1500 B.t.u., and the other low or about 150 B.t.u. It is desirable to try the behavior of the two gases. The next three months will be employed in the testing of the two McDougall furnaces equipped with the oil and gas fuel appliances. There will be a few changes in the piping and cooling and in the flue connections. A Feld washing machine, made by the Bartlett-Hayward Co., at Baltimore, will be employed to wash the elemental sulphur and collect it in the shape of emulsion. Mr. Wierum has also tried the Cottrell process on a small scale. He states that apparently this process precipitates the sulphur perfectly, but that there will be naturally many questions of detail as to how to recover it after it is precipitated. The McDougall furnaces are 18-ft. six-hearth plants, which have sufficient capacity for making thorough and competent tests of the Hall desulphurizing process.

DENVER—July 19

Shipments of Uranium and Vanadium Ores from Green River are being made to the East. Several cars have been shipped, and more ore is being hauled. It is understood that most of this will be treated in the United States, instead of being sent to Europe.

The Park County Mill Project is being advanced. A. E. Moynahan, President of the Custom Mills Co., was in Denver lately in connection with the enterprise, the intention being to commence operations with a 100-ton plant. The company is capitalized at \$500,000 and has wisely set aside \$5000 for determining the character of the different ores which will come to the mill for treatment. The plant will probably be a combination of amalgamation, concentration and cyaniding, but this will not be determined until a thorough metallurgical test of the ores has been made.

His Highness, Prince de Croy of Belgium, W. J. Van Maanen, proprietor of the Belgian Gazette, a financial paper of Brussels, and Camille Perin, head of the General Coal Co., of Belgium, left Denver, July 5., for Steamboat Springs, whence they will make an examination of the Yampa coal field in

Routt County, and of the survey line of the Colorado & Northern Ry. to the anthracite fields, the building of which is part of the enterprise they have in mind; this road has its southern terminus near Hayden on the Denver & Salt Lake, formerly known as the Moffat Road. The line is also projected northward from the Pilot Knob anthracite field, to a junction with the Saratoga & Encampment Ry., a feeder of the Union Pacific Ry., and thence onward to Casper, Wyoming, opening a market for the fine engine coal of the Yampa field.

An Interesting Project at Eagle is the draining of the lake at the headquarters of Lake Creek with the object of placer mining the 80 ft. of wash deposit in the lake bottom. A sample of the wash is said to run as high as \$13 to \$20 per cu.yd. In order to drain to the bottom of the deposit it will be necessary to drive a 900-ft. tunnel. Work on this project is being done by Edward J. O'Flaherty, for the Electra Gold Mining Co., of Denver.

The Geology of the Lady Belle Mine consists of a sandstone stratum varying from 40 to 50 ft. with a blue lime above and schist below, the dip being 34°. The richest ore is found on the hanging wall in the sandstone, but most of the sandstone runs from 5 to 15 oz. silver. There are spots of azurite in the sandstone where the best ore is found. The total shipment is 20 cars with an average gross settlement of \$3100 per car; the royalties are 40%. A new strike of copper oxide on the Dakota claim has been made about a mile east of the Lady Belle on Horse Mountain.

BUTTE—July 19

An Increase of Tuolumne Capital Stock will be voted upon at the special meeting of the company on Aug. 18; the increase will be from 800,000 shares of \$1 par, to 1,500,000 shares of \$1 par, for the purpose of combining with the Butte Main Range Mining Co. Some opposition will be brought out but it is doubtful whether it will be strong enough to defeat the merger plans. If it is voted, it will mean that the Tuolumne mine will be used to provide a development fund for the Main Range with an indefinite or permanent suspension of dividends.

F. H. Wood, Vice-President of the New Mines Sapphire Syndicate, of London, England, accompanied by Sydney Finnegan, secretary, and F. H. Lathbury, a mining engineer in the employ of the company, recently made a trip of inspection to the company's sapphire mines at Yogo, Mont. Before leaving for his home in London Mr. Wood announced that the company is about to put \$40,000 into improvements for the purpose of increasing the output of the mines. The Yogo sapphires are noted for their brilliancy and size and the demand for them is increasing both in this and foreign countries. The company's sapphire bed extends over a length of four miles and contains a great supply of the gems.

Electric Hauling Over the Butte Anaconda and Pacific from the Butte mines to the Washoe plant will be commenced about Oct. 1. The portion of the road from the yards at Anaconda to the smelting works, known as the high line, is now completely electrified, and the ore cars brought from Butte under steam power are conveyed over the high line by electric locomotives. It has been demonstrated already that the electrically-operated locomotives are able to pull nearly twice the load of the steam type up the grade to the plant, and at a faster rate of speed, making a saving in cost of approximately 35%. It is probable that the passenger service will be carried on under electricity within a short time, although no definite data for its inauguration has been given out as yet.

The Butte Central Mine and Mill Are Closed and it is probable that the bondholders will be allowed to foreclose and bid in the property, after paying off the local claims, amounting to about \$20,000. Later there will probably be a reorganization. There is local confidence in the Ophir mine, but through the recommendation of some engineers and the superintendent, Samuel McConnell, the company built a mill and expected to make development expenses by mining the low-grade ore in the mine. Mr. McConnell wants to take upon himself all the blame for the mistake, but that is small

comfort to stockholders, especially when they remember that Mr. McConnell quoted frequently from alleged reports of engineers and assayers. The Ophir is but 500 ft. deep, and no mine in Butte has been an important producer at so comparatively shallow a depth.

Butte Again Cuts Wages, in accordance with the agreement between the mining companies and the union. The June payroll was made up at \$3.50 and the miners accepted their pay envelope at that rate. Butte miners drew the high figure of the schedule but one month in the year, that being January, when they got \$4 per day. In one subsequent month they were paid the \$3.75 rate when under the schedule the companies could have reduced to \$3.50. The \$3.75 rate prevailed during three months. The reduction in the pay rate for June meant a loss of over \$125,000 to the men and to Butte trade circles. The provision in the contract with the miners' union is to the effect that when the general average price of copper is below 15c. per lb. for the month the wages shall be \$3.50 per day, and when above 15c. and up to 17c. per lb. the rate is \$3.75, while above 17c. the rate is \$4 per day.

SALT LAKE CITY—July 19

A Metallurgical Research Station in Salt Lake City will be established by the U. S. Bureau of Mines in September of this year. The station will be supported in part by state funds, and in part by a recent Federal appropriation. It will be operated in connection with the School of Mines of the University of Utah, and attention will be given to methods of treating low-grade ores. Recently the state made an appropriation of \$7500 for this kind of investigation, and as Utah is the first state to have made such an appropriation, it will have the first station to be established by the Federal authorities.

The Chief Consolidated Mine at Tintic has lately come to the front, and bids fair to take its place among the important producers of the state. The company owns a large and favorably situated area, much of which is still to be developed. In 1912, 31,000 tons of ore were shipped, net earnings from which were \$323,000; early in the present year a dividend of \$87,600 was paid, and recently a second of like amount has been declared. An oreshoot has been developed from the 1000- to the 1400-ft. level, and probably extends beyond these levels, above and below. The ore has been followed for 650 ft. in length and in some places is 60 to 70 ft. across. Another shoot, thought to be equally promising, opened on the 1400, has been followed 350 ft. below the level. Connections at depth with the Gemini, recently completed, have facilitated operation, furnishing a needed outlet and improving ventilation.

FLAT RIVER, MO.—July 19

Attention is Again Directed to Madison County, Missouri, where the Federal and National Lead companies have secured properties. With two such strong companies operating, confidence will be restored in the district and it is surmised that a great deal of optioning and diamond-drilling will be done this season. The National Lead Co. has secured the famous old Mine La Motte property containing about 37,000 acres and lying about three miles north of Fredericktown. It is planning a great deal of development work. The Federal Lead Co. has been operating the old Catherine Lead Co.'s mines. Lately it has optioned a tract near Fredericktown that is supposed to contain copper. The shaft has been unwatered and a diamond drill will be installed. A report is in circulation that M. J. O'Brien, who controls the North American property, will start drilling on the Schulte land to verify the drilling that was done some years ago and showed good ore. S. Clarke has organized a local company to option and prospect copper lands. Drilling will be started about Aug. 1, south of Fredericktown.

NEGAUNEE—July 21

The Finlay Method of Appraisal of Michigan mines was upheld by Judge Cooper at Ironwood in the recent suit between the Newport Mining Co. and the city of Ironwood. The Newport Co., owned by Ferdinand Schiessinger of Milwaukee, was taxed \$98,996 in 1911 on an assessment of \$8,535,000. The previous assessment on practically the same showing had been \$1,471,061. The Newport company protested that other property was not assessed at such a relatively high rate and that the Finlay method of appraisal was wrong in theory. This suit has been watched with interest by other mining companies and was in the nature of a test case; if the mining company had won, suits would have been started by other operators.

Important Ore Discoveries, southwest of Crystal Falls in the Mastodon section recently made by the Longyear company, Oliver Iron Mining Co. and Cleveland-Cliffs Iron Co.,

will cause considerable new construction of railroad. The Chicago & Northwestern Ry., one of the two ore carrying roads serving the Crystal Falls district, is planning new track and yards for a branch leaving the main line at Mastodon Station. This branch will probably serve all the mines southwest of Crystal Falls, some of which now ship over the present line which follows a more roundabout route. The Chicago, Milwaukee & St. Paul Ry. may also extend a new branch line to the Mastodon field.

DULUTH—July 21

The Income of the State of Minnesota from the mines it owns in fee will be greater this year than at any time heretofore. For the last month and more these properties have been shipping at the rate of 100,000 tons a week. The biggest producer is the Grant mine at Buhi, Mesabi range, operated by Jones & Laughlin. This big Pittsburgh concern is also conducting important exploratory work in the vicinity of Grand Rapids, at the extreme western end of the Mesabi, where it has an extensive acreage under option. Leading officials of the company recently inspected operations and also paid a visit to the Steel Corporation's big concentrator at Coleraine. It is surmised that the Jones & Laughlin interests will take over the Grand Rapids lands, in which event the erection of a washing plant will follow. Much of the ore is sandy in its nature, similar to that mined in the vicinity of Coleraine.

HOUGHTON—July 21

The Edison Experiment on Quincy Stamp Sands which is to be undertaken during the present summer is attracting a good deal of local attention, particularly for the reason that a few years ago the Edison people secured several carloads of Calumet & Hecla stamp sands and made experiments with their process of extraction by electricity. No reports ever were secured on these experiments on Calumet conglomerate tailings, and it was the general impression here that the results were not satisfactory.

The Consideration Which the Calumet & Hecla Co. Shows for Employees is shown in the notices sent to the men in their pay envelopes this month. Under the terms of the workmen's compensation and employer's liability act in this state, compensation is paid only for injuries which are of such a nature as to cause disability for at least two weeks. Minor injuries receive no compensation at all. The company now announces that in addition to the provisions as required by law, the Calumet & Hecla, the Ahmeek, the Osceola and all other subsidiary companies will pay compensation at the sixth day following the injury. This compensation will come from the Employees Aid fund.

SPOKANE—July 19

Valuable Mineral Lands in the Colville Reservation are being inspected by a party of engineers under Joseph T. Pardee, of the U. S. Geological Survey. The lands, which will aggregate 188 square miles, lie from 75 to 100 miles northwest of Spokane. Government examinations began a year ago and probably will be completed this summer, according to Mr. Pardee, who says that as a result of the 1912 field work that portion of the reservation east of Nespelem, which contains most of the mineral deposits of this area, has been classified as to the mineral or nonmineral character of the lands. This classification has been transmitted to the Commissioner of Indian Affairs, to whom interested parties may apply for details. The lands determined to be mineral in character are for the most part grouped around five localities: Covada, Upper Nine Mile Creek, Keller, Nespelem and Park City, with a few scattering areas elsewhere. None of the lands classified as mineral will be allotted to Indians, but the classification will not operate against the title to any lands that may have been granted or reserved by the government for schools, power sites or other purposes. Although some of the lands classified as mineral have been proved by underground work to contain valuable orebodies, most of them have not been developed and their mineral classification is based upon evidence offered by the surface and by the geology of the region in general.

TORONTO—July 22

The Dispute Involving Claim No. 940 in the Gillies Limit, which was staked by several people at the time of the opening of this territory, has finally been settled. The application of B. Neilly, manager of the Penn-Canadian Mines, Cobalt, who hired a special engine to get him into Haileybury first, has been declared valid. This claim was desired by a good many people on account of some rather promising surface showings, and five different men staked it. Neilly was the first to arrive at the recording office, however, and his application has been sustained.

Serious Bush Fires near Porcupine and in other parts of northern Ontario have occurred recently, and in some instances, small settlements have been completely destroyed. A great deal of damage has been done to timber and pulp wood, thousands of acres of which have been burned off and a serious setback was given to many of the settlers in this district. The different mining camps in Cobalt, Porcupine, Kirkland Lake, Larder Lake and Gowganda were seriously threatened, but fortunately the rains came in time to prevent any large conflagration. While the danger is not yet quite over, the different camps are in a much better position than they were last year and no fears were entertained of any great disaster.

The Burnside Property at Kirkland Lake has drawn attention to the district with an exceedingly rich surface discovery and a small rush has resulted. This property adjoins the Foster-Tough and operations were commenced on the extension of the No. 5 Foster vein. Results of development not having been so satisfactory as was expected, surface prospecting was started, with the result that another vein, running parallel and about 100 ft. south, was uncovered. This has now been stripped for over 50 ft. and shows exceedingly rich ore, a considerable proportion of the valuable content being in the form of sylvanite. At one place, there was 20 in. of ore which gave an assay of \$10,000 to the ton, but it is believed that the average width is about 9 in. and the average value about \$500.

CHIHUAHUA—July 14

The Mining Industry Throughout Northern Mexico is Completely Paralyzed as a result of the continued revolutionary disturbances. With the blowing out of the furnaces at the Chihuahua plant of the American Smelting & Refining Co., on July 7, every smelting plant in the northern states is shut down. Those at Mapimi, Torreon, Asarco, Aguascalientes, San Luis Petosi, Monterey and Matehuala have been out of commission for periods of from 30 to 90 days. The early resumption of operations at any of them seems unlikely. Details of actual conditions in southern Chihuahua, as well as throughout the states of Durango, Sinaloa, Coahuila, Zacatecas and Aguascalientes are lacking, owing to the fact that railroad communication south of Chihuahua has been cut off since early April, but sufficient information is at hand through reports of automobile parties of mining men and of others passing through this city to say that few mines are operating, only those which have milling plants on the ground and were fortunate enough to have supplies on hand. So far as can be ascertained, foreigners have not been maltreated to any great extent nor have foreign-owned or foreign-operated mines suffered property damage. In a few instances foreign as well as native companies have been requested to contribute to the cause of the rebels, sometimes with money, but more often with provisions. Owing to the rebel occupation of the Santa Eulalia camp several weeks ago, and to the discontinuation of train service over the two narrow-gauge railroad lines, all of the mines there are closed. Since the discontinuation of service on the National line to El Paso, June 3, the city has been completely isolated, the Northwestern line via Madera having been out of commission for some time previous. The city is held by the government forces, while the region around is infested with rebels. All the foreign women and not a few of the men from near-by camps, are in the city, on account of the desired protection of about 4000 Federal soldiers. Foodstuffs, while not plentiful or varied, are sufficient for about 60 days and sell at advanced prices. Occasional news from outside points is brought in by automobile. There has been some exchange of shots between Federals and rebels just outside of the city limits, but it is not believed that an attack will be made. Several days ago rebels visiting the American Smelting & Refining plant, about six miles out of the city, were fired on by the Federal outposts, stationed on the surrounding hills; at least a score of shells dropped, fortunately without injury to person or property within the smeltery grounds.

The Closing Down of the Smelting Plant and the Santa Eulalia Mines has thrown approximately 5000 men out of employment, and considering that the majority are without resources and that an embargo has been placed on provisions leaving the city; these idle men constitute a menace, which may help the rebel cause, both by their taking up arms in order to secure food and by the creating of greater discontent toward the established government. It should be stated, however, that most of these miners have taken a neutral or pro-Federal stand and show a disposition to work as long as possible, a most encouraging sign as evidencing their weariness of the disturbed conditions which have existed for the last three years. Still another encouraging feature in this state

as well as in other states, is the organization in the larger cities, and even in the smaller towns and haciendas, of citizen-volunteer protective guards.

The Rio Tinto Copper Co., at Terrazas, about 25 miles north of Chihuahua, has continued operations with interruptions, in spite of occasional visitation by rebel bands, and has sufficient fuel and supplies on hand for at least 60 days. In the western part of the state, Yoquivo, Batopilas, Tres Hermanos, Concheño and Barranca del Cobre companies are operating in a small way, but have been unable to market bullion for over 45 days. Owing to the closing of the Mexico-Northwestern Ry. and to the prohibition by the military authorities of sending out supplies, operations must soon cease. At Cusiuhiriachic several companies are carrying on operations just sufficient for the maintenance of organization. At Parral, work is practically at a standstill on account of the impossibility of getting in supplies. Several of the larger concerns have, however, managed to keep milling plants in operation by hauling supplies in wagons from Chihuahua.

GUADALAJARA—July 15

Control of the Mirador Mine in the Mascota district has been purchased by Ralph H. Ramsdell, manager of the Casados mine, who has also leased the reduction plant erected in that district several years ago by the Lawson Development Co. For some time this plant has been treating a limited amount of Mirador ore. The output of the mine and mill will be increased.

Plans of the Cinco Minas Co. for the erection of a 250-ton reduction plant in the Hostotipaquillo district are not being interfered with by disturbed conditions in Mexico. Some supplies for the plant have entered Mexico through Tampico and Veracruz, and other shipments are being routed across the Tehuantepec Isthmus to the Pacific port of Manzanillo. It is still expected to have the plant ready for operation before the end of the year. Judge J. W. Gerard, of New York, is president of the Cinco Minas Co.

The El Favor Company has Built a High Wall around its reduction plant and store, due to the presence of bandits in the Hostotipaquillo district, and has made arrangements to defend the properties in case of attack. Bandits visited the El Favor camp several weeks ago, but were satisfied with a contribution of 100 pesos, and made no attempt to molest anyone. Operations at the El Favor and Mololoa mines have continued uninterrupted. High-grade ore from the El Favor mine is being shipped steadily to Aguascalientes, and much Mololoa ore is being milled at El Favor.

The Mexican Searchers, Ltd., of London, has surrendered its bond on the Pinavete mines in the Jora district of Tepic, and is withdrawing from the field. General conditions in Mexico are responsible. The deal for the mines, which involved several hundred thousand pesos, was arranged in 1911, and the English concern has been at work since that time, the new development amounting to about 1000 meters. The mines are owned by the Maduro Mining Co., of Chicago, of which H. M. McIntosh is the principal stockholder. The principal property is the San José de Ventanas, one of the famous antiguas of western Mexico.

Thirty Bandits Attacked the Compañía Minera de Los Reyes, a Mexico City concern, in the San Sebastian district of Jalisco a short time ago. Luis Terry, a Frenchman, manager for the company, and five Mexican employees fortified themselves in the reduction plant and held off the bandits, killing the leader and several of his men. When the bandits withdrew they went to the near-by camp of the Navidad Reduction & Mines Co., an American company, and looted the store there. Only limited work has been in progress for some time, and the value of the store stock did not exceed 600 pesos. The properties of the Navidad company are under option to California and Arizona interests, but because of disturbed conditions in Mexico no examination has yet been made.

The Camp of the Mezquital Mining Co., a Philadelphia company, in the Mezquital del Oro district of Zacatecas, was recently attacked by rebels, and later looted. The three foreigners at the camp attempted to hold off the rebels, but the latter were in such number that it was impossible to do so. None of the foreigners was harmed, but all were robbed of clothing and other possessions. A few days ago Dr. J. H. Spence and M. Minehan, local mining men, and T. F. M. Fitzgerald and F. W. Holler, respectively mine superintendent and mining engineer for the Tonopah-Belmont Development Co., of Tonopah, Nev., were held up and robbed by rebels while on the way to Guadalajara from the Bolaños district of Jalisco. The rebels took their arms and ammunition, and 130 pesos in bills and silver.

THE MINING NEWS

ALASKA

A STRIKE ON SOME TRIBUTARIES OF THE SUSHANNA RIVER has been made near the head of the White River. The diggings are reported to be rich in value, and a number of men are now on their way there.

RAINBOW—Twenty tons of concentrate from the 500 tons of ore milled during the winter at the Chena mill have been shipped to Tacoma.

FISHER LEASE (Fairbanks)—Brunelle & Co., who are working a large crew on the Niggerhead claim on lower Dome, are said to be hoisting rich dirt.

AMERICAN EAGLE (Fairbanks)—A test shipment of 10 tons of ore from the McCarty lease on the American Eagle claim was recently made to the Fursteneau mill. The ore milled at the rate of \$20 a ton.

MT. ANDREW—A recent examination of this property was made by representatives of the Granby Consolidated Mining & Smelting Co., with a view to purchase. The mine is located on Prince of Wales Island, and has been a good producer.

HOFFMAN BENCH FRACTION (Fairbanks)—Pay has been discovered by James Fallon and associates at this claim on Eva Creek; it is said to average about 85c. to the wheelbarrow. From the fact that the shaft drained several water-filled shafts farther up Eva Creek, it is thought to be on the continuation of the rich Eva paystreak.

HOT SPRINGS DISTRICT—It is thought that the output for 1912 will be exceeded by that of the present season. Many plants, large and small, are working. Howell & Cleveland are in good ground near the mouth of Miller Gulch. Bock, who did much prospecting by Keystone drill during the winter in the flats of Sullivan Creek, discovered a considerable area of pay dirt, which he is now engaged in mining.

TOTATLANIKA DISTRICT—It is planned to work the J. P. Sherman ground in this district by scraping and hydraulic methods. The ground is shallow, the depth to bedrock on the benches being only 6 ft. A ditch will be built to furnish water on the benches. The machinery and other supplies have been placed on the ground and the preliminary work is well under way.

MIZPAH (Fairbanks)—Thirty-five tons of ore taken out in prospecting the claim two years ago will be sacked for shipment to the Fursteneau mill at the head of Fairbanks Creek. Six tons milled at the time of prospecting returned \$90 to the ton; the present shipment is expected to mill about \$60. If the run proves satisfactory, a boiler and hoist will be installed and stoping commenced. The shaft is down 120 ft. and several hundred feet of tunnels have been driven.

FAIRBANKS DISTRICT—From the regularity with which clean-ups are arriving at the banks, it is freely predicted that the placer output of the camp will exceed the output for 1912. In spite of continued dry weather, only two creeks, upper Dome and upper Cleary, have reported any shortage of water. Here, however, operations are seriously hampered by the inability of the operators to obtain sufficient water for continuous sluicing. There is a slight shortage of labor, but this is not unusual in June and it is not expected to become serious.

CHATHAM MINING CO. (Fairbanks)—The interest of Joseph Henderson in 18 claims lying at the head of Chatham Creek, and embraced in the holdings of the Chatham Mining Co., has been purchased by St. Scrafford and Luther C. Hess. Wm. T. Burns, Hess and Scrafford are now the sole owners of the property. Much development work has been accomplished and a large amount of ore has been extracted. The four-stamp mill has been in continuous operation since September, 1912. Work will be continued under the direction of Mr. Nicholson, formerly connected with the Cliff mine, in the Valdez district.

CIRCLE DISTRICT—Hydraulic operations in the Circle district are suffering from a water famine. Barnette & Harrington on Mastodon, Berry & Lamb on Mammoth, and Berry on Eagle, are all forced to work only intermittently. Clark, on upper Mastodon, will soon have his hydraulic plant erected and ready for work. The Elmer dredge, on No. 10 Mastodon, is expected to start digging before July 1. There is little summer work among the smaller operators, as they find that drift mining in the comparatively shallow ground of the Circle district can be done to better advantage in winter when frost obviates the need of timber.

SPALDING (Fairbanks)—The latest clean-up, from 25 tons of ore taken from the 100-ft. level, gave \$1577, equivalent to \$63 a ton. This is the lowest grade of any ore that has been crushed for more than a year, and is said to have come from an unusually weak spot on the 100-ft. The mill is idle at present while the ore bins, holding about two weeks' run, are being filled. A shipment of lumber and other supplies has been made to the mine for the purpose of rebuilding the little mill of three 250-lb. stamps, which was destroyed by fire during the winter. Plenty of water is obtainable from the mine for the operation of this mill, and it will accordingly be placed near the collar of the shaft. It will be used to crush the high-grade ore, while the ore of lower grade will be hauled to the larger mill, which is located on Dome Creek, 2000 ft. from the mine.

RHOADS & HALL (Fairbanks)—Quartz mining through-

out the Fairbanks district has received new impetus because of recent developments in this, the leading lode mine of the camp. The vein was lost last fall through a fault occurring between the 70-ft. and the 140-ft. levels of the winze. Crosscuts were driven into both hanging and foot, and about June 20, the foot-wall crosscut encountered the vein 80 ft. from the winze. Development work is being rushed on this portion of the vein, which seems to be in a solid formation, entirely free from the numerous slips and faults that have made mining so difficult and expensive in other parts of the mine. The depth from the surface is about 300 ft., making it 100 ft. below the permanent water level. The ore is as rich as any that has been found in the mine; the vein is said to be slightly larger than in the upper levels, averaging about 18 in. in width. A new messhouse and new quarters for the men are under construction. As soon as these are completed the crew will be increased and work of sinking a new shaft will start. The shaft will be vertical and will be sunk at such an elevation that the ore can be trammed directly to the mill. L. B. Rhoads is manager.

ARIZONA

Cochise County

COMMONWEALTH EXTENSION (Pearce)—About 25 men are at work on the property, where development work is confined to the 360-ft. level. The company plans to erect a mill and cyanide plant in the near future.

MASCOT (Wilcox)—The Mascot Copper Co. has begun to haul its copper ore by auto trucks to the new bins, recently completed at Wilcox, the shipping point. The ore is delivered to the bins by chutes from a trestle. Pierce-Arrow trucks are used.

COPPER QUEEN (Bisbee)—A gas pocket was encountered in the Holbrook mine recently and several miners together with Roos Moon, the night foreman, and Emmett Finny, the assistant superintendent of the Holbrook, were overcome by the gas which rapidly filled the drift.

Gila County

MIAMI COPPER (Miami)—Work of installing the electric hoist at the Captain (No. 1) shaft is almost completed and the retimbering and widening of the shaft from the 220-ft. depth to the tramping level (420 ft.) is well under way. The Red Springs shaft also has been retimbered. At the mill the new crushing and screening equipment is being installed, and the grab bucket is rapidly transferring the stock pile near shaft No. 4 to the mill. The bucket with a force of two men to each of the two 8-hr. shifts is dumping more than 500 tons of ore into the bins daily. Later it will be used to clean up the last of the large stock pile that has almost been exhausted by dropping it into the mine through the ore chute that was formerly the No. 2 shaft.

Pima County

VULCAN (Tucson)—The Vulcan group of four patented claims in the vicinity of the San Xavier mine, has been bonded to Los Angeles people, who will continue to extract ore from the old glory hole.

OLIVE (Tucson)—Arrangements have been made to secure water from the San Xavier mine for operating the new concentrator. This, coupled with the opening up of new ore-bodies, has made possible the resumption of work in the camp.

Pinal County

MAMMOTH-COLLINS (Schulz)—Work has been commenced at the old Mammoth property, which recently changed hands. Engineer McBride ordered from El Paso recently a large pumping plant, compressor and drills which will be operated by electricity. A power line from the Ray Consolidated power plant at Hayden, is to be built at once. A new mill will probably be built at the mine.

CALUMET & ARIZONA (Superior)—The shaft is still making a fair amount of water, although not nearly so much as three weeks ago. White shaft men have been substituted for the Mexicans formerly employed and piston drills have replaced the lighter drills since the water was encountered. The shaft is now 500 ft. deep and during the past two weeks it has been cut at the rate of 25 ft. per week. Connection between the shaft and main tunnel has been established at a depth of 130 ft., the connecting drift being about 100 ft. in length. The transmission line is now working smoothly, running the two compressors evenly. The current from Winkelman, is stepped down from 4500 volts to 420, 240 and 110 for various uses of the plant.

Yavapai County

CORONADO (Congress)—A new mill has been purchased by the Wakota Development Co. to be installed at once.

ROUGH RIDER (Zonia)—The new hoist is on the ground and as soon as it is in working order the property will begin to ship.

Y-P (Senator)—The mill began to operate on full time on July 1. The 800-ft. tram line connecting the mine and plant is nearly finished.

COMMERCIAL (Prescott)—Exceptionally high-grade ore has been encountered in the north drift from the winze from

Garbirino Hill. Daily shipments have been increased to 50 tons.

ARKANSAS-ARIZONA (Jerome)—Good ore is being taken from the south drift of the 1400-ft. crosscut which lacks 25 ft. of being under the shaft. When this point is reached a station will be cut and sinking will be begun after a raise has been put through to connect with the shaft.

SUNDANCE (Senator)—After a short examination by W. E. Muse, representing the Farwell estate of Chicago, and Mr. Gaffney, its engineer, it has been decided to reopen the property. The mine will be unwatered first and cleaned out to permit of more elaborate examination. The property is equipped with a 10-stamp mill, some mining machinery and several substantial buildings. It adjoins the Senator mine.

Yuma County

ARIZONA SOUTHWESTERN (Copperville)—The annual meeting was held in Kingman last week. The old board of directors were reelected for the ensuing year.

NEW JERSEY (Chloride)—Large bodies of ore have been opened recently. Manager Mingle is in Los Angeles arranging for the necessary new hoisting and pumping equipment.

KINGMAN COPPER (Mineral Park)—The drilling outfit is on the ground at Mineral Park and drilling under the direction of a competent crew will be begun at once.

SWANSEA CONSOLIDATED (Bouse)—That work on a large scale will be resumed at the Swansea property is absolutely assured. A contract has been let for the continuation of No. 6 shaft for 1000 ft. Mr. George Mitchell, formerly president of the old company, has taken over the Bouse-Swansea R.R. and will supervise the operations. The regeneration of the Swansea Consolidated is due to M. Schutte, a banker from Holland, who visited that property recently.

TUMCO (Yuma)—The latest reports from the Tumco, better known as the Hedges mine, are that the property is now operating steadily. Of the old equipment 50 stamps have been dismantled, a new tube mill of 150 tons daily capacity has been installed, and the mill recently put in operation. Considerable money has been spent on the new pipe line and pumping plant. About 125 men are employed about the property and work is being carried on in all levels of the mine.

CALIFORNIA

Amador County

BUNKER HILL (Amador City)—The deepening of the shafts has progressed in the past two weeks at the rate of 4 ft. per day. It is expected to complete the sinking of the contemplated 400 ft. within 100 days. E. Hampton is superintendent.

SOUTH EUREKA (Sutter Creek)—It is reported that no dividends will be paid for the month of May owing to the large outlay for supplies, timbers and other materials and the preparation for placing in commission the Oneida mill. The South Eureka and the Oneida are both being put in excellent condition for extensive extraction.

Calaveras County

WATERMAN (Angels)—A new three-compartment shaft has been started and good progress is being made.

REINER (Altaville)—The two skips that were lodged in the shaft by being caught in the clutches have been taken out with the assistance of a diver.

Humboldt County

HORSE MOUNTAIN COPPER CO. (Eureka)—Copper concentrate is being hauled by wagon to Arcata on the Oregon & Eureka R.R. for shipment to the Tacoma smeltery. Arrangements are being made to employ auto trucks. Forty-five men are employed at the mine and mill. David Wilson is manager.

Inyo County

TUNGSTEN ORE of high grade is reported to have been discovered within a few miles of Jackass Springs and about 30 miles from Keeler, at the lower end of the Ubaheba Range. The discovery was made by Harris and Graham. Graham died while on the prospecting trip.

INYO CERRO GORDO (San José)—This is a new corporation organized to operate the Cerro Gordo mines, and to succeed the Four Metals Co. The directors of the Inyo Cerro Gordo Mining & Power Co. are: F. J. Hambly, President; Alexander Peers, Vice-President; A. L. Dornberger, Secretary-Treasurer; John E. Richards and Fred C. Ross, directors.

BLUE BELL (Darwin)—Cash Clark, of the Argus mine, has taken a purchase agreement on the Blue Bell, situated in Snow Cañon. Under the management of J. C. Cress, one of the owners, the mine is reported to have paid for development and to have some high-grade ore in place, chiefly gold, but containing some silver. The shaft is down 200 ft.; the tunnel is 175 ft. long and cuts the orebody 1000 ft. below the surface. The mine is equipped with a five-stamp mill, Wilfley concentrator and cyanide plant. About 250 tons of tailing left from early-day working will be cyanided. The ore recently developed carries only a small percentage of sulphides and the tailing will not pay for cyaniding. A new 30-stamp mill is contemplated.

Kern County

MOLYBDENITE is reported to have been discovered 2½ miles northeast of Randsburg. Eighteen claims have been located by J. Y. Anderson, E. E. Teagle, Manuel Rodgers and F. M. Myrick. The lode on which the first discovery was made, by Anderson, is said to be 30 ft. wide, to contain 5½% molybdenum, and to have been traced for more than two miles. It occurs on a contact of lime and schist.

Madera County

DAULTON—The installation of a 10-stamp mill is contemplated. The ore yields both gold and copper. The Daulton brothers are owners.

Mariposa County

HUNTERS VALLEY—It is reported that J. S. Covert has located quicksilver claims in the valley about 45 miles east of Modesto. It is said that the samples will average 3% in quicksilver. At the Daly mine 15 men are employed and teams are hauling ore to the Ruth Pierce mill. Mr. Sugarman of San Francisco, is manager. The old Blackemore mine is also being developed under Mr. Sugarman's management. The mill of the School mine is working on good ore. A shipment of ore from the George Dulcich property has been sent to the Selby reduction works.

Modoc County

HESS (Alturas)—The hoist has been installed and the skip track is down below the 100-ft. level. The engine that drives the mill has been shipped and as soon as it is installed the stamps will again drop. A recent clean-up is reported to have shown a good average value of ore.

LEIGHTON GOLD MINING CO (Highgrade)—This is a new organization which has purchased the Prudential, Eureka, Eureka Extension and Anniversary claims, which are said to be an extension of the Lucky Dutchman lease on the Yellow Jacket mine. T. E. Sturdevant, of Boulder, Colo., is president. E. C. Betts and S. E. Tisher, of Denver, are directors. The capital stock is \$500,000, and it is reported that one-half this amount has been paid in.

Nevada County

GOLDEN CENTER (Grass Valley)—The unwatering of the shaft to a depth of 150 ft. disclosed the fact that the first level had not caved. The 4x6-in. timbers used for car tracks in the mine nearly 50 years ago were found in fairly good preservation and in place.

LE DUC (Grass Valley)—The new buildings to take the place of those destroyed by fire have been constructed and the machinery, most of it new, has been erected in the mill, which is again in operation. The engine, blowers and other machinery for the underground work have been reinstalled and the long tunnel is being advanced.

Placer County

RALSTON—Diamond drilling is in progress to determine the location of the gravel channel.

BLACK CANON (Westville)—The reopening of this old mine was begun May 15. A new road will be built to connect with the Westville-Bald Mountain road. Electric power will be installed and a pole line built from Alta, a distance of 14 miles. The old steam plant will be employed to drive a sawmill for timber and lumber. The mine is equipped with a 20-stamp mill in good repair, which will be driven by two 25-hp. motors. The old shaft, 246 ft. deep, will be rebuilt, and a crosscut to the shaft at the mill level will be run for tramping the ore. A compressor has been ordered. A site has been cleared for the shaft and compressor houses. E. B. Quigley, manager, formerly superintendent of the Barton mine, is interested with Eastern men, and has taken a bond and lease.

Plumas County

NELSON POINT, on the middle fork of the Feather River, has been prospected and reported to be good dredging ground; it is stated that Lawrence Gardella, a dredge operator at Oroville, contemplates installing a dredge.

ONION VALLEY—The roads are opened and a number of miners are going into the district. The activity includes the Pilot Peak range, the Blue Nose country and Nelson, Poormans, Hopkins, Dixon, Winters and Washington Creeks. It is said that this will be the best summer in Onion Valley for 10 years. The general geological formation is similar to that of Cripple Creek, Colo. About two years ago high-grade arsenical ores were found in the Oversight mine near Minerva Bar. The outfitting points for the district are Gibsonsville and Johnsville. It is not expected that there will be a rush of miners but the country is well prospected.

Shasta County

BALAKLALA (Redding)—The old brick stack has been razed by dynamite. The structure was 275 ft. high and cost \$34,700 to build. After the plant was forced to close, the stack became unsafe and in view of a contemplated resumption of operations it was found advisable to tear it down. The work was done by 96 shots disposed over ¾ of the circumference and fired simultaneously by electricity.

Siskiyou County

OSGOOD (Yreka)—This property and adjoining claims have been bonded to Oregon and Ohio men. Frank Rose, of Talen, Ore., is manager. The company has also bought the Nigger Boy mine on Ash Creek.

Tuolumne County

BLACK OAK (Soulsbyville)—A suit involving the purchase of this gold property was continued to July 17, to be argued before the Superior Court in Stockton. At the time for the purchase Charles A. Knox, of Berkeley, who held the option, asked for an extension of time. Thomas A. Fisher demanded compound interest at a high rate. The deal was about to fall through when the interest was reduced to 7% per annum. On Apr. 6, 1913, Mr. Knox made his payment with the interest as agreed upon. Fisher refused to accept the payment upon the terms. The difference in interest amounts to \$84,000.

Yuba County

RED RAVEN (Dobbins)—The Elk Gold Mining & Milling Co. has been declared by the Supreme Court to be entitled to this property, in recent litigation with the Mother Lode Mining Co. Development of the mine by shaft to a depth of 35 ft. and by tunnel has proved the property to be a valuable prospect. The shaft will be deepened to 400 ft. before drifting is done. The present owner is now installing a gasoline hoist and pumps and an electric-lighting plant. The mine will be operated wholly by electricity within a short time. The company is a close corporation. Otto C. Wullweber, J. Schultz and B. A. Kip, of Sheboygan, Wis., are the principal owners. George A. Bruce, of Marysville, is manager.

COLORADO**Clear Creek County**

TWO KINGS—The new compressor plant is in operation at this property, in Hukill Gulch. The bottom of the shaft is in a 14-in. vein of pay ore. The shaft will be sunk 100 ft. below the tunnel level on the Centennial vein and drifts will be advanced on the vein. A shipment of \$40 ore has been made.

SPORTING TIMES (Georgetown)—After a period of idleness extending over two years, the property is to be reopened and operated. The underground workings will be overhauled, caves will be removed and tunnels retimbered where necessary. The company plans to drift on the vein intersected by the east crosscut driven from the Moore Adit and to undertake other development.

BLUE RIDGE (Lawson)—Active development is under way. A raise is being made on the vein from the upper level and drifting is in progress east and west from the bottom of the winze. A 4-ft. vein of concentrating ore is being developed, containing an 8-in. streak of smelting ore reported to assay \$70 in gold, silver and lead. The low-grade ore is treated in the company's mill, and both the smelting ore and concentrate are shipped to the Chamberlain-Dillingham Ore Co. at Idaho Springs.

Dolores County

RICO-WELLINGTON (Rico)—The last monthly statement shows receipts of \$14,200 for zinc concentrate, \$12,800 for lead concentrate, \$6335 for crude copper ore, and \$3000 for crude lead ore shipped. There is also about \$12,000 in ore in transit. During the month of May a \$12,000 overdraft was taken care of and the debt to the Knight syndicate cut down from \$99,500 to \$75,400. This is the entire indebtedness of the company. The net smelter returns amount to approximately \$30,000 a month. The mill is handling 50 tons of ore daily and turning out 18 cars of lead concentrate, 24 cars of zinc and 20 cars of crude copper and lead ore per month.

Teller County

PORTLAND (Independence)—It is now stated that 200 tons capacity will be added to the Portland mill, which will bring the total to 700 tons.

EL PASO (Cripple Creek)—In about a month work will be commenced at the Deep Drainage Tunnel level, which is 1328 ft. below the surface. This will give a large amount of stopping ground on orebodies already developed in levels above. The shaft which was raised from the tunnel is now being timbered.

AMERICAN EAGLE—Some ore valued at nearly \$1 per pound, was mined on this property, of the Stratton Estate by Baker & Matheson, lessees, and 14 sacks were shipped by rail to the Portland Mill, Colorado Springs. En route, however, 8 sacks valued at \$1000, were stolen from the sealed car. It is said that arrests will soon be made.

MORGAN & MILLER LEASE SUIT—This suit in which Judge John Sheaffer entered a decree against the Ajax Gold Mining Co. compelling specific performance of a verbal lease as well as granting an injunction preventing the company from mining any of the ore opened by the leasers has been amicably settled out of court.

EL ORO—An important discovery is reported, an ore-shoot 4 ft. in width having been opened and already driven on for 20 ft. The coarse ore is said to run about 2 oz. gold to the ton, while the screenings will go much higher. It was cut on the 350-ft. level of the main shaft and is believed to be the extension of the main Eclipse oreshoot which produced many thousand dollars worth of ore some years ago. Four carloads will be shipped at once.

ANCHORIA-LELAND (Cripple Creek)—Gold Hill is now to be developed at depth, that is to say, below the 1000-ft. point, where a barren zone has been proved to exist. It is believed rich ore will be reached, as has been done in other mines in the district where the same conditions exist. The plan now decided on is to sink the 1000-ft. shaft of the Anchoria-Leland to the 1300-ft. point, and from there to develop the Moon-Anchor, Conundrum and other mines of the Gold Hill section. C. W. Howbert is at the head of the enterprise.

San Juan Region

TURNER GROUP—These 17 carnotite claims, in the Long Park district, near Nucla, in southwestern Colorado, are sold to O. B. Willmarth for the Colorado Carnotite Co. The group is now being placed in productive form.

COLORADO MINING CORPORATION—At Russell Siding, Huerfano County, uranium and vanadium deposits are being developed. The ore is exposed on the surface for 4500 ft., is 1 to 7 ft. in width, and yields from 2.63 to 2.65% vanadium oxide. Ores of similar character have been located near La Veta.

RAWLEY (Bonanza)—About a year ago the 6000-ft. drainage tunnel was completed, the mine being shut down in 1912 to allow of the unwatering of the workings, which it was estimated would take about a year. This is now accomplished, and a force of about 40 men will be put to work and production will be resumed. It is one of the biggest low-grade mines in the state and carries gold, silver and copper in paying quantities. The mine is owned by the Rawley Mining Co., of New York. W. C. Russell is manager.

IDAHO**Coeur d'Alene**

LUCKY FOUR (Murray)—This company has been organized under the laws of Oregon with \$50,000 capital, 1,000,000 shares, to operate a group of claims in the Summit district.

GUELPH (Burke)—Oscar H. Hershey, geologist for the Bunker Hill & Sullivan, has just completed an inspection of

the Guelph and reports highly encouraging indications. The company will develop a vein pointed out by Mr. Hershey as well as the vein on which work has been conducted heretofore.

MICHIGAN**Copper**

STRIKE—All the Michigan copper miners except those in the Hancock and Oneco have struck, July 23, as we go to press.

LA SALLE (Calumet)—The stock pile has been about cleaned up and rock shipments henceforth will come direct from the underground openings. About 200 tons are being shipped to the mill daily, which will be increased as fast as the necessary additional labor can be secured.

FRANKLIN (Franklin Mine)—This company is driving a crosscut from the 32nd level, to cut the conglomerate lode, formerly mined at this property to a depth of about 2300 ft. The opening is made to ascertain the conditions of the formation at the additional depth of 900 ft. The formation parallels the Pewabic lode at a distance of about 450 feet.

MASS (Mass)—The operating force at this property is being increased as fast as possible, but the labor conditions throughout the district are in a very unsettled state and the smaller outlying mines are particularly handicapped in securing underground labor. Both B and C shafts are operating one shift, but as soon as the additional labor can be secured, two shifts will be resumed. Shipments of about 400 tons are being made to the company's mill daily.

HANCOCK (Hancock)—Rock shipments of 50-car lots are made about every two weeks to the Lake Milling, Smelting & Refining Co.'s plant. The rock is the product of development work. Operations are handicapped by the scarcity of underground labor throughout the district. Developments continue satisfactory and the work in the lower levels is showing the formation to have many characteristics in common with the Pewabic lode as opened in the lower workings of the Quincy.

Iron

A SCORE OF DWELLING HOUSES WILL BE MOVED between the Maas and Negaunee mines by the Cleveland-Cliffs company preparatory to caving the ground.

CORRIGAN, MCKINNEY & CO.—The company is removing the mine machinery from its Crystal Falls mine where operations were recently abandoned.

JUDSON (Crystal Falls)—At this new mine of the Long-year interests in the Mastodon section, supplies and machinery are being received preparatory to starting development work. Dwellings are being erected for the company officials and employees.

IRON RIVER ORE CO. (Iron River)—A meeting of directors of this local company was recently held and an assessment of 1c. per share was levied. The company's mine west of Iron River is at present filled with water, and it is planned to pump it out.

BALKAN (Crystal Falls)—At this property of Pickands, Mather & Co. in the Mastodon section, operations have been started preparatory to changing the course of Mastodon Creek to a channel farther from the new mine. A small exploratory shaft is being sunk, but nothing has yet been done on the stripping.

PURCELL (Iron River)—The Purcell mine, operated by the McGreevey Steel Co., made its first shipment of ore a few days ago and it is the expectation of the management that regular shipments will be made until the close of navigation in the fall. The property was opened up in a hurry, as the task of putting down the shaft was not commenced until the middle of last December. It is 235 ft. deep and drifting was started at a depth of 220 feet.

CLEVELAND-CLIFFS IRON CO. (Iron River)—It is now a known fact that this company has located a body of ore on the lands on the north range, where drilling has been in progress for some time past. Just when the property will be opened up has not been announced. John Bush, formerly superintendent of the Ashland mine on the Gogebic range, is looking after the company's interests in that field.

PICKANDS, MATHER & CO. (Crystal Falls)—A contract has been let for stripping the territory recently leased from the Nevada Land Co., where it is known that a large body of ore exists. The overburden is not deep in some places, while in one spot it extends to a depth of 100 ft. and the task of getting ready to take out the ore will be a large one. The work will be in charge of William Perkins, of Norway.

ATHENS (Negaunee)—The work of shaft sinking at this property was commenced a few days ago and the work will be rushed with all possible speed, as the job is a large one and it will require some time to complete it. This property was drilled several years ago and the ore was reached at a depth below 2000 ft., the drills still being in ore when the holes caved at 2280 ft. The shaft will be lined with concrete and the entire equipment will be of the most modern and substantial design. The shaft will be sunk 2000 ft., making it one of the deepest on the Marquette range. Contracts have been let to J. S. Wahlman, of Ishpeming, for the erection of engine-house, shop building, and combination office and warehouse; only the engine-house will be built this year. The recent assessment of \$565,000 on this property indicates a large ore-body.

OLIVER IRON MINING CO.—This company has suspended drilling operations on the Michigan Land & Iron Co.'s lands in the Witch Lake district but no announcement has been made as to the results. The exploratory work covered a large area. Two of the drills operated in the Fence River country, two near Trout Lake and one near Witch Lake. A great many holes were drilled, some of which were put down to considerable depth. The fact that the company drilled in the region for over two years would lead to the belief that the work was not entirely barren of results.

MINNESOTA

ALLEN (Virginia)—This, the only new producer in the Virginia district for this season, is an underground property. It will not make heavy shipments this year.

CUYUNA IRON & MANGANESE CO. (Crosby)—This company is drilling its twentieth hole on Section 10, 46-29, and is in iron and manganese. Ore has been encountered in each of the 20 holes drilled.

ROGERS, BROWN ORE CO. (Crosby)—Up to Friday, July 18, the three shafts of this company (Armour No. 1, Armour No. 2 and Kennedy) have sent to dock 240,000 tons. This is the heaviest tonnage from one producer that has yet been obtained on the Cuyuna range.

CUYUNA-DULUTH IRON CO. (Ironton) has announced Aug. 3 as the date on which the first shipment will be made. This is a stock company with shares widely scattered. The Duluth shareholders in the company have arranged to run an excursion to Ironton on the shipping date in honor of the event.

WHITESIDE (Buhl)—The drying plant which the She-nango Furnace company is building will be the largest and best of the kind in the Lake Superior region. It will be equipped to eliminate the combined moisture as well as the ordinary moisture. The former requires something like 600°, whereas 212° serves for the latter.

HULL-RUST (Hibbing)—Mining operations are being pushed with a vigor at this Steel Corporation property, as is the case with other large open-pit properties in the district. The shipments from the mine are averaging better than 700 cars a day. There are thirteen steam shovels in operation in the one pit and two forces are worked. The Hull-Rust, the largest iron mine in the world, will undoubtedly establish a new record for production this season.

PITTSBURGH STEEL ORE CO. (Riverton)—The company has added another giant, with a 4-in. nozzle and 100 lb. head. The hydraulic operation being a unique one in the iron country, is watched with interest. It is doubtful whether there is another property on the whole Cuyuna range where conditions are such as to permit the hydraulic-ing the surface from the orebody. The land is on the shore of the Mississippi River, and the surface is only 45 ft. deep, which is shallow for the Cuyuna; the dumping ground is low and of sufficient slope to carry the sand and water mixture a considerable distance by gravity. Developments of the process will be followed with interest.

CUYUNA RANGE MINING TIMBER—The forthcoming report of the Minnesota State Forester will show that the Cuyuna Range mines used approximately \$70,000 worth of mining timber in 1912. This figure includes 3500 cords of lagging (jack pine, tamarack, cedar and spruce) at \$5.50 per cord, 1,050,000 lin.ft. of mining timber (jack pine, tamarack, spruce, white pine, norway pine, birch, ash and maple) at 4½c. per lin.ft., and about 10,000 short ties (tamarack and spruce) at 10c. each. The timber situation on the Range is becoming serious. The surface is largely cut-over pine land, denuded 20 or 30 years ago, while the second growth consists largely of jack pine, which to most mine operators is undesirable.

SPRUCE (Eveleth)—Five men were imprisoned in this mine for 31 hr. last week, when a cloudburst caused a number of the levels to become partly filled with water. There were 250 men in the mine when the water started to come in but most of them were employed on the upper levels and had plenty of time to seek safety. Five were unable to reach the shaft so they sought refuge in one of the drifts and banked rock in front of them to keep out the rushing water, but it reached a level of 5 ft. and the men stood up to their necks in it until rescued. A drift was blasted through from the timber shaft by the rescuers and all of the men were taken out alive, although they stated that they could not have endured the hardship many hours longer. The mine is the property of the Steel Corporation. The damage to the property is estimated at \$100,000.

MAHONING (Hibbing)—This famous mine was for years the world's greatest openpit producer of iron ore, but now in that particular ranks second to its neighbor, the Hull-Rust. This year it is doing nearly double the work it has usually carried on during the summer season. Both the Steel Corporation and so called independent interests are associated in the control and operation of the property. While the season's output of the Mahoning will be about normal, at approximately 1,500,000 tons, much more stripping than usual is being accomplished. Three steam shovels are engaged in removing overburden during the daytime, and two are employed in that work at night. Usually of late years only one shovel has been assigned to operations of this character.

MONTANA

Broadwater County

OHIO-KEATING (Radersburg)—A good body of ore was cut a short time ago by a crosscut on the 500-ft. level at this property in the Radersburg mining district. The shoot has been drifted on for a length of 70 ft., the ore averaging over \$25 in gold. Shipments of ore are being made daily by wagon.

DOBLER (Clasoll)—Preparations are being made to resume operations soon. Some time ago shaft sinking was started, but in the swampy ground, a large amount of water was encountered, so that work was suspended. A large pumping plant is being installed, and as soon as this is completed, sinking will begin again.

Butte District

MOUNTAIN VIEW—A six-drill compressor is being installed on the property 40 miles south of Libby. The main tunnel is in 1400 ft. and will be continued until it crosscuts the four ore veins on the claims.

TUOLUMNE—A special meeting of the stockholders of the Tuolumne Copper Co. will be held in Butte, Aug. 18, to vote on a measure to increase the capital stock from 800,000 shares to 1,500,000 shares, the purpose of the increase being to acquire new properties. It has been announced that the

next regular dividend will not be declared at the usual time. On the 2200-ft. level the East drift is now in 6 ft. of ore averaging 6% copper and 12 oz. of silver per ton. A considerable tonnage of ore has been blocked out by this drift.

BUTTE AND SUPERIOR—The results for the last ten days of June again showed an improvement over anything previously recorded, if reports can be credited. During this period the company treated daily an average of 588 tons, with a recovery of 92.69% and with concentrates averaging 49.09%. For the entire month the company produced 6,713,881 lb., with an average recovery of 90.25%, and with concentrates averaging 49.10%. Considering that it was only three months ago that the recovery was less than 80% and that the concentrates were running less than 46%, this performance is most gratifying in every way.

Deer Lodge County

SOUTHERN CROSS (Cable)—About 25 carloads of ore are being shipped weekly from this mine of the Anaconda company in the Georgetown district. A shoot of ore, 20 ft. in width, was recently opened by a crosscut on the 475-ft. level. A tunnel is being driven from a point near the railroad to connect with the shaft at the 75-ft. level in order to facilitate the handling of ore and to afford an inlet for timber and supplies, thus doing away with an uphill haul to the collar of the shaft.

Granite County

ROYAL BASIN (Princeton)—The final payment of \$25,000 was made July 1 on the property operated by the Royal Basin Mining & Milling Co. A tunnel is being driven which will, when completed, tap the vein at a depth of 800 ft. On No. 2 level a crosscut driven in new territory west of the old workings, recently opened a good body of copper ore.

PURITAN (Phillipsburg)—James A. Murray, of Butte, owner of this mine, has begun work preliminary to operating the property, which has been idle for many years. The mine is rich in native silver, much of the ore running between 200 and 300 oz. It was closed when the slump in the price of silver came. The shaft is being retimbered to water level, after which the water will be pumped out and development work begun.

Jefferson County

RUBY (Basin)—Recently one of the richest strikes of gold ore made in Montana in years was made at this property in the Helena district about 20 miles northeast of Butte. Lessees operating the mine drove a crosscut from the tunnel, striking the ore at less than 100 ft., the shoot being only a few inches wide, but running into the thousands of dollars to the ton in gold.

NEVADA

Comstock Lode

K. & R. PROPERTY (Ludwig)—This property, situated 1½ miles northeast of the Nevada-Douglas mine, is now a regular shipper. A 12- to 15-ft. vein, with a high-grade streak of cuprite, was recently cut in the lower tunnel.

YERINGTON MOUNTAIN (Yerington)—This property, situated several miles east of Yerington, made its initial shipment to the Thompson smelting works recently. Development has been in progress for a year, and a large tonnage of ore is now on the dump and blocked out in the mine. A spur was recently built from the Southern Pacific to the mine.

Elko County

Alpha (Jarbridge)—A new mill has been ordered from Allis-Chalmers. Roads are being built to the millsite. A new boarding house will be erected and operated. The mine is operated by the Elko Mining Co. organized by Honore Palmer. John A. Jess is in charge of operations.

Esmeralda County

INDIAN QUEEN (Benton, Calif.)—Joseph L. Bley principal owner of the Tip Top mine is reported to have taken a purchase option on the Indian Queen. This mine is said to have a large production to its credit. In recent years it has not been operated regularly.

Humboldt County

SNOWSTORM GROUP (Rochester)—A 4-ft. vein has been discovered which assays \$22 per ton.

RYE PATCH (Rochester)—The dumps have been leased and a cyanide plant to treat them will be erected. It is estimated that there are 50,000 tons of ore assaying 5 to 20 oz. silver.

NORTH OF ROCHESTER, about four miles, and south of the Rye Patch mine more silver locations have been made. This ground was originally located four years ago, before the Rochester boom.

DREAM (Rochester)—A discovery of good-grade silver ore on this property, situated in Fisher Cañon, 1½ miles southeast of Rochester, has recently been made. The ore resembles the better grade from Nenzel Hill.

ELKO PRINCE (Gold Circle)—The report of the sale of this property to New York capitalists has been confirmed. The first payment, of \$100,000, has been made. The new company plans to erect a mill of such capacity and type as to make the custom milling of the low-grade ores of the district, as well as the better grade of ores of the Elko-Prince, possible. It is reported that the company will erect a power plant on a fork of the Little Humboldt.

Lyon County

GILBERT MINE (Silver City)—This property is now being worked by lessees.

NEVADA-WASHINGTON (Yerington)—Sinking has been resumed and a good grade of ore is being taken out.

BLUE JAY (Yerington)—A gasoline hoist has been installed. The retimbering of the shaft is progressing steadily. The 200-ft. and 400-ft. levels will be driven to cut the ore-shoot opened on the 100-ft. level.

YERINGTON MOUNTAIN (Yerington)—The shaft which is being sunk to connect No. 3 tunnel with No. 4 tunnel is now down 600 ft. Regular shipments are now being made, the ore coming entirely from development.

EMPIRE-NEVADA (Yerington)—A crosscut at water-level is now being driven from the shaft toward the orebodies exposed on the surface. Lessees are now making shipments of ore in addition to the regular shipments by the company.

Mineral County

TIP TOP (Sunland)—The material is on the ground for the construction of a 40-ton mill. The mine is situated on White Mountain summit and has been well developed. Thorndyke, McMill and Bley are the owners.

LUCKY BOY (Hawthorne)—A vein varying from three to seven ft. in width and carrying ruby silver and gray copper was cut in the tunnel. The discovery was made at a point 2300 ft. from the portal and at a depth of 175 ft. from the surface.

CONSOLIDATED MINING CO. (Aurora)—The drainage tunnel is now in 1500 ft., and will be driven 3200 ft. farther to connect with the Durand shaft. The tunnel is being driven on contract. The crosscut to the Humboldt shaft is in 1700 ft. A distance of 200 ft. more must be driven to cut the vein, which has been developed to a depth of 420 ft.

CINNABAR STRIKE—Samples from the cinnabar strike east of Mina have assayed as high as 7% mercury. A second discovery has been made two miles east of the original location, and sinking is now in progress. These two locations, which include about 500 acres, are now being surveyed.

White Pine

BUTE & ELY—The Heilbronner Co. in opposing the Coppermies merger points out that the Butte-Ely stockholders, who made the exchange, are paying \$3.12½ in cash and quick assets for stock offered at \$3 on the eastern exchanges, without taking any note of the value of the property itself.

NORTH CAROLINA

Mecklenburg County

NORTH CAROLINA PARTRIDGE SMELTING CO.—This company, of Charlotte, has completed its Partridge hot-blast smelting plant and is receiving ore.

Montgomery County

A SUPPOSED DISCOVERY OF TIN has been made near Mount Glead.

NEW WORK HAS BEEN STARTED on properties southwest of the Iola mine.

TALC PROPERTIES—Work is active at the three mines on Deep River.

COGGINS MINE—This property in the northern part of the county has been sold and it is reported that work has been commenced.

REYNOLDS MINE—This has been leased, with option of purchase, to D. C. Stainback. A small high-grade vein was discovered at this place three years ago and the property was taken over by M. L. Jones, who developed the Iola mine. Jones sunk a shaft on the high-grade vein and did a little other prospecting. Afterward a vein 6 or 7 ft. in width, but of low grade, was uncovered. Mr. Stainback will explore both veins.

UWARRA (Candor)—Sinking has commenced in the main shaft at 300 ft. A station will be cut at the 400 level and the shaft continued indefinitely. For some time there has been a boundary dispute between the Iola and Uwarra mines, the latter contending that underground works of the Iola had entered its ground. The parties have agreed upon a survey to be made by their respective engineers, with the aid of a disinterested outsider.

Randolph County

ASHBORO COPPER MINE (Ashboro)—The property is again in operation, developing and shipping some ore.

Union County

COLLOSSUS MINE (Waxhaw)—A cyanide plant is being constructed by the Mecklenburg Iron Works, of Charlotte, for this property, otherwise known as the Howie mine.

SOUTH DAKOTA

GOLDEN REWARD (Deadwood)—The leasing system is proving successful here after having been followed for about a year. There are at the present time 44 leasers at work at various points, and a large proportion of the mill supply is produced by them. Some of the leases are yielding smelting grades of ore as well, and the work is responsible for a prosperity in the Bald Mountain district almost equal to the boom days of the camp.

CUMBERLAND—Differences among the stockholders have been adjusted and the following directors elected: F. C. Crocker, president; Jackson Crocker, vice-president; J. W. Fowler, Jr., secretary-treasurer; Alex Madill and F. L. Livingston. The warring interests have had a long siege in the courts, but now that peace again reigns it is proposed to resume work. The property has in the past been a heavy producer, and is equipped with hoist, compressor and a small stamp mill.

HOMESTAKE (Lead)—Twenty stamps have been added to the equipment, making a total of 1020 stamps now dropping. Production is up to the normal, and for the first half of the present year from January to June inclusive, \$936,000 has been paid in dividends. The present monthly dividend, since the increase in capitalization, is \$163,254. In common with many securities on the New York exchange, Homestake has settled to a point where it is an attractive investment, and local people are buying it when they can get it around \$100 per share.

ELLIPTIC—A crew of men under the management of F. S. Stratton has unwatered the 700-ft. shaft and installed a diamond drill in the bottom. Former drilling is stated to have exposed at a depth of 600 ft. below the shaft bottom, a body of remarkably rich free-gold ore. Mr. Stratton and associates are seeking confirmation of these results, and

should they be able to secure anything similar, will continue the shaft and develop thoroughly. A great deal of interest attaches to this work, as it is in a section outside of the recognized productive district, and a success will mean the stimulation of prospecting over a wide territory.

TITANIC—Cleaning out the old shaft, enlarging it to two compartments and timbering with substantial square sets, is rapidly going forward. The old shaft is a little over 100 ft. deep, and is repaired and enlarged nearly to the bottom. In addition to sinking to the 300-ft. point, the company will crosscut from each 100-ft. level. The work is being done on the Carbonate claim of the Iron Hill company, about 200 ft. west of and 50 ft. lower than the mouth of the Iron Hill shaft. From the latter shaft during former operations a large quantity of ore was extracted. The work now being carried forward by the Titanic company is destined to explore a virgin territory along the main ore-making fault of the camp. A commodious shaft house has been erected and arrangements made for the installation of a power hoist as soon as it shall be needed.

CANADA

British Columbia

SURF INLET GOLD MINES, LTD.—W. S. Edwards, one of the largest shareholders in the Dome mine and Dome Extension at Porcupine, Ont., has bonded for \$850,000 the claims of this company on Princess Royal Island, 400 miles north of Vancouver. His engineer, J. Parsons, is making an examination of the property. The group comprises nine claims. It was bonded from the owner, E. A. Cleveland, three years ago by A. B. Clabon and Fred M. Wells, and by them vested in the present company. Several tunnels have been driven on quartz veins, and a raise in ore extends at one point, 260 ft. to the surface. The valuable mineral is gold, the ore being amenable to treatment by milling and cyaniding. The development work to date exceeds 2000 ft. The ore in sight is estimated at 125,000 tons valued at approximately \$1,000,000.

Ontario—Sudbury District

WHISTLE—The Canadian Nickel Co. is preparing this mine for production. The main orebody is above an adit level and is proved by drilling.

SHEPARD—This old mine, lying between the Kirkwood and the Blezard, has been unwatered by the Crown Reserve Co., of Cobalt and is now being examined. It has not been operated since the early '90s, at which time it shipped to New Jersey several cars of ore running 5% to 6% nickel.

MORGAN TOWNSHIP—A Sudbury syndicate is developing an outcrop in the township of Morgan on the North range east of the Levack properties. This outcrop was located by Thomas A. Edison's expedition about 1900 and was later relinquished. Henry Ranger is in charge of the work.

KIRKWOOD—The Mond Nickel Co. is said to have taken a contract to operate this property owned by William McVittie of Sudbury on a royalty basis. The mine lies about a mile east of the Garson mine, operated by the Mond company and is partly developed and drilled. The ore is in the foot wall and is good grade. A new shaft house and equipment are being installed.

MURRAY—At this mine, owned by the Canadian Nickel Co., successor to the Dominion Nickel-Copper Co., a shaft is being sunk near the old smelting plant site to open up the orebody recently developed by drilling. The company has cleared a new site for a plant near the mine, having abandoned the one selected last year, but no work or contracts for its erection have yet been concluded.

WORTHINGTON—The Mond Nickel Co., which once had an option on this property, but relinquished it after drilling, has purchased the mine from the McIntire estate of Montreal and will begin operations at once, at the same time carrying on explorations by drilling. The same owners had the Blezard mine and the Mond company is reported to have taken a contract to operate this on a royalty basis.

MOUNT NICKEL—The Nickel Alloys Co. of New York, which drilled this property in 1911, has suspended work until matters in litigation with the former owner, B. Howard Coffin, of Boston, are settled. Recently two attempts to renew drilling have been made by parties claiming control from the Coffin interests, but in each case they have been stopped by court order. The mine is reported to have drilled several hundred thousand tons of ore.

MEXICO

Chihuahua

BATOPILAS (Batopilas)—We are informed by the New York office of the Batopilas Mining Co. that its property is in continuous operation and that the June bullion product will soon be shipped via the West Coast Route, as it is reported that the road is about to reopen for traffic.

Sonora

WEST COAST SMELTING & REFINING CO.—The company is planning to construct an automobile road from its property 51 miles northwest of Cabo to the Gulf of California. As soon as conditions improve, the new smelting plant recently designed by Ricketts & Banks will be built.

TIGRE (Yzabel)—Operations for June produced \$133,049 of which \$52,438 was profit. The stamps crushed 5619 tons and the cyanide plant treated 5275 tons of current tailing and 1971 tons of dump tailing. During the first half of 1913, \$117,750 worth of bonds were bought in and canceled, leaving outstanding bonds of \$99,050.

ASIA

Chosen

ORIENTAL CONSOLIDATED—During May the 240 stamps ran 26.2 days, crushed 26,107 tons, producing \$152,954, and giving a profit of \$59,567. The East Candlestick 10-stamp mill was hung up for a month because of labor shortage.

THE MARKET REPORT

METAL MARKETS

NEW YORK—July 23

The metal markets have been rather inclined to quiet and steadiness. There is so far no apparent inclination toward the revival of trade, except in copper.

Copper, Tin, Lead and Zinc

Copper—What was foreshadowed in our last report transpired immediately afterward. The price for electrolytic having been cut to the point where European buyers were interested, it developed that their interest was large and heavy transactions were effected on July 17 and 18 in which all of the agencies participated. The bulk of the business was done at 14c., delivered in Europe, or about 13.80c., New York. Most of the sales were for August-September shipment, but some contracts for October shipment were consummated. The producers having comparatively few orders on their books at first met the demand freely, but when it persisted they raised their prices, beginning on July 19. American consumers at first remained apathetic, but by July 21 they began to display some interest. Some million-pound transactions were consummated among them, but their buying has not yet become large or general, although it has been increasingly evident that they are short of supplies. On the other hand, the producers are maintaining their willingness to trade and have not marked up prices quite so rapidly as the daily newspapers have indicated. At the close large interests were still willing to do business at 14 3/4c., delivered, usual terms.

A considerable volume of business in Lake copper was done around 14.40c., New York. On some special brands 14.50c. was realized. The Lake producers have such a large accumulation of copper, far out of proportion to the electrolytic stock, that the miners' strike ought not to interfere with deliveries.

In the aggregate the business of the last week ran to many tens of millions of pounds, being the largest of any week for several months.

Electrolytic copper closes strong at 14.15@14.25c., while Lake is quoted at 14.25@14.50c. We quote casting copper nominally at 13.70@13.75c. as an average for the week.

The market for standard copper in London has been strong and active, and has advanced steadily with larger transactions than for some time past. On July 17 the market for spot was £63 5s. and for three months £63 8s. 9d.; on July 18, £63 13s. 9d. and £63 16s. 3d., respectively, and on July 23 it was over £1 higher, closing at £64 15s. for spot and £64 17s. 6d. for three months.

Base price of copper sheets is now 20c. per lb. for hot rolled and 21c. for cold rolled. Full extras are charged, and higher prices for small quantities. Copper wire is quoted at 15 1/2c. per lb., for carload lots at mill.

Exports of copper from New York for the week were 7335 long tons. Our special correspondent gives the exports from Baltimore at 2322 tons for the week.

Visible Stocks of Copper in Europe on July 15 are reported as follows: Great Britain, 18,670; France, 3730; Rotterdam, 4300; Hamburg, 1830; Bremen, 1810; total, 30,340 long tons, or 67,961,600 lb., being 1760 tons less than the June 30 report. In addition to the stocks above 2080 tons are reported afloat from Chile and 4850 from Australia, making up a total of 37,270 tons.

Tin—The excitement which had prevailed in the London market has subsided. The tone has become strong and prices have advanced from day to day in an orderly manner. Transactions were comparatively small. Sellers in this market were rather reluctant to enter into large commitments, and were almost daily asking a slight premium over importation price. Fair purchases for future delivery by consumers were reported. The market closes at a slight recession from the top at £188 15s. for spot and the same for three months, and about 41 1/2c. per lb. for August tin in New York.

Lead—An active business was done in the early part of the week at rather better prices, St. Louis basis. We quote New York at 4.32 1/2@4.35c., and St. Louis at 4.20@4.22 1/2 cents.

The market for Spanish lead continues strong and has advanced to £20 10s.; English lead 10s. higher.

Spelter—The market is a shade firmer and St. Louis is quoted 5.05@5.15c.; New York, 5.20@5.30 cents.

The market abroad is also firmer, good ordinaries being quoted £20 15s.; specials, £21 10s. per ton.

The base price of zinc sheets was advanced 1/4c. on July 23, and is now \$7.25 per 100 lb., f.o.b. Peru, Ill., less 8% discount.

Imports and Exports in Great Britain of metals other than iron and steel, are reported for the five months ended May 31, as follows, in long tons, except quicksilver, which is in pounds:

	Imports		Exports	
	1912	1913	1912	1913
Copper.....	50,389	58,905	22,859	30,681
Tin.....	18,879	19,277	23,321	18,022
Lead.....	91,221	91,417	21,937	26,817
Zinc.....	57,053	59,873	3,733	3,973
Quicksilver, lb.....	2,384,648	2,162,062	939,645	1,115,181
Minor metals.....	2,956	3,560	11,484	13,921
Ores, etc.:				
Tin ore.....	13,019	13,951	.....	.....
Pyrites.....	388,043	368,837	.....	.....

DAILY PRICES OF METALS

NEW YORK

July	Sterling Exchange	Silver	Copper		Tin	Lead		Zinc	
			Lake, Cts. per lb.	Electrolytic, Cts. per lb.	Cts. per lb.	New York, Cts. per lb.	St. Louis, Cts. per lb.	New York, Cts. per lb.	St. Louis, Cts. per lb.
17	4.8640	58 1/2	@14 1/4	@13.75	39 1/2	@4.32	4.20	5.20	5.05
18	4.8650	59 1/2	@14 1/4	@13.75	39 1/2	@4.32	4.20	5.20	5.05
19	4.8665	59 1/2	@14 1/4	@13.85	39 1/2	@4.35	@4.22	@5.30	@5.15
21	4.8665	58 1/2	@14 1/4	@14.00	40 1/2	@4.35	@4.22	@5.30	@5.15
22	4.8665	58 1/2	@14 1/4	@14.05	41 1/2	@4.35	@4.22	@5.30	@5.15
23	4.8675	58 1/2	@14 1/4	@14.15	41 1/2	@4.35	@4.22	@5.30	@5.15

The quotations herein given are our appraisal of the market for copper, lead spelter and tin based on wholesale contracts with consumers without distinction as to deliveries; and represent, to the best of our judgement, the bulk of the transactions, reduced to basis of New York, cash, except where St. Louis is specified as the basing point. The quotations for electrolytic copper are for cakes, ingots and wirebars. The price of electrolytic cathodes is usually 0.05 to 0.10c. below that of electrolytic. We quote casting copper at 0.15c. below the price for electrolytic. The quotations for lead represent wholesale transactions in open market for good ordinary brands, both desilverized and non-desilverized; the specially refined corroding lead commands a premium. The quotations on spelter are for ordinary Western brands; special brands command a premium. Silver quotations are in cents per troy ounce of fine silver.

LONDON

July	Silver	Copper			Tin		Lead, Spanish	Zinc, Ordinaries
		Spot	3 Mos	Best Sel'td	Spot	3 Mos		
17	27 1/8	63 1/4	63 1/8	68	181 1/2	182 1/2	20	20 1/2
18	27 1/4	63 1/4	63 1/4	68 1/2	182	182 1/2	20	20 1/2
19	27 1/4	.....	.....	.....	.....	.....	.....	.....
21	27 1/8	63 1/4	64 1/8	69	183 1/2	184 1/2	20 1/2	20 1/2
22	27 1/8	64 1/8	64 1/8	69 1/2	187 1/2	187 1/2	20 1/2	20 1/2
23	27 1/4	64 1/2	64 1/2	69 1/2	188 1/2	188 1/2	20 1/2	20 1/2

The above table gives the closing quotations on London Metal Exchange. All prices are in pounds sterling per ton of 2240 lb., except silver which is in pence per troy ounce of sterling silver, 0.925 fine. Copper quotations are for standard copper, spot and three months, and for best selected, price for the latter being subject to 3 per cent. discount. For convenience in comparison of London prices, in pounds sterling per 2240 lb., with American prices in cents per pound the following approximate ratios are given: £10 = 2.17c.; £15 = 3.26c. = £25 = 5.44c.; £70 = 15.22c. Variations, £1 = 0.21 1/4c.

Other Metals

Aluminum—The market has improved and sales have been on a larger scale than for several weeks. Quotations are 23¼ @ 23¾ c. per lb. for No. 1 ingots, New York. Foreign aluminum brings about 19½ c. in bond.

Antimony—The market has been quiet, with small sales only. The prices are a little off, 8.40 @ 8.50 c. per lb. being quoted for Cookson's; 8 @ 8.10 c. for Hallett's; 7.45 @ 7.55 c. for Hungarian, Chinese and other outside brands.

Quicksilver—The market has been rather quiet, but generally steady, and there is no change in prices. The New York quotation is \$40 per flask of 75 lb., with 60 c. per lb. asked for small orders. San Francisco, \$39.50 for domestic and \$37 for export orders. London, £7 10s. per flask, with £7 2s. 6d. asked from second hands.

Gold, Silver and Platinum

Gold—There was no change on the open market in London, prices remaining at the Bank level, 77s. 9d. per oz. for bars and 76s. 4d. per oz. for American coin. There was some demand for Paris but most of the supplies went to the Bank of England.

Exports of gold from New York week ended July 19 were \$2,131,732, chiefly to Paris. Imports were \$316,539, from Australia, Mexico and Central America.

Iridium—There has been no improvement in supplies and dealers are still quoting about \$85 per oz., New York.

Platinum—The market is rather quiet but remains very steady. Dealers continue to ask \$45 @ 46 per oz. for refined platinum, and \$49 @ 52 for hard metal.

Silver—The market has continued quiet and steady, advancing to 27¼ d. and dropping back to 27½ d. on Chinese selling and cessation of buying by the Indian Bazaars.

Exports of silver from London to the East, Jan. 1 to July 10, reported by Messrs. Pixley & Abell:

	1912	1913	Changes
India.....	£3,677,200	£4,044,000	I. £366,800
China.....	933,500	417,000	D. 516,500
Total.....	£4,610,700	£4,461,000	D. £149,700

Exports of silver from New York week ended July 19 were \$1,650,207, to London and Paris chiefly. Imports were \$184,267, from Mexico and South America.

Gold and Silver movement in the United States six months ended June 30:

	Gold		Silver	
	1912	1913	1912	1913
Exports.....	\$33,396,836	\$63,734,616	\$33,669,222	\$33,321,781
Imports.....	25,264,342	27,910,595	25,264,240	18,132,804
Excess, exp.	\$8,132,494	\$35,824,021	\$8,394,982	\$15,188,977

Exports of merchandise for the six months this year were valued at \$1,166,160,120; imports at, \$879,199,831; excess of exports, \$286,960,289. Adding excess of exports of gold and silver gives \$337,973,287 as the total export balance.

Zinc and Lead Ore Markets

JOPLIN, MO.—July 19

The high price of zinc blende is \$48, the base per ton of 60% zinc, ranging from \$43 @ 45. Calamine sold at \$21 @ 23 per ton of 40% zinc. The market was weaker, with offerings here and there 50c. per ton lower. The average of all grades is \$42.50 per ton. Lead is unchanged at \$52.50 per ton of 80% metal, with the average of all grades \$52.24 per ton.

SHIPMENTS WEEK ENDED JULY 19

	Blende	Calamine	Lead ore	Value
Totals this week.	9,230,890	1,010,520	1,361,200	\$245,655
Totals 29 weeks.	312,894,090	22,214,540	51,914,500	\$8,672,292
Blende value, the week,	\$196,936; 29 weeks, \$7,021,974.			
Calamine value, the week,	\$12,450; 29 weeks, \$286,737.			
Lead value, the week,	\$36,269; 29 weeks, \$1,363,581.			

PLATTEVILLE, WIS.—July 19

The base price paid this week for 60% zinc ore was \$44 per ton. The base price paid for 80% lead ore was \$52 @ 53 per ton.

SHIPMENTS WEEK ENDED JULY 19

	Zinc ore, lb.	Lead ore, lb.	Sulphur ore, lb.
Week	2,254,240	187,610	995,020
Year to date	80,468,870	3,999,390	34,450,460
Shipped during week to separating plants,	2,207,460 lb. zinc ore.		

IRON TRADE REVIEW

NEW YORK—July 23

No serious weakness in finished steel prices has developed, even though some few of the mills are nearing the point where they will not be able to operate full with business now on books. Sentiment for the more distant future has distinctly improved in the past week and predictions are frequent that 1914 will prove one of the best years the iron and steel trade has ever had. This opinion is strongly held by some of the largest producers, who predict that the next buying movement will be the greatest seen for years. It is probable, however, that even if the market proves strong eventually there will be some price readjustments in the near future. Thus wire products have been weak for two or three months, and for 30 days past it has been possible to buy from some mills at \$2 under the nominal prices. Sheets have been declining for some time, and the leading interest is now adjusting current shipments on its contracts to the prices made by independents for several weeks, but it is not revising any contracts. No irregularities in plates have been reported, but some shading in the next few weeks would not be surprising. Tubular goods and merchant bars are easily the strongest in the list, with mills very well filled.

The most notable new business in the past week has been in structural steel, in which some good contracts have been placed. Some shipbuilding contracts have been let, which will require a large tonnage of plates and shapes.

Pig iron is quiet and some buyers seem to think that the bottom has not yet been reached. Sales have been chiefly of small lots.

Exports and Imports of Iron and Steel and of manufactures thereof in the United States, five months ended May 31, are valued by the Department of Commerce and Labor, as below:

	1912	1913	Changes
Exports.....	\$115,427,964	\$130,270,191	I. \$14,842,227
Imports.....	11,028,718	14,493,787	I. 3,465,069
Excess, exports.	\$104,399,246	\$115,776,404	I. \$11,377,158

Actual tonnages of iron and steel exports, so far as given in the reports, were 1,249,834 in 1912, and 1,251,091 in 1913; increase 1257 tons only. Tonnage of imports was 75,526 in 1912, and 128,207 in 1913; increase 52,681 tons.

PITTSBURGH—July 22

The steel mills continue to run at practically full capacity, and output is large for the season, the weather having been unusually favorable for July. Absolutely necessary repairs have been crowded into the shortest space of time possible. The wire mills, however, are running light, and only about half the independent sheet mills are running, the others being down for repairs. The unfinished steel supply does not seem to be increased in consequence.

The Connellsville coke market is quiescent. The operators have not sold below \$2.50, the figure they set long ago, but the full July tonnage has not been taken. The next question is what will be done on August tonnage. The operators have had to restrict output, and furnaces doubt whether they will be resigned to continue this restriction, but there is no guarantee that if the price were reduced more coke would be sold.

Pig Iron—The pig-iron market has not firmed up. It is losing nickels per ton when formerly it was losing quarters, but the trend up to the moment continues downward. Basic has weakened from the \$14.50 level, sales being made at \$14.35, if not at \$14.25, while 2500 tons bessemer sold at \$15.75, Valley, the \$16 quotation having been largely nominal for several weeks. We now quote: Bessemer, \$15.75; basic, \$14.35; malleable, \$14; No. 2 foundry, \$13.75; forge, \$13.50, f.o.b. Valley furnaces, 90c. higher delivered Pittsburgh, except that foundry iron can be done at \$14.50, Pittsburgh.

Ferromanganese—The market has been quiet since the open reduction of \$2.50, reported last week, and the new figure is occasionally shaded on small prompt lots. We quote the regular market on prompt and forward at \$58.50, Baltimore.

Steel—The market has been quiet, but there is no loosening up in the supply and prices are as well held as ever on billets and sheet bars, though rods are off 50c. The Youngstown Sheet & Tube Co. is now operating several of the six new openhearth furnaces it has been building, and the Midland plant of the Pittsburgh Crucible Steel Co., also six furnaces, is now starting. The Edgar Thomson extension of 14 furnaces will begin operations in a moderate way in a few weeks. We quote billets at \$26.50, sheet bars at \$27.50 and rods at \$28.50, maker's mill, Pittsburgh or Youngstown.

IRON ORE

The railroads concerned have complied with the order of the Interstate Commerce Commission that rates on ore from the Lake Erie ports to the Pittsburgh and Wheeling districts must be equalized. The new rate is 88c. to furnaces in both districts. This a reduction of 8c. to Pittsburgh, but an increase of 28c. in the Wheeling rate. Several of the companies intend to put in another complaint that the new rates are exorbitant.

British Iron Ore imports six months ended June 30 were 2,916,538 long tons in 1912, and 4,022,629 tons in 1913; increase, 1,106,091 tons.

SAULT STE. MARIE CANAL

The total freight passing through the Sault Ste. Marie Canals in June was 12,173,613 short tons, the heaviest tonnage ever reported in one month. For the season to July 1 the total tonnage reported was:

	1912	1913	Changes
East-bound.....	15,329,385	18,286,122	I. 2,956,737
West-bound.....	4,521,385	7,109,241	I. 2,587,856
Total.....	19,850,770	25,395,363	I. 5,544,593

The number of vessel passages reported was 7180, showing an average cargo of 3523 tons. The mineral freights included in the totals were, in short tons except salt, which is in barrels:

	1912	1913	Changes
Coal.....	3,940,305	6,496,119	I. 2,555,814
Iron ore.....	12,928,232	15,270,994	I. 2,342,762
Pig and manuf. iron.....	197,811	145,195	D. 52,616
Copper.....	30,689	33,532	I. 2,843
Building stone.....	2,282	273	D. 2,009
Salt, bbl.....	295,687	265,279	D. 30,408

Iron ore this year was 60.1% and coal 25.6% of the total tonnage reported.

COKE

The Connellsville "Courier" reports coke production in the Connellsville region for the half-year ended June 30 at 10,657,038 short tons. Shipments for the half-year were 10,623,160 tons, showing practically no stocks left on hand.

Exports and Imports of Fuel in the United States, five months ended May 31 are reported as follows, in long tons:

	Exports		Imports	
	1912	1913	1912	1913
Anthracite.....	829,278	1,647,208	30	13
Bituminous.....	4,998,276	5,138,387	621,610	633,853
Coke.....	344,905	409,538	33,019	27,912
Bunker coal.....	3,255,375	3,008,654		
Totals.....	9,427,834	10,203,787	654,629	661,765

Increase in exports 775,953 tons, or 8.2%; increase in imports, 7136 tons, or 1.1%. The bunker coal, or coal furnished to steamships in foreign trade, is practically all bituminous. The heaviest exports are to Canada, while that country also furnishes a large share of the imports. The imports are mainly on the Pacific Coast.

CHEMICALS

NEW YORK—July 23

The general market is dull, but fairly steady in most lines.

Imports and Exports of Chemicals and raw materials in the United States, five months ended May 31, were as follows:

	Imports		Exports	
	1912	1913	1912	1913
Arsenic, lb.....	2,012,920	3,930,875		
Copper sulphate, lb.....			5,079,140	3,202,092
Bleach, lb.....	29,738,094	32,334,605	400	4,820
Potash salts, lb.....	263,255,770	253,652,949	1,538,832	5,221,278
Soda salts, lb.....	4,874,359	5,865,593	200,692	152,887
Acetate of lime, lb.....	197,478	312,085	30,127,147	31,650,710
Nitrate of soda, tons.....	21,697	23,604	4,226	2,666
Sulph. of ammonia, tons.....			60	
Phosphate, tons.....			470,417	484,941
Sulphur, tons.....	7,413	2,623	15,019	33,735
Pyrites, tons.....	380,281	431,481		
Magnesite, tons.....	34,293	68,593	356	510
Chrome ore, tons.....	23,349	23,409		

Exports include reexports of foreign material. Some phosphate rock is imported, but is not given separately in the trade returns.

Arsenic—The market is still dull. There is little buying, but supplies are lighter, and quotations at \$3.12½ @ 3.37½ per 100 lb. are fairly firm.

Copper Sulphate—Sales have been good. Prices are steady at \$5.25 per 100 lb. for carload lots, and \$5.50 per 100 lb. for smaller parcels.

Nitrate of Soda—The market is still quiet, with only moderate sales. Quotations are a shade off, at 2.35c. per lb. for both spot and futures. Efforts are being made by the Chilean producers to restrict production and thus secure higher prices.

PETROLEUM

Exports of mineral oils from the United States in June were 181,289,671 gal. For the six months ended June 30 the total exports were 862,273,280 gal. in 1912, and 931,673,465 in 1913; an increase of 69,400,185 gal., or 8%, this year.

COPPER SMELTER'S REPORTS

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

	Feb.	March	April	May	June
Alaska shipments.....	660,250	472,293	1,730,252	1,771,508	2,203,191
Anacosta.....	21,250,000	22,900,000	23,800,000	25,600,000	
Arizona, Ltd.....	3,000,000	3,200,000	3,100,000	3,200,000	3,000,000
Copper Queen.....	6,810,706	7,558,709	8,210,166	8,301,605	7,477,936
Calumet & Ariz.....	4,050,000	4,250,000	4,500,000	4,500,000	4,300,000
Chino.....	3,898,998	4,464,723	3,925,409	3,883,611	3,787,157
Detroit.....	1,689,277	1,640,671	1,856,517	2,001,633	1,750,601
East Butte.....	1,325,000	1,400,000	1,400,000	1,268,595	
Mammoth.....	1,661,150	1,641,091	1,450,000	1,700,000	1,750,000
Giroux*.....	600,000	625,000	600,000	625,000	
Mason Valley.....	1,348,070	1,608,492	1,264,304	1,186,560	
Miami.....				1,943,900	2,612,000
Nevada Con.....	4,798,537	5,555,320	5,650,000	5,933,275	6,344,863
Ohio.....	380,849	591,651	690,001	650,071	
Old Dominion.....	2,381,000	2,853,000	3,040,000	2,749,000	2,511,000
Ray.....	3,610,000	4,287,000	4,379,128	4,384,400	
Shannon.....	1,152,000	1,260,000	1,238,000	1,080,000	924,000
South, Utah.....	nil	62,224	132,267	200,000	
Tennessee.....	1,600,151	1,796,394	1,718,188	\$1,037,115	1,379,220
United Verde*.....	2,750,000	3,000,000	3,000,000	3,000,000	
Utah Copper Co.....	7,585,303	8,248,880	9,539,847	10,003,227	11,637,949
Lake Superior*.....	19,000,000	19,000,000	17,000,000	18,705,000	16,500,000
Non-rep. mines*.....	5,399,849	6,203,606	6,000,000	6,300,000	
Total prod.....	94,951,140	102,619,054	104,224,079	109,824,500	
Imports, bars, etc.....	21,372,292	24,215,480	25,578,297	22,205,942	
Total blister.....	116,323,432	126,834,534	129,802,376	132,030,442	
Imp. ore & matte.....	9,459,432	11,911,041	7,177,363	10,528,562	
Total Amer.....	125,782,864	138,745,575	136,989,739	142,559,004	
Miami†.....	2,817,200	3,102,200	2,312,900	2,272,000	2,908,000
Shattuck-Arizona.....	1,136,480	1,234,450	1,158,326	1,026,170	1,059,625
Brit. Col. Cos.....					
British Col. Cop.....	688,312	844,735	794,000		
Granby.....	1,740,000	1,967,962	1,857,452	1,782,570	1,789,000
Mexican Cos.....					
Boleo†.....	2,535,680	2,204,720	2,811,200	2,424,800	1,984,640
Cananea.....	4,880,000	4,772,000	3,581,690	2,272,000	2,908,000
Moctezuma.....	2,730,914	3,062,159	2,753,240	2,695,881	3,438,793
Other Foreign.....					
Braden, Chile.....	1,178,000	1,472,000	1,512,000	1,150,000	1,804,000
Cape Cop., S. Af.....	712,320	732,480	586,880	387,520	414,400
Kyshtim, Russia.....	1,352,960	1,478,400	2,544,640	1,490,000	
Spassky, Russia.....	1,003,520	974,400	974,400	721,280	
Exports from.....					
Chile.....	5,824,000	7,840,000	7,616,000	3,584,000	5,824,000
Australia.....	5,512,000	6,944,000	6,608,000	7,840,000	7,616,000
Arrivals—Europe‡.....	8,509,760	15,585,920	10,545,920	13,661,760	5,277,440

† Boleo copper does not come to American refiners. Miami copper goes to Cananea for treatment, and reappears in imports of blister. From May 1, Miami copper is refined in the U. S. and appears under American mines.

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

§ In operation only 20 days in May.

STATISTICS OF COPPER

Month	United States			Visible Stocks.		
	U.S. Refin'y Production	Deliveries, Domestic	Deliveries, for Export	United States	Europe	Total
VI, '12.....	122,315,240	66,146,229	61,449,650	49,615,643	117,801,600	167,417,244
VII.....	137,161,129	71,094,381	60,121,331	44,335,004	108,186,000	152,521,003
VIII.....	145,628,521	78,722,418	70,485,150	50,280,421	113,299,200	163,579,621
IX.....	140,089,819	63,460,810	60,264,796	46,701,374	113,568,000	160,269,374
X.....	145,405,453	84,104,734	47,621,342	63,065,587	107,408,000	170,473,587
XI.....	134,695,400	69,369,795	55,906,550	76,744,964	103,801,600	180,546,564
XII.....	143,354,042	58,491,723	65,713,796	86,164,059	96,947,200	183,111,259
Year, 1912.....	1,581,920,287	819,665,948	746,396,452			
I, 1913.....	143,479,625	65,210,030	60,383,845	105,312,582	78,491,840	183,904,422
II.....	130,948,881	59,676,492	72,168,523	123,198,332	77,504,000	200,702,332
III.....	136,251,849	76,585,471	77,699,306	122,302,890	81,244,800	203,547,690
IV.....	135,353,402	78,158,837	85,894,727	104,269,270	87,180,800	191,450,070
V.....	141,319,416	81,108,321	68,285,978	75,549,108	85,948,800	161,497,908
VI.....	121,860,853	68,452,571	68,067,901	67,474,225	77,235,200	144,709,425
VII.....				52,904,606	71,904,000	124,808,606

Note—From Jan. 1, 1913, visible supplies in Europe do not include copper afloat.

Mining Companies—United States

Name of Company and Situation	State	Shares		Dividends		
		Issued	Par	Total	Latest	Amt
Acaea, g.	Colo.	1,438,989	\$ 1	\$ 129,618	Jan. '11	\$0.01
Adams, s.l.e.	Colo.	80,000	10	778,000	Dec. '09	0.04
Almeek, c.	Mich.	50,000	25	1,700,000	Apr. '13	7.00
Alaska Mexican, g.	Alas.	180,000	5	3,187,381	May '13	0.30
Alaska Treadwell, g.	Alas.	200,000	25	13,185,000	May '13	1.00
Alaska United, g.	Alas.	180,200	5	1,397,050	May '13	0.50
Am. Zinc, Lead & Sm.	U. S.	165,360	25	985,820	Apr. '13	0.75
Anacanda, c.	Mont.	4,332,300	25	74,919,375	Apr. '13	0.05
Argonaut, g.	Cal.	200,000	5	1,200,000	June '10	0.05
Arizona Copper, pf.	Ariz.	1,426,120	1.20	1,831,011	May '13	0.02
Arizona Copper, com.	Ariz.	1,519,896	1.20	15,429,473	Feb. '13	0.48
Bagdad-Chase, g. pf.	Cal.	84,819	5	202,394	Jan. '09	0.10
Baltic, c.	Mich.	100,000	25	7,750,000	Dec. '12	7.00
Bingham N. H., c.	Utah.	228,690	5	294,219	July '12	0.10
Bonanza Dev., g.	Colo.	300,000	1	1,425,000	Oct. '11	0.20
Bunker Hill Con., g.	Cal.	200,000	1	751,000	July '13	0.05
Bunker Hill & Sul., l.s.	Ida.	327,000	10	14,369,550	July '13	0.20
Butte-Alex Scott, c.	Mont.	74,000	10	111,000	June '13	0.50
Butte & Ballaklava, c.	Mont.	250,000	10	125,000	Aug. '10	0.50
Caledonia, l.s.c.	Ida.	1,300,000	1	52,000	June '10	0.01
Calumet & Arizona, c.	Ariz.	596,353	10	17,714,441	June '13	1.25
Calumet & Hecla, c.	Mich.	100,000	25	122,050,000	June '13	10.00
Camp Bird, g. s.c.	Colo.	1,100,051	5	9,383,512	Jan. '13	0.24
Centen'l-Eur., l.s.g.c.	Utah.	100,000	5	3,750,000	Apr. '13	1.50
Center Creek, l.z.	Mo.	100,000	10	420,000	Jan. '13	0.05
Champion, c.	Mich.	100,000	25	8,000,000	June '13	1.00
Cliff, g.	Utah.	300,000	1	120,000	Jan. '13	1.00
Cliff, g.	Alas.	100,000	1	180,000	Nov. '12	0.05
Colo. Gold Dredging.	Colo.	100,000	10	250,000	July '13	0.25
Colorado, l.s.g.	Utah.	1,000,000	0.20	2,570,000	Dec. '12	0.02
Columbus Con., g.s.	Utah.	285,540	5	226,832	Oct. '07	0.20
Commercial Gold.	Ore.	1,750,000	1	43,750	Dec. '10	0.00
Con. Mercu., g.	Utah.	1,000,000	1	3,415,313	July '12	0.03
Continental, z. l.	Mo.	22,000	25	285,000	Jan. '13	0.50
Copper Range Con., c.	Mich.	393,445	100	13,492,906	Apr. '13	0.75
Daly Judge, s.l.	Utah.	300,000	1	585,000	June '13	0.15
Daly West, s.l.	Utah.	180,000	20	6,606,000	Jan. '13	1.50
Doctor Jackpot, g.	Colo.	3,000,000	0.10	45,000	Mar. '11	0.00
Doe Run, l.	Mo.	65,782	100	3,237,869	Dec. '12	1.50
Elkton Con., g.	Colo.	2,500,000	1	3,029,460	May '13	0.02
El Paso, g. s.	Colo.	490,000	5	1,658,545	Mar. '13	0.12
Erastine, g. s.	N.M.	300,000	5	400,000	Dec. '12	0.00
Fed. M. & S., com.	Idaho.	60,000	100	2,708,750	Jan. '09	1.50
Fed. M. & S., pf.	Idaho.	120,600	100	9,028,060	June '13	1.50
Florence, g.	Nev.	1,050,000	1	840,000	Apr. '11	0.10
Frances-Mohawk, g.	Nev.	912,000	1	546,000	Jan. '08	0.05
Free Coinage, g.	Colo.	10,000	100	180,000	Dec. '09	1.00
Fremont Con., g.	Calif.	200,000	2.50	194,000	June '13	0.02
Frontier, z.	Wis.	1,250	100	161,272	June '13	2.00
Gemini-Key'ne, l.g.s.	Utah.	5,000	100	2,110,000	May '13	10.00
Gold Chain, g.	Utah.	1,000,000	1	130,000	May '13	0.03
Gold Coin of Victor.	Colo.	1,000,000	1	1,350,000	Feb. '09	0.02
Gold Dollar Con.	Colo.	2,500,000	0.10	100,000	Dec. '12	0.00
Gold King Con., g.	Colo.	5,750,370	1	1,407,319	Dec. '11	0.03
Golden Cycle, g.	Colo.	1,500,000	5	2,441,000	June '13	0.02
Golden Star, g.	Ariz.	400,000	5	140,000	Mar. '10	0.05
Grandfield Con., g.	Nev.	3,558,367	10	24,906,811	Apr. '13	0.30
Grand Central, g.	Utah.	500,000	1	1,520,750	Apr. '13	0.05
Grauite, g.	Colo.	1,650,000	1	269,500	Nov. '12	0.00
Hazel, g.	Cal.	900,000	1	875,000	Nov. '12	0.01
Hecla, l.s.	Idaho.	1,000,000	0.25	2,850,000	June '13	0.02
Hercules, l.s.	Idaho.	1,000,000	1	3,650,000	July '11	0.06
Homestake, g.	S. D.	218,400	100	32,204,537	July '13	0.65
Horn Silver, l.s.z.	Utah.	400,000	25	5,662,000	Sept. '07	0.05
Iowa, g.s.l.	Colo.	1,666,667	1	200,166	June '11	0.00
Iowa-Tiger Leasing g.s.	Colo.	12,655	1	13,921	Jan. '12	0.10
Iron Blossom, s.l.g.	Utah.	1,000,000	0.10	1,570,000	Apr. '13	0.10
Iron Silver, s.l.g.	Colo.	500,000	20	4,700,000	Apr. '13	0.10
Jamison, g.	Cal.	390,000	10	378,300	Jan. '11	0.02
Jerry Johnson, g.	Colo.	2,500,000	0.10	150,000	Nov. '11	0.01
Kendall, g.	Mont.	500,000	5	1,475,000	Nov. '12	0.02
Kennedy, g.	Cal.	100,000	100	1,831,001	Apr. '10	0.03
King of Arizona, g.	Ariz.	200,000	1	396,000	Aug. '09	0.12
Klar Piquette, z.l.	Wis.	20,000	1	162,500	Dec. '12	0.50
Knob Hill, g.	Wash.	1,000,000	1	45,000	May '12	0.00
Liberty Bell, g.	Colo.	130,551	5	522,093	Oct. '10	1.00
Little Bell, l.s.	Utah.	300,000	1	75,000	Mar. '11	0.05
Little Florence, g.	Nev.	1,000,000	1	430,000	Jan. '08	0.03
Mammoth, g.s.c.	Utah.	400,000	25	2,280,000	Oct. '12	0.15
Mary McKinney, g.	Colo.	1,309,252	1	1,025,188	Apr. '13	0.02
May Day, g.s.l.	Utah.	800,000	0.25	148,000	Feb. '13	0.03
Mexican, g.s.	Nev.	201,600	2.50	20,160	Aug. '11	0.10
Miami, c.	Ariz.	664,993	5	1,844,516	May '13	0.50
Modoc, g.s.	Colo.	500,000	1	275,000	Feb. '11	0.01
Mohawk M. Co.	Mich.	100,000	25	2,975,000	Feb. '13	0.01
Monarch-Mad'a, g.s.l.	Colo.	1,000,000	1	40,000	May '12	0.10
Montana-Tonop., s.g.	Nev.	921,865	25	530,000	May '08	0.44
Mountain, c.	Cal.	250,000	1	4,216,250	May '11	0.10
National, g.	Nev.	750,000	1	570,000	May '11	0.10
Nevada Con., c.	Nev.	1,999,394	5	12,237,986	June '13	0.37
New Century, z.l.	Mo.	330,000	1	237,600	Oct. '09	0.01
New Idria, q.	Cal.	100,000	5	1,710,000	June '13	0.10
North Butte, c.	Mont.	410,000	15	10,865,000	Apr. '13	0.50
North Star, c.	Cal.	250,000	10	3,886,989	June '13	0.20
Old Dominion, M. & Sm.	Ariz.	162,000	25	2,956,000	Apr. '13	1.25
Ophir, s. g.	Nev.	201,600	3	2,068,360	Jan. '12	0.10
Ophove, g.s.l.	Utah.	898,978	0.25	80,907	Jan. '13	0.02
Oroville Dredging.	Cal.	700,000	5	1,383,036	Dec. '09	0.12
Oseola, c.	Mich.	96,150	25	11,458,550	Apr. '13	3.00
Parrot, c.	Mont.	229,850	10	7,221,273	May '13	0.15
Pearl Con., g.	Wash.	1,909,711	0.05	181,422	Dec. '10	0.02
Pharmacist, g.	Colo.	1,500,000	1	87,500	Feb. '10	0.00
Pioneer, g.	Alas.	5,000,000	1	4,041,526	Oct. '11	0.03
Pittsburgh-Idaho, l.	Ida.	803,000	1	216,810	Oct. '12	0.04
Pittsburgh Silver Peak, g.	Nev.	2,790,000	1	613,800	June '13	0.02
Portland, g.	Colo.	3,000,000	1	9,277,080	Apr. '13	0.02
Quill, c.	Wash.	1,500,000	1	67,500	Feb. '13	0.01
Quincy, c.	Mich.	110,000	25	20,732,500	June '13	1.25
Republic, g.	Wash.	1,000,000	1	85,000	Dec. '10	0.01
Rochester, l.z.	Mo.	4,900	100	188,396	Dec. '10	0.50
Round Mountain, g.	Nev.	866,426	1	328,404	Sept. '10	0.04
Seven Troungs Coal, g.	Nev.	1,500,000	1	37,500	July '12	0.02

Mining Companies—United States—(Continued)

Name of Company and Situation	State	Shares		Dividends		
		Issued	Par	Total	Latest	Amt
St. Joseph, l.	Mo.	1,000,000	\$10	\$ 8,860,357	June '13	\$0.15
Shannon, c.	Ariz.	300,000	10	750,000	Jan. '13	0.50
Shattuck-Arizona, c.	Ariz.	350,000	10	1,225,000	Jan. '13	0.50
Silver King Coal, l.s.	Utah.	1,250,000	5	2,159,885	Apr. '13	0.15
Sioux Con., s.l.g.	Utah.	745,389	1	872,097	July '11	0.04
Skidoo, g.	Cal.	1,000,000	5	275,000	May '12	0.02
Smuggler, l.s.z.	Colo.	1,000,000	1	2,235,000	Nov. '06	0.03
Snowstom, c.g.	Ida.	1,500,000	1	1,147,118	Apr. '13	0.01
South Eureka, g.	Calif.	299,981	1	366,881	Apr. '12	0.07
Standard Con., g.s.	Cal.	178,394	10	5,229,809	Jan. '12	0.10
Stratton's Ind., g.	Colo.	1,000,000	0.60	486,000	May '13	0.06
Success, z.	Ida.	1,500,000	1	925,000	May '13	0.02
Superior & Pitts., c.	Ariz.	1,499,793	10	4,799,340	June '13	0.38
Tamarack, c.	Mich.	60,000	25	9,420,000	July '07	4.00
Tennessee, c.	Tenn.	200,000	25	3,556,520	June '13	0.75
Tomboy, g. s.	Colo.	300,000	4.85	3,069,090	June '13	0.48
Tom Reed, g.	Ariz.	909,555	1	1,318,940	June '13	0.06
Tonopah Belm't, s.g.	Nev.	1,500,000	1	4,343,093	Apr. '13	0.25
Tonopah Ext., g.s.	Nev.	943,433	1	353,785	Jan. '13	0.02
Tonopah of Nev., s.g.	Nev.	1,000,000	1	10,450,000	Apr. '13	0.40
Tri-Mountain, c.	Mich.	100,000	25	1,250,000	Dec. '12	3.00
Tuolumne, c.	Mont.	800,000	1	520,000	May '13	0.10
United Sam. g. s. l.	Utah.	500,000	1	495,000	Sept. '11	0.05
United Cop. Min., c.	Wash.	1,000,000	1	110,000	June '13	0.01
United (Crip. Ck.) g.	Colo.	4,000,100	1	440,435	Jan. '10	0.04
United Globe, c.	Ariz.	23,000	10	1,184,500	Apr. '13	7.50
United Verde, c.	Ariz.	300,000	10	33,347,000	June '13	0.75
Utah, s.l.	Utah.	100,000	10	325,000	Dec. '10	0.02
Utah, c.	Utah.	1,562,599	10	18,616,484	June '13	0.75
Utah Con., c.	Utah.	300,000	5	7,650,000	Apr. '13	0.50
Valley View, g.	Colo.	1,000,000	1	240,000	Dec. '10	0.04
Victoria, g.s.l.	Utah.	250,000	1	207,500	Mar. '10	0.04
Vindicator Con., g.	Colo.	1,500,000	1	2,677,000	Apr. '13	0.03
Wasp No. 2, g.	S. D.	500,000	1	416,965	May '13	0.02
Wellington Mines, g.	Colo.	10,000,000	1	210,000	Jan. '13	0.00
Wolverine, c.	Mich.	60,000	25	7,940,000	Apr. '13	5.00
Work, g.	Colo.	1,500,000	1	172,500	July '08	0.00
Yak, s.l.	Colo.	1,000,000	1	1,417,685	Oct. '10	0.04
Yankee Con., g.s.	Utah.	1,000,000	1	1,675,500	Jan. '13	0.01
Yellow Aster, g.	Cal.	100,000	10	1,156,789	July '13	0.05
Yellow Pine, l.z.s.	Nev.	950,000	1	275,508	July '13	0.02
Yukon Gold, g.	Alas.	3,500,000	5	4,987,500	June '13	0.07

Coal, Iron, Industrial and Holding Companies

Amalgamated, c.	Mont.	1,538,879	\$100	\$76,659,791	May '13	\$1.50
Am. Sm. & Ref., com.	U. S.	500,000	100	24,333,333	June '13	1.00
Am. Sm. & Ref., pf.	U. S.	500,000	100	44,606,333	June '13	1.75
Am. Smelters, pf. A.	U. S.	170,000	100	7,620,000	Apr. '13	1.50
Am. Smelters, pf. B.	U. S.	300,000	100	11,607,000	Apr. '13	1.25
Cambria Steel	Penn.	900,000	50	17,335,000	May '13	0.62
Greene Cananea.	U. S.	2,471,314	25	2,475		

Assessments

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

Monthly Average Prices of Metals SILVER

Table with columns: Month, New York, London. Shows monthly average prices for silver.

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

COPPER

Table with columns: Month, New York (Electrolytic, Lake), London, Standard. Shows monthly average prices for copper.

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

TIN

Table with columns: Month, New York, London. Shows monthly average prices for tin.

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

LEAD

Table with columns: Month, New York, St. Louis, London. Shows monthly prices for lead.

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

SPELTER

Table with columns: Month, New York, St. Louis, London. Shows monthly prices for spelter.

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

PIG IRON IN PITTSBURG

Table with columns: Bessemer, Basic, No. 2 Foundry, 1912, 1913. Shows prices for pig iron.

STOCK QUOTATIONS

Table with columns: Name of Comp., Bid. Lists various stock quotations.

Table with columns: Name of Comp., Bid. Lists various stock quotations.

SAN FRANCISCO

Table with columns: Name of Comp., Bid. Lists various stock quotations.

N. Y. EXCH. July 22

Table with columns: Name of Comp., Clg. Lists various stock quotations.

N. Y. CURE July 22

Table with columns: Name of Comp., Clg. Lists various stock quotations.

BOSTON CURE July 22

Table with columns: Name of Comp., Bid. Lists various stock quotations.

LONDON July 12

Table with columns: Name of Com., Clg. Lists various stock quotations.