

# The Engineering and Mining Journal

VOLUME 97

JANUARY 17, 1914

NUMBER 3

## Yamagano Gold Mine, Satsuma, Japan—I

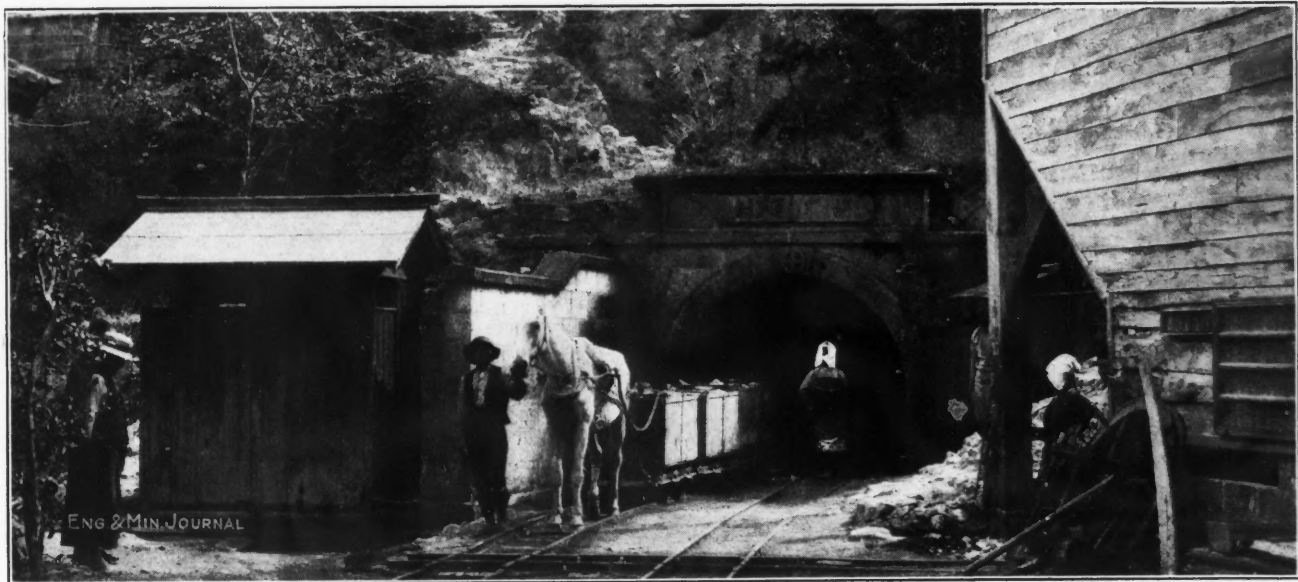
BY TARO M. YOSHIDA\*

*SYNOPSIS*—The largest gold-mining establishment in Japan, which has been in the possession of the same family for 256 years. It is equipped with a modern stamp-milling plant and cyanide-treatment annex. Auxiliary equipment is modern and efficient. History and description of the establishment are given.

✻

The Yamagano gold mine which embraces the two mines of Yamagano and Nagano, is in the province of

Bureau of Mines. Shimadzu Dzusho Hisamichi, the Lord of Miyanojo Castle, having heard the news, reported it to his master, Shimadzu Mitsuhsa, then the Grand Lord (Daimyo) of Satsuma, who is an ancestor of the present Prince Shimadzu. Hisamichi was ordered by his master to explore the region. This he did at once, working up against the stream along Sasigawa. They found several gold nuggets when they entered the Nagano River region. Thus encouraged, Hisamichi continued



ENTRANCE TO GOMAME ADIT BEFORE INSTALLATION OF ELECTRIC TRANSPORTATION

Satsuma, near the extreme southern end of Kyushu, Japan, in a mountainous region about nine miles west of the Yokokawa station, on the Kyushu main line of the Imperial Government Railways. As the mine is close to the state highway, transportation is conveniently carried on between there and Yokokawa. The freight office and warehouses at Yokokawa are connected by telephone with the mine.

### GOLD FOUND EARLY IN 17TH CENTURY

At the time of Kwan-ei, early in the 17th century, someone found a gold nugget among the pebbles in the bed of a small stream near Miyanojo, 15 miles northeast of Nagano village, the present site of Prince Shimadzu's

his exploration and discovered vein gold at Musodahi, on March 22 of the 17th year of Kwan-ei (1640). Tradition has it that on the eve of the discovery of the mine, Hisamichi dreamed that a phantom appeared who directed him to the spot where he could find a rich vein. At any rate, the region was called "Musodahi," which means the valley of vision, and is still known by that name.

Mitsuhsa then reported the discovery of the mine to Tokugawa Shogunate and obtained permission to work the mine. Soon after mining began, several other rich veins were discovered and the production of gold increased to such an extent that the Shogunate became envious and withdrew the concession granted. This was in the 20th year of Kwan-ei (1643). The action of the Shogunate was found to be quite unreasonable as the pro-

\*Secretary Prince Shimadzu's Bureau of Mines, Nagano Mura, Satsuma Gun, Kagoshima Ken, Japan.

duction of gold was beneficial to the country as well as to Lord Shimadzu, and the concession was again granted to him in the second year of Meireki (1656), after an interval of 13 years. After that the mine was owned and worked by the household of Prince Shimadzu, and has so continued up to the present time, a period of about 256 years.

#### TOTAL PRODUCTION MORE THAN 24 MILLION DOLLARS

The total production of gold from the time the mine was reopened, the second year of Meireki (1656), to the end of the first year of Taisho (1912), amounted to 1,220,713 oz. The greatest amount of gold produced in a single year was in the second year of Manji (1659), when 56,029 oz. were obtained. From Kyoho, 1716, to the earlier part of Meiji, about 1870, the condition of the mine was not favorable, and the annual production of gold averaged only 1200 ounces.

After the Restoration of 1867, new Western technical reforms were introduced in all industries of Japan, metal mining among them. Prince Tadayoshi Shimadzu, the father of the present prince, took a keen interest in metallurgy and was so eager to adopt the most modern appliances then used in the West that he had an assay room erected in the compound of his beautiful Iso mansion at Kagoshima, and attended all the experiments himself. During the three years, from 1877 to 1880, Prince Tadayoshi engaged an experienced French mining engineer, Mons. P. Oget. He then had an up-to-date stamp mill erected at Yamagano, according to the engineer's design, sparing no expense. This improvement greatly stimulated the gold production.

In 1904, the Bureau of Mines of Prince Shimadzu's household was established for the purpose of developing the Yamagano and also the Serigano gold mine<sup>1</sup>, and Dr. Ryosaku Godai was appointed president of the bureau. The designing and erecting of a new central mill and cyanide plants at Nagano were entrusted to him. Through the efforts of Doctor Godai the mills and plants were completed in October, 1907, and consequently the bureau was also removed to the present site, at Nagano. Although the present situation of the headquarters is actually at Nagano, a distance of four miles from Yamagano, the name "Yamagano Gold Mine" is still retained, as that name was well known throughout Japan for more than two centuries. Doctor Godai resigned his position in December, 1910, and Kikujiro Saigo, the ex-Mayor of Kyoto, succeeded him as president of the bureau.

#### VOLCANIC COUNTRY CHARACTERIZED BY MANY VEINS

The southern part of Kyushu in general shows evidences of volcanic activity, and many craters, both extinct and active, are to be found. Ashes from these volcanoes are often as deep as 50 feet.

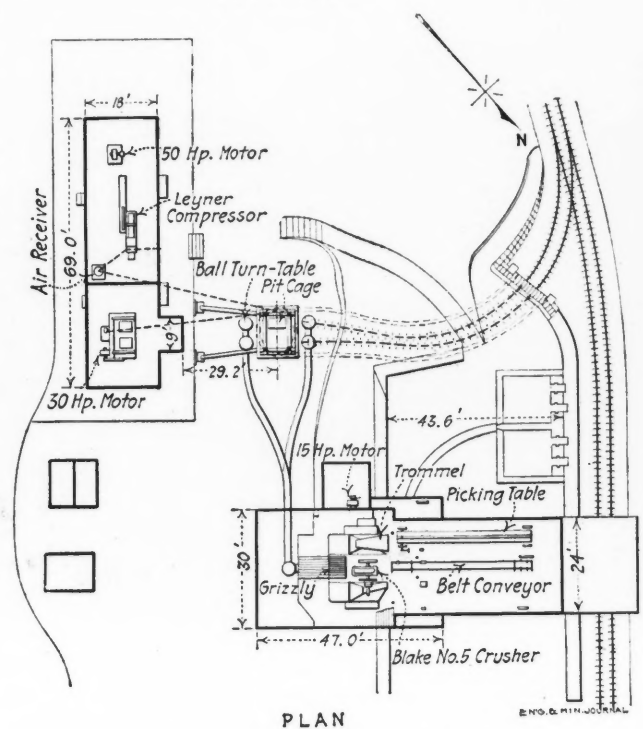
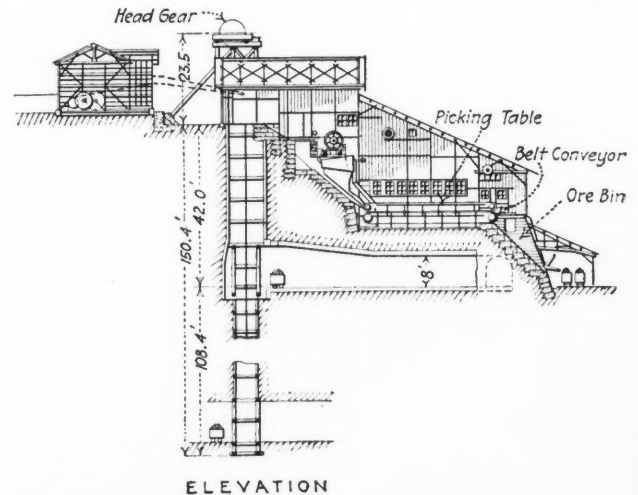
The ore deposits of the Yamagano are in fissure veins in a volcanic region, the country rocks being augite-andesite, tuff, and volcanic conglomerate. Tertiary shale exists and on the western border of the region Tertiary rock with leaf fossils is often encountered.

There are more than 40 veins which range in width from 3 to 30 ft., having a general strike east and west

<sup>1</sup>The Serigano gold mine is also famous in Japan. It is situated at the extreme southern end of Satsuma, a distance of about 30 miles from the Yamagano mine. It was discovered in the third year of Manji (1660), since which time it has been owned and worked by Prince Shimadzu's household. The annual production of gold is about one-third of that of the Yamagano.

and dip 40 to 80° N. The main adits in use are the Hiire, 3000 ft. long in Yamagano, and the Gomame, 6500 ft. long in Nagano. Besides these, there are two crosscuts in Nagano, one of which is called Sambandaki and is 2100 ft. long. The Gomame and Hiire adits are 100 ft. and 480 ft., respectively, above the Sambandaki.

It was thought that free gold could not be present in places very far below the surface, but this apparently was a wrong idea, as patches of free gold have been found



HOISTING AND SORTING PLANT

at a depth of about 700 ft. This occurred in an offshoot of the Sarashi vein at the end of the Gomame adit.

#### ELECTRIC TRANSPORTATION FROM MINE TO MILL

Regular overhand stoping from the levels is the chief method used in this mine for extracting milling ore. The Sambandaki and Kotaka crosscuts are driven with Leyner and Sargent rock drills. For transporting ore from Gomame and Sambandaki, an electric tramway using 25-lb. rails has been installed. The gage is 20 in., and 1-ton steel cars are used, while 12-lb. rails and 1/2-ton

wooden cars are used in the Sarashi and other veins. The ore from Sarashi and others is sent down to Gomame through a shaft, while the ore from the Sambandaki level is hoisted 146 ft. through a shaft by means of a cage carrying a 1-ton car. The hoist is a 30-hp. Allis-Chalmers double-drum machine, and is run by electricity.

At a station in the Sambandaki level, the ore is discharged on a grizzly and crushed by a No. 5 Blake crusher and sized through a trommel having holes from  $\frac{1}{4}$  to  $\frac{1}{2}$  in. in diameter. It is then hand picked on a steel sorting belt 3 ft. 4 in. wide, the distance between the centers

at Nagano. In the former there are 20 stamps of 900 lb. weight each, the mill crushing 660 long tons of ore monthly. The pulp flows over four sets of fixed and shaking amalgamating plates, and into pointed boxes or spitzkasten, in which it is separated into sand and slime. The slime is sent directly to the cyaniding plant at Ipponsugi, while the sand is concentrated and reclassified on three Wilfley tables. The heavy amalgam and pyrites are subjected to pan amalgamation, while light sand and slime are sent to Ipponsugi. The cyaniding plant of Ipponsugi is about  $\frac{3}{4}$  of a mile distant from the Yamagano stamp mill. In this plant, sand and slime, with 1%



#### HOIST AND SORTING PLANT AT KUROTARO BRIDGE, SAMBANDAKI

An electric tramway is now installed for ore transportation, and a steel bridge replaces this wooden structure.

being 30 ft. 6 in. The fines from the trommel are carried on a link-belt conveyor to the ore bin. The ore supply, sorting and conveying belts are driven by a 15-hp. Westinghouse induction motor, 2000 volts, 44 amp., and 60 cycles.

There is also an air compressor of the two-stage Leyner type, driven by an induction motor, 2000 volts, 14 $\frac{1}{2}$  amp., and 60 cycles. The compressed air is sent to the Sambandaki adit through 4-in. pipes, for use in the Leyner drills which were used for driving the headway.

#### ORE IS STAMP CRUSHED AND AMALGAMATED

There are two stamp mills, one at Yamagano and one

of lime added, are leached in wooden tanks 20 ft. in diameter and 4 $\frac{1}{2}$  ft. deep.

#### NAGANO MILL THE PRINCIPAL INSTALLATION

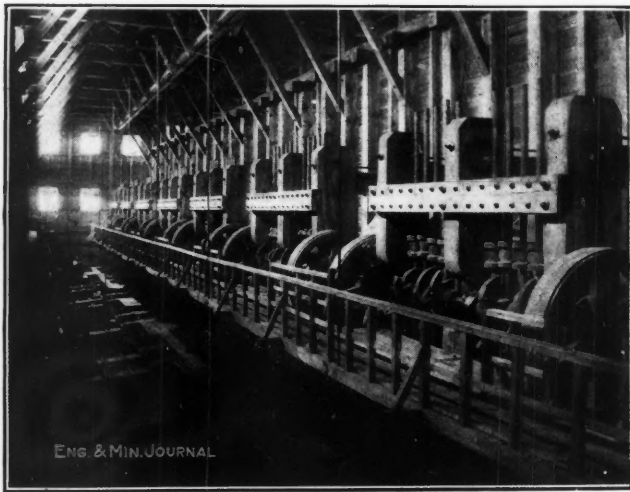
The Nagano metallurgical works embraces stamp-mill and sand and slime plants, as well as an assay office, and is situated about one mile to the west of the Gomame main adit. The ore is discharged from tram cars upon a grizzly 6 ft. 8 in. wide and 15 ft. long by a hand tippie, and the rock is crushed in a Gates gyratory ore crusher. The size of product being less than 2 in., after which it is conveyed to ore bins which extend the whole length of the mill and are capable of holding more than 750 tons. The

ore is carried in side-discharge cars. From the ore bins, the ore is fed to the stamp batteries by means of suspended Challenge feeders.

The stamps, of which there are 80, weigh 900 lb. each and are set to drop 8 in. 80 times per minute. They crush 2200 long tons of ore per month, through 30-mesh screens.

The pulp runs over 16 pairs of fixed and shaking amalgamating plates and flows into four hydraulic-cone separators, from which the slime overflow runs directly to the slime-cyaniding plant, while the sands are run down over 11 Wilfley tables, where the heavy amalgam and pyrites are caught and the tailing is led to the sand-cyaniding plant through a launder. The concentrates are sent to the Ikuno mine for smelting.

All of the machinery in the stamp mill is driven by a 200-hp. induction motor, running at 514 r.p.m. The



80-STAMP MILL AT NAGANO

speed reduction is obtained by means of a 21-in. belt and a pair of cast-steel spur wheels.

The average amalgam contains 19% of gold and 13% of silver. The experience of many years has taught us that the extraction of gold by amalgamation is a great deal lower in the summer time.

(To be Concluded)

⌘

## Mineral Production of Austria in 1912

The output of mining and metallurgical products in Austria during 1912 and the preceding year are officially

Mine Products	1911	1912	Changes	Workmen 1912
Gold ore.....	29,647	30,192 I.	445	558
Silver ore.....	24,143	21,794 D.	2,349	2,137
Mercury ore.....	111,018	117,780 I.	6,762	954
Copper ore.....	10,974	17,354 I.	6,380	802
Iron ore.....	2,765,815	2,926,686 I.	160,871	6,223
Lead ore.....	23,845	27,952 I.	4,107	3,606
Zinc ore.....	32,166	34,675 I.	2,509	500
Tin ore.....	944	606 D.	338	170
Antimony ore.....	270	4,520 I.	4,250	48
Pyrites.....	15,805	13,996 D.	1,809	179
Manganese ore.....	15,954	12,471 D.	3,483	181
Graphite.....	41,599	45,375 I.	3,776	1,051
Lignite.....	25,152,601	26,283,690 I.	1,131,089	53,179
Bituminous coal.....	14,487,550	15,797,890 I.	1,310,340	70,777
<b>Metallurgical Products:</b>				
Gold, kg.....	205	204 D.	1	(a)
Silver, kg.....	50,244	49,355 D.	889	386
Mercury.....	704	763 I.	59	216
Copper.....	1,760	3,057 I.	1,297	213
Pig iron.....	1,596,148	1,759,850 I.	163,702	5,951
Lead.....	18,097	19,993 I.	1,896	287
Zinc.....	15,766	17,298 I.	1,532	1,475

(a) Included under gold ore, and silver.

reported herewith, in metric tons, unless otherwise stated. The labor statistics relate only to 1912.

The total value of the mining output for 1912 is reported at 352,545,531 kroner, and of the metallurgical at 179,217,612 kroner, an increase, as compared with 1911, of 32,438,136 kroner in the former and of 23,543,503 kroner in the latter category.

⌘

## Fluorspar in Kentucky and Illinois

BY AVEEY H. REED\*

The year 1913 was eventful in mine development and production.

In Illinois the two principal operations, Rosiclare and Fairview, extended the exploitation of their orebodies with continued success and without indication of mineralization playing out either in depth or along the strike. The productive levels at Rosiclare during the year were those at 320 and at 420 ft., and lateral development has extended on the Rosiclare vein more than 5000 ft. from one main shaft. Fairview operations include five separate shaft installations, all of which were worked more or less during the year. Late in the summer Goodhope shaft, the earliest main shaft, was lost and had to be abandoned on account of irreparable caving. Blue Diggings shaft and operation promise hereafter to be Fairview's mainstay; an excellent new concrete-lined vertical shaft was completed 200 ft. in depth; during the year also the Fairview Transportation Co.'s standard-gage standard-equipped tram railroad was extended about one mile to this operation. Both Rosiclare and Fairview operations were twice flooded by the Ohio River in the spring of 1913, which caused some restriction of output. Rosiclare also commenced in the latter part of November to curtail output, and it was not expected in mid-December that normal production would be made again until after Jan. 1, 1914.

It is given out as a fair estimate that Rosiclare produced about 65,000 tons, and Fairview about 35,000 tons of fluorspar of all grades, in 1913. And it is estimated that about 10% of that tonnage was sold as No. 1 grade, either in lump form or ground. Late in December Rosiclare was credited with having 50,000 tons fluorspar broken in the mine stopes, and was also credited with having 6000 tons in stock at Shawneetown, Ill.

In Kentucky some real fluorspar mines have been established and systematic mine development started. Less than a mile south of Mexico, Ky., the Tabb system of faults and veins crosses the L. C. R.R. Repeated attempts have been made to locate the Tabb vein where it crosses the railroad, but only within the last two years has effort been rewarded and the vein encountered.

The Pigmy mine is located here; and it is found that the vein carries large bodies of good fluorspar; indications are favorable for the ultimate development of a substantial mine. Present mine workings extend 150 ft. in depth in solid rock walls, and active work in putting down the main shaft to 200 ft. was under way in December. This mine operates a concentrating plant, which in December was also in process of complete remodeling and enlargement. Production of the Pigmy mine in 1913

\*Mining engineer, Marlon, Ky.

will slightly exceed 5000 tons, 50% of the output being sold as No. 1 grade.

La Rue mines (formerly Asbridge) and the Hoosier mines (also known as Tabb) are two other meritorious operations located on the Tabb vein; and each has undergone important development during the year. La Rue is operating from two shafts, the principal one being 250 ft. deep, showing splendid deposits in rock walls. Production of La Rue during 1913 is stated to be 15,000 tons. The mines are about  $2\frac{1}{2}$  miles west of the Pigmy mine and the I. C. R.R. During the year a macadamized road was completed to the railroad, giving service also to the Hoosier mines and others.

The Brown & Ward shaft, the principal operation of the Hoosier, is one mile west of the Pigmy and the I. C. R.R. Much interest was aroused during the year by the unwatering and reclaiming of this shaft, which was sunk about 1888 by S. S. Brown and associates, at the time the Ohio Valley R.R., now part of I. C. R.R. system, was built through the region. It was the first development on the Tabb vein, and was in search of lead and zinc ore; but fluor spar was reputed to have been the principal material found in quantity, so that finally when more water than usual was met with, short of 200 ft. in depth, shaft work was suspended. It was only in the latter part of 1913 that this shaft was reclaimed; it confirms the legend and shows remarkably large fluor spar deposits, undoubtedly the makings of a good mine. The operators are preparing to increase the output next year over the several hundred tons produced during 1913.

In the vicinity of Marion, Ky., are the Franklin and the Keystone (Sunnybrook), adjoining properties both located on the Columbia vein. They are five miles southwest of Marion, and off the Marion and Salem public road. Each has reached 300 ft. in depth in its main shaft, and has encountered fluor spar deposits in place second in quantity and quality only to Rosiclare. It is noteworthy that the Franklin did not go in strong for output in 1913, but rather confined its efforts to development; it is estimated that it now has over 15,000 tons ready for stoping.

Kentucky is credited with producing 30,000 tons of fluor spar in 1913, distributed as follows: La Rue, 15,000 tons; Pigmy, 5000 tons; Keystone, 3000 tons; Franklin, 2000 tons; all other operations, 5000 tons.

The prevalent price for metallurgical fluor spar in 1913 was \$5.75 to \$6 f.o.b. Illinois shipping points, and \$5.25 to \$5.50 f.o.b. Kentucky shipping points. The difference in freight rates of about 30c. per ton in favor of Illinois continued effective Nov. 1; a new tariff on the I. C. R.R. made an advance on fluor spar from Kentucky shipping points.

Acid-grade, ground fluor spar from Illinois fluctuated in price considerably, except for outstanding contracts. The latter business is believed to have been done at \$15 to \$17 net in earload lots by Fairview, on its "Keystone" grade; and Rosiclare is suspected of getting somewhat less than these figures on contract business. Kentucky grinders accepted some acid-grade ground as low as \$11.50, but most that sold by Kentucky interests brought \$12 to \$12.50.

Glass and enamel grade of ground fluor spar showed a remarkable inclination to decline. Competitive business was not easy to get at \$10 to \$10.50, and \$11 was a fair price at any time during the year, except, of course, upon old contracts.

The metallurgical trade seemed reluctant to place its contracts for renewal, in November and December, except at concessions from former prevailing prices. It seems reasonably certain that Illinois prices for next year's contract business will be \$5.25 to \$5.50; and it is not unlikely that some contracts will be taken by Illinois as low as \$5. Kentucky will do well to get much contract business for the new year, at \$4.75 to \$5, although some favorably located business may be got at holding-on-prices of \$5 to \$5.25. Foreign fluor spar is selling near Eastern seaboard for contracts in 1914, at prices that will not permit Illinois and Kentucky quotations named to get much of that business; and even competition in the immediate Pittsburgh district will be keen, on account of foreign fluor spar. It is estimated that about 25,000 tons of metallurgical grade of fluor spar was imported in 1913, and there is expected to be a larger tonnage imported in 1914.

✻

### Sulphur in 1913

The consumption of sulphur in the United States remained about stationary in 1913. The Union Sulphur Co. of New York continues to be the dominant factor in the production of this mineral, the developments at the Bryan Heights dome, in Texas, not having come up to expectations. The Union Sulphur Co., owing to its large stock of sulphur, prepared as a preliminary to extending its export trade, kept its production in Louisiana as low as practicable in 1913, and at the end of the year was pumping from only four wells. The production of some of these wells has been remarkable, having exceeded all previous records in total production. The production of the Union Sulphur Co. in 1913 was approximately 480,000 tons; the company as heretofore maintained a considerable stock at Sulphur, La. The company's domestic business was about the same as in 1912, but it increased its sales in Europe, where it has four distributing stations. The company also shipped some sulphur last year to Mexico, where the local mines were not equal to the demand.

The Freeport Sulphur Co., operating the Bryan Heights deposit, was reported at the end of 1913 to be pumping sulphur at the rate of about 100 tons per week. The company's first well had to be repiped, and operations were not steady during most of the year. A shipment of about 730 tons was made to New York during December. The company is now building another "steaming" plant, which should be ready for operation in the spring of 1914. It is understood that there was a small production during the year from the Wyoming, Utah and Nevada properties, but this does not figure in the general market.

The production of sulphur in Sicily was below that of previous years, and the sales were greater, so that stocks were considerably reduced, as shown by the following figures for the fiscal years ended Aug. 1: In 1912, the production was 366,457 metric tons; sales, 447,638; stocks, 444,381; in 1913, the corresponding figures were: Production, 349,602; sales, 434,473; stocks, 354,169 tons. There was an agitation among the Sicilian producers to ask the Consorzio for higher prices, owing to increased production costs. Several mines, closed on account of fires and explosions, remained inactive and others reached

such depth that their exploitation is becoming unprofitable at present prices.

There were some negotiations during the year for sulphur properties in the islands of the Pacific Ocean, but the only operation actually undertaken was that on White Island, in the Bay of Plenty, off the coast of New Zealand. A small plant was shipped to this volcanic deposit, and a small production was made in 1913. It is understood that a company was again floated to operate the sulphur deposit of the well known Mexican volcano, Popocatepetl. This deposit, however, is too far inland to be available for commercial production, except for local trade. The volcanic deposit at Cerritos, in San Luis

## Stripping with the Hydraulic Giant

BY L. O. KELLOGG

Steam shoveling has long been considered the only available method of removing the overburden from the iron-ore deposits of the Lake Superior ranges, especially the Mesabi. Attempts to use other methods have heretofore been failures. The Pittsburgh Steel Ore Co., however, at its Rowe mine on the Cuyuna range this year, introduced a new method using water, which has been successful. The orebody under exploitation is situated

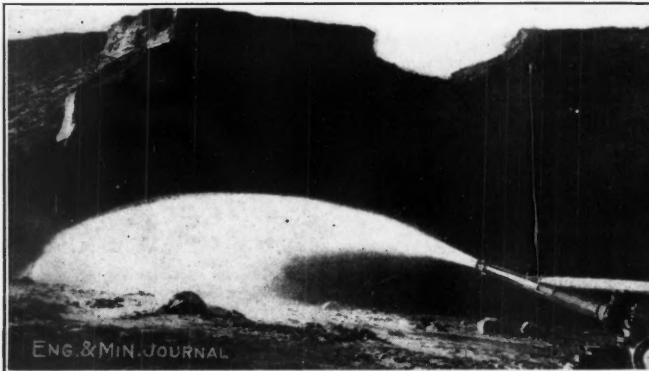


FIG. 1. THE GIANT WORKING AGAINST THE BANK UNDER THE HIGH SLUICED PIT

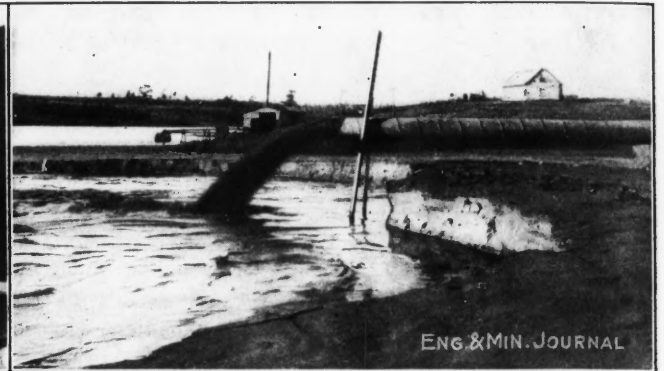


FIG. 2. THE SAND-PUMP DISCHARGE PIPE ON THE EDGE OF THE BAYOU



FIG. 3. THE HYDRAULIC STRIPPING PIT FROM THE EDGE OF THE HIGH SLUICED PIT



FIG. 4. THE SLUICEWAY FROM BANK TO SUMP AND GRATING TO CATCH BOULDERS AND BRUSH

Potosi, owned by the Virginia-Carolina Chemical Co., was not operated in 1913 on account of the disturbed conditions in Mexico.

Japan continued to ship sulphur to the Pacific Coast and anticipates some extension of trade with the opening of the Panama Canal.

Explorations for new sulphur properties were not so active in 1913 as during the previous year.

The Consolidated Gold Fields of South Africa, through its American subsidiary, acquired in 1913 a four-fifths interest in La Grange Mining Co., which operates one of the largest hydraulic mines in the world, near Weaverville, Trinity County, Calif. Certain additions to the water system were authorized, whereby a larger amount of gravel is to be washed hereafter. In addition to the value of the mine, the possible development of 14,000 hp. from the water system is suggested, in the company's report, as an asset of future value.

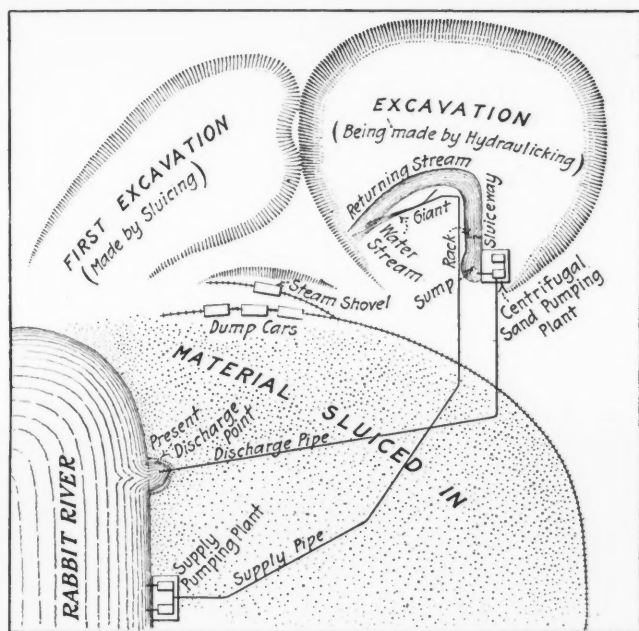
on one side of a bayou or widening of Little Rabbit River, the top of the overburden reaching a considerable elevation above the water and the top of the ore lying about 20 ft. below the water. A dike of impervious clay protects the ore and the pit from flooding by the water.

A pumping plant was established on the edge of the river and a stream of water piped to the hill over the ore and turned loose. This simple sluicing operation was extremely efficient for a time, the returning stream of water carrying a full burden of material down into the river. As the dip of the hill was washed away, however, the grades became too low and the action of the water became much less efficient. Resort was then had to hydraulicking, which was the method in use at the time of visiting. The accompanying drawing shows the layout ap-

proximately; it is purely diagrammatic, and not even roughly to scale.

At a point on the side of the bayou, two plunger pumps pick up water and deliver it to a 12-in. pipe line about 1500 ft. long, leading to the center of the excavation pit and supplying an ordinary hydraulic giant; a 10-in. pipe is used for the last few hundred feet of the line. The stream from the giant is used to undercut the banks of the overburden and the débris is washed down a rough sluiceway to a sump. Here a centrifugal sand pump picks up the mixture of débris and water and delivers it to a 12-in. pipe, which discharges it on the edge of the bayou, about 1000 ft. away.

The supply pumps are made by the Imperial Iron Works, of Duluth; they have two horizontal plungers each and are gear driven by electric motors. They have together a rated capacity of 3500 gal. per min. Nozzles of different diameters are used on the giant; a 4-in. was in service at the time of visiting and was throwing a stream for about 75 ft. It was calculated from the noz-



DIAGRAMMATIC LAYOUT OF HYDRAULIC STRIPPING

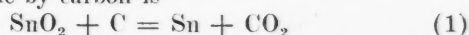
zle velocities and diameters that the pressure at the pump was about 120 ft., although no gage readings had ever been taken. The capacity of the Morris centrifugal sand pump is 5000 gal. The pump is belt driven by an electric motor. The static head was about 28 ft. It is a matter of some care to keep the sand pump working at the proper rate to take care of the supply of material. The larger boulders as well as brush and roots are eliminated from the stream of débris by the rack shown in one of the photographs. A large part of the pipe used is spiral riveted, with a flexible joint which has proved satisfactory.

The overburden here, as in most parts of the Cuyuna, is easy to handle, being fine and unconsolidated glacial drift. The only boulders found lie immediately above the ore. The center of the excavation at the time of visiting was at the top of the orebody. The side to the north had already broken through in places to the excavation made by the preliminary sluicing. The method was proving remarkably cheap, but with the installation in

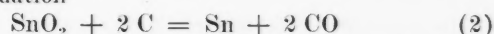
use was somewhat slow and for that reason a steam shovel had been added to the equipment in order to hurry the completion of the stripping and also because hydraulicking is not practicable in the coldest weather.

### Electric Tin Smelting

The supposition that the electric furnace is inappropriate for the smelting of tin ores, on account of its high temperature, is without foundation; for, as a matter of fact, the reduction of tin oxide by carbon requires a very high temperature, especially if the impurities are to be eliminated. The partial reaction produced in the reduction of tin oxide by carbon is



but the reduction of at least two-thirds takes place according to the equation



The carbonic oxide burns outside the furnace, and also acts as a reducing agent on traversing the charge. Under appropriate conditions, and after some hours of working, the reactions (1) and (2) take place equally. For this purpose we need theoretically 665 kw.-hr. per ton of ore. Moreover, we have to bear in mind the quantity of heat necessary to raise the charge to the required temperature, which amounts to from 1400 to 1600° C. in the reaction zone. The total consumption of energy per ton required may be estimated as follows:

	Kilowatt-hours
Reduction .....	665
Slag .....	130
Specific heat .....	65
Radiation .....	130
Gases .....	150
<b>Total .....</b>	<b>1140</b>

The first experiments, conducted by A. F. Maclaren, in London, were followed, in 1911, by others undertaken by Doctor Walmsley, in the Northampton Institute. A continuous current of 300 amp. and 100 volts was actually used, which was quite inappropriate, on account of the excessive heat dispersed at the positive pole, and of electrolytic action set up in the slag. The first experimental furnace was analogous to that used by Harmet in the reduction of iron ores. It consisted of a chamber constructed of magnesite bricks, and having a lining of tar and magnesite. The arch had a charging hole. The inside diameter was 140 mm., and the total height 356 mm. Two inclined bars of carbon, each 13.5 mm. in diameter, served as the electrodes. The apparatus had no water circulation for cooling purposes.

In the first experiment the charge consisted of 9 kg. of ore, containing 63% tin, 2.3 kg. of coke-powder, and 2.3 kg. of flux, but, owing to want of sufficient current, only 5.5 kg. of ore were actually reduced. The consumption of energy amounted to 40 kw.-hr.—viz., 15 in heating and 25 in reduction. The fusion gave 2.4 kg. of tin in bars and 0.6 kg. of residues, corresponding to a yield of 85.5%. The slag was irregular, and the consumption of current amounted to 8960 kw.-hr. per ton of tin. In another experiment, 2.9 kg. of pure tin and 1.1 kg. of residues were obtained from 7.3 kg. of ore, or a yield of 90%, with a consumption of energy at the rate of 4900 kw.-hr. per ton. The metal contained 99% of tin, and

Note—Reproduced from an abstract in "The Mining Journal" from "La Revista Minera y Metalúrgica de Madrid," 1913, based on the experiments carried out by H. Harden in Cornwall, and described in the "Elektrotechnische Zeitschrift."

a little iron, but no arsenic. When working under good conditions the slag ran well on tapping, was gray in color, had a vitreous luster and contained, on an average, 0.5% of tin. The electrolysis of the slag, melted down with soda carbonate and dissolved in water, gave a good deposit of tin on iron cathodes, but the yield was not very high, and the consumption of energy was at the rate of 1820 kw.-hr. per ton.

After the preliminary tests, experiments were conducted on a large scale. The current, obtained from a Diesel plant, was a three-phase alternating one of 50 periods, and from 650 to 675 volts. By means of an oil transformer, a current of 30, 40, 50 or 60 volts could be produced at will in the secondary circuit. The primary circuit was furnished with a registering wattmeter, and the secondary one of each phase with an ampere-meter. The conducting bars were united to the electrodes by flexible wires, avoiding as much as possible the phenomena of induction. A shaft furnace was used, provided with special patented arrangements. It contained three electrodes with carbon-bearers, and means of regulating the same. The formation of a direct arc was avoided. The charge formed a cone round the reaction zone, in which the electrodes burnt freely, surrounded by incandescent gases, which served as resistance. Certain arrangements made avoided the loss of metal by volatilization, which loss was under 0.5%. Tap holes for metal and slag were at different heights. When the holes became closed by a slag rich in iron, they were opened by the aid of an auxiliary electrode. The oxyacetylene flame served the same purpose.

The furnace was first heated with a small fire of wood or coke. To 100 kg. of ore were added, on an average, 14 kg. of culm. At the commencement of the charge the furnace was worked with 60 volts and approximately 1000 amp. per phase; afterwards the normal current was applied (40 volts, 2500 amp.). In one special case the tension fell to 30 volts. At the beginning of the charge the variations of current were relatively high, but ceased immediately on the electrodes burning freely. After half an hour the first tapping of metal took place, the slag being tapped after the lapse of several hours. The slag was vitreous, dark green and fluid. After several hours' running, arsenides and sulphides of iron were introduced at regular intervals in order to avoid the formation of hard slags. By this means a metal containing 98% tin was obtained from very impure ores. With ordinary Bolivian ore, containing 49.5% tin, and approximately 15% iron, an average yield of 92% was obtained, and it sometimes reached as much as 97%. The liquid metal was refined in shaft furnaces containing iron tubes for the injection of air. By this simple means a commercial purity of 99.76%, and more, was obtained. Finally, the metal was cast into pigs.

The three factors—yield of tin, consumption of energy and loss in slag—are inter-related within narrow limits. It is easy to obtain a slag containing only 0.25% tin, but then the process is not an economical one, as the consumption is 3000 kw.-hr. per ton of metal. On the other hand, with a slag containing 17 to 19% of tin, the consumption of energy can be reduced to 1300 kw.-hr. per ton of metal—but this, again, is not economical, as the rich slag cannot be worked afterward. An economical run can be obtained, between these two extremes, with an extraction of over 96% of tin.

As a typical example we quote the average of the results obtained during a week's continuous run. The yield was 96.75%, the consumption of energy was as follows:

	Kilowatt-hours
Heating .....	1,178
Reduction .....	13,935
Total consumption .....	15,113

This corresponds to 2200 kw.-hr. per ton of tin. The consumption of electrodes amounted to 12.7 kg. per ton of metal. During some days the expenditure of current descended to 1700 kw.-hr. per ton. The mineral was very moist (15% water), which naturally increased the expenditure of energy.

The electric smelting of tin ore gives a high yield. By using two furnaces of sufficient size—the second one for the extraction of the tin from rich slag—the consumption of energy can be reduced to 1400 kw.-hr. per ton. The electric furnace yields a pure tin continuously, and from the first, which is certainly not the case with the reverberatory furnace. Moreover, as compared with the latter, the hand labor is less, as two workmen are sufficient for one furnace, and the space occupied by the furnace is much reduced. The consumption of electrodes is so small that it need not be taken into account.

The electric process can be advantageously employed in places where the ores are good, but not very rich, and where waterfalls can be utilized for supplying the power needed.

⌘

### Goldfield Consolidated

During November, 1913, the total production of the Goldfield Consolidated Mines Co. was 28,947 tons, from which \$170,779 was realized. Development work amounting to 2675 ft. was performed. The operating costs were as follows:

	GOLDFIELD CONSOLIDATED NOVEMBER COSTS		
	Mines Co.	Milling & Trans Co.	Total
Mining:			
Stopping .....	\$2.85	.....	\$3.26
Development .....	0.41	.....	0.19
Shipping expense .....	0.19	.....	0.04
Dump moving .....	0.04	.....	0.09
Transportation .....	.....	\$0.09	1.78
Milling .....	.....	1.78	0.05
Marketing .....	.....	0.05	0.36
General expense .....	0.27	0.09	0.15
Bullion tax .....	0.15	.....	0.01
Construction .....	0.01	.....	0.01
Flood damage .....	0.01	.....	.....
Total costs .....	\$3.93	\$2.01	\$5.94
Miscellaneous earnings .....	0.02	0.04	0.06
Net costs .....	\$3.91	\$1.97	\$5.88

⌘

### Filtration of Barium Sulphate

Krak (*Chemist Analyst*, 1912, p. 26) has shown that if the supernatant liquid be poured off, a precipitate of barium sulphate can be granulated by stirring it with a saturated, slightly acid solution of ammonium acetate, so that it may readily be filtered by suction. In discussing this, J. L. Osborne (*Journ. Soc. Chem. Ind.*, Oct. 31, 1913) says that there is no such action if the supernatant liquid is not removed. Ammonium chloride and hydrochloric acid do not disintegrate the granular precipitate when once it is formed. If the barium sulphate is originally precipitated cold, much longer action of the ammonium acetate is necessary to give the easily filterable granules.



# Petroleum in the United States

The production of petroleum in the United States experienced a noteworthy expansion in 1913, which was stimulated by the high prices prevailing for crude oil in every field. The accompanying table, which is based upon reports by our correspondents, gives the details of the production.

## PRODUCTION OF CRUDE PETROLEUM IN THE UNITED STATES (In Barrels of 42 Gal.)

Field	1911	1912	1913
California	77,224,359	84,823,992	96,881,967
Colorado	226,926	200,000	(a) 220,000
Gulf } Texas	9,256,474	11,778,324	(f) 14,280,000
} Louisiana	10,720,420	(e) 9,791,896	(e) 12,750,000
Illinois	31,317,038	28,400,000	21,600,000
Lima } Indiana	1,695,289	1,200,000	3,814,000
} Ohio	2,960,711	3,000,000	
Mid-continental (b)	57,911,525	52,771,603	64,556,000
Kentucky-Tennessee	472,458	500,000	(a) 500,000
Appalachian (c)	26,117,960	26,000,000	22,224,000
Wyoming (d)	194,690	500,000	2,354,000
Others	5,000	5,000	(a) 50,000
<b>Total</b>	<b>218,372,850</b>	<b>218,970,815</b>	<b>239,229,967</b>

(a) Estimated. (b) Kansas and Oklahoma. (c) Pennsylvania, New York, West Virginia and eastern Ohio. (d) Includes Utah. (e) Includes Marion County, Texas. (f) Includes Panhandle field of Texas.

Although there was a diminished production in the Eastern fields, there was nevertheless great activity in them and general prosperity.

## Petroleum in Illinois in 1913

BY RAYMOND S. BLATCHLEY\*

Illinois continued in 1913 the alarming decline in oil production that threatens to speedily reduce her rank as a producing state. The estimated production for the year is 21,600,000 bbl., as against 28,601,308 in 1912. The accompanying table covers the annual production from 1905 to 1913:

### ILLINOIS OIL PRODUCTION, 1905-1913<sup>1</sup>

Year	Bbl.	Value
Previous	6,576	.....
1905	181,084	\$116,561
1906	4,397,050	3,274,818
1907	24,281,973	16,432,947
1908	33,686,238	22,649,561
1909	30,898,339	19,788,864
1910	33,143,262	19,669,383
1911	31,317,038	19,734,339
1912	28,601,308	24,332,605
1913 (estimated)	21,600,000	27,432,000
<b>Total</b>	<b>208,112,868</b>	<b>\$153,431,078</b>

<sup>1</sup>Day, Mineral Resources of the U. S., Calendar year 1912, Advance chapter, 1913, p. 12.

It may be expected that such a sharp decline will continue for some time or until the general production reaches a stage which will correspond to the development of the deep-sand locality of Lawrence County. Here the numerous pools have a good staying quality and therefore their decline may be expected to be slow. The opening of new pools is liable, of course, to reverse the situation. The basis of estimating the production for 1913, since only 11 months returns are available, is to assume the December runs of the Ohio Oil Co. and the Tidewater Pipeline Co. equivalent to those of November and the tank car shipments about 2,000,000 bbl., as compared with 2,674,649 bbl., according to Day for 1912. The tank-car shipments are made from Duncansville, Lawrenceville, Flat Rock, Stoy, Robinson, Bridgeport, Sandoval, Carlyle, Casey, and Allendale. The accompanying table gives the pipe-line runs and stocks, by months, of the Ohio Oil Co. and the runs of the Tidewater Pipeline Co. according to the *Oil City Derrick*:

### ILLINOIS OIL PRODUCTION FOR 1913

Month	Runs, Bbl.		Stocks, Bbl., Ohio Oil Co.
	Ohio Oil Co.	Tidewater Pipeline Co.	
January	1,614,667.45	126,944.68	11,598,519
February	1,366,718.50	112,266.29	10,366,955
March	1,478,900.43	124,473.25	9,966,083
April	1,479,791.92	126,079.22	9,486,416
May	1,573,150.55	145,629.14	8,990,143
June	1,493,990.77	128,682.11	8,111,629
July	1,557,197.98	136,618.21	7,618,891
August	1,506,112.05	136,306.20	6,934,310
September	1,469,552.16	141,854.13	6,478,499
October	1,515,010.47	147,261.93	5,782,397
November	1,407,188.00	131,316.00	5,875,337

The decline of production, like that of 1912, is further marked by the release of oil from storage. Surplus oil began to accumulate from 1906 and reached its zenith about September 1, 1910, with stocks aggregating 29,289,164 bbl. The drain on storage continued steadily until August 1, 1912, at the rate of about 19,500 bbl. per day. From August, 1912, until Feb. 1, 1913, the drain averaged 23,400 bbl. per day and since that time it has averaged about 16,000 bbl. per day.

Illinois has shared steadily in the general advance in prices of oil since Jan. 1, 1912. This has been due chiefly to the demand for motor fuels and also other prevailing economic conditions. The highest annual value of oil in the state was reached in 1913. The following table shows the advances in price of Illinois oil.

### FLUCTUATIONS IN PRICES PER BBL., OF ILLINOIS OIL IN 1913

Date	Price per Bbl.	Date	Price per Bbl.
Jan. 1	\$1.08	Feb. 20	\$1.25
Jan. 3	1.11	Apr. 15	1.30
Jan. 27	1.14	Nov. 5	1.35
Feb. 1	1.17	Nov. 19	1.40
Feb. 6	1.20	Nov. 21	1.45

The average price per barrel for the 11 months is about \$1.27, which makes the total value of oil produced for the year about \$27,432,000.

### SOUTHEASTERN ILLINOIS OIL FIELDS

The main oil fields of southeastern Illinois showed a general decline for the year. The Clark, Cumberland, Coles and Edgar County fields (shallow pools) show a much more weakened condition than in the previous year. These fields produce from one to three barrels of oil per day per well and still seem to be profitable when a number of them are pumped on one central power. The Crawford County area maintained the same steady low yield of the year before. There was but little new drilling done in the county.

The chief inside development in the main fields took place in Lawrence County, particularly at the south end of the field where there are as many as four and often five producing sands to the well. Even this new work was greatly handicapped because of an extensive summer drought which caused a shortage of water for drilling purposes. The new wells were of good size but not sufficient to check a general decline for Lawrence County and hence for Illinois. The wonderful production of the area has delayed the decline of the State production for several years. Most of the new drilling was done to the McClosky limestone.

The Allendale pool was discovered and defined in 1912, in sections 3, 4, 9 and 10 of T. 1 N., R. 12 W., Wabash County. This pool was a disappointment in extensive development. There are at present 36 producing wells with a daily production of about 700 bbl. The oil comes from a depth of 1480 to 1550 ft. in a sand which seems

\*Oil geologist, Illinois State Geological Survey, Urbana, Ill.

to correspond to the Kirkwood sand of Lawrence County. The field structure has the appearance of an isolated shelf along the western limb of the LaSalle anticline, along which the main fields lie.

The Carlyle pool, three miles northwest of Carlyle, Ill., showed a decline in production in the last year. There are at present 154 producing wells in the field with an average daily production of about 1070 bbl. Only 10 new wells were added to the field during the year. These had an initial yield of 96 barrels.

The Sandoval pool, just north of Sandoval, has 112 producing wells with an average daily production of about 875 bbl. The new drilling in this field exceeded that of Carlyle. There were 17 new wells developed with an initial production of 405 barrels.

#### MISCELLANEOUS DEVELOPMENTS

Three new oil wells were added to the Carlinville pool in Macoupin County. One of the wells is credited with an initial yield of 100 bbl., of a thick heavy oil while the total initial yield of the three reached 165 bbl. There are now six gas wells and seven small oil wells in the field. The oil comes from the Pottsville sand immediately overlying the St. Louis limestone.

A small oil well was discovered a mile south of the old Brown well east of Centralia, Ill. The initial yield of the well was 20 bbl. The oil comes from a depth of about 1650 ft. in a sand which corresponds to the Kirkwood sand of Lawrence County.

A new pool was opened on the D. Hebert farm in Sec. 15, Allison Township, Lawrence County, late in July by the Ohio Oil Co. The first well produced initially 50 bbl., of oil from the Kirkwood sand and a second well, 40 bbl. These two wells are the only ones developed in the pool at present. Their combined daily production now is about 30 bbl.

Barren wells were drilled in 1913 near Murphysboro, Equality, Harrisburg, Duquoin, Hoffman, Hoyleton, Edwardsville, Millstadt, Pinkstaff, Kingman, Lexington, Dundas, Anna, Olive Branch and Villa Grove. New drilling is going on or will soon start near Allerton, Vandalia, Pesotum and Mahomet. The last two towns lie along the LaSalle anticline and drilling will go to the Trenton limestone.

SEVEN-YEAR RECORD OF ILLINOIS OIL WELLS

Years	Wells Completed	Wells Producing	Initial Output, Bbl.	Dry Holes	Average Yield per Well	Total Production, Bbl.
1906	3283	2793	113,012	490	40.4	4,397,050
1907	4988	4260	139,163	728	32.6	24,281,973
1908	3574	3019	78,960	555	26.1	33,686,238
1909	3151	2593	89,756	558 <sup>1</sup>	34.0	30,898,339
1910	2139	1671	93,256	468	55.8	33,143,362
1911	1364	1059	66,919	305	63.1	31,317,038
1912	1256	986	65,586	270	66.6	28,601,308
1913 <sup>2</sup>	1629	1338	42,235	291	31.6	21,600,000

<sup>1</sup> 70 gas wells included.

<sup>2</sup> Eleven months.

On Jan. 1, 1913, it was estimated that 21,238 wells had been drilled in Illinois. Of these 3422 or 16.1% were barren. In the first 11 months of 1913, 1629 wells were drilled with 291 or 17.9%, barren. The total up to Dec. 1, 1913, was 22,867 wells drilled, with 3713, or 16.2% barren. According to E. W. Parker, statistician of the U. S. Geological Survey, there were 13,222 productive oil wells in the Illinois fields on Jan. 1, 1913 and an oil acreage of about 288,207 acres. The abandonment of old wells is gradually decreasing the total of productive wells.

## California Oil in 1913

BY M. L. REQUA\*

In California, 1913 has witnessed a number of interesting occurrences in the oil industry. Probably the most important is the entrance of the Royal Dutch Shell group. Offices have been opened in San Francisco under the name of the American Gasoline Co. and active operations commenced by acquiring the California Oilfields, Ltd., situated in the Coalinga field, the production of which has been about 12,000 to 14,000 bbl. per day for the past year.

The general impression in the oil industry is that this corporation will continue to gather oil land, and will in time become an aggressive competitor in the California fields. It is probable that this means another pipeline from the fields to tide-water at some point, probably San Francisco Bay.

The completion of the General Petroleum line from Midway to Los Angeles has given an outlet for the Midway oils into Southern California where in the past, prices have ruled relatively higher than in the valley fields.

There has recently been an announcement in the San Francisco papers that financial arrangements have been completed in London whereby the company is to receive \$3,000,000 immediately and possibly larger sums at a later period, depending upon the conclusions reached as to taking up the option held by E. J. De Sabla upon the controlling interest in the Union Provident Oil Co., which in turn controls the Union Oil Co. This financing with the future possibilities attached to it has been the development of the last part of November and has attracted a great deal of interest among oil men in California.

The finances of the Union Oil Co. have undergone a serious shaking up during the year, the stock having declined from \$100 and over to between \$50 and \$60 per share. Dividends have been suspended with the announcement that they will be paid semiannually hereafter instead of monthly. There is no apparent promise that there will be any forthcoming dividend in January and the stockholders are not in a particularly happy frame of mind. The company, however, is getting into a much more satisfactory financial condition, owing to being able to liquidate pressing indebtedness with funds that would otherwise have gone for dividends and there seems to be no question but what ultimately the wisdom of the action will be full demonstrated.

No company in California is possessed of greater proved and possible territory than is the Union Oil Co. It has, in common with most of the oil companies of the state, been undergoing a period of depression which has been so characteristic of the business for the past several years. In addition to this, lack of sufficient working capital has seriously embarrassed operations and the suspension of dividends is undoubtedly a wise move.

Whether the De Sabla option will be exercised, is the most interesting bit of speculation now being indulged in by the oil industry of the state. Controlling the Union Oil Co. the General Petroleum Co. would rank as one of the great oil corporations in California.

The Standard Oil Co. during the past year has not only enjoyed its usual prosperity but has experienced un-

\*Consulting engineer, Crocker Bldg., San Francisco, Calif.

usually satisfactory results from drilling in Midway and in southern California. At the present time its production is stated as approximately 55,000 bbl. per day and there is a prevailing impression that with little effort this could be very materially increased. The gushers of the Standard in Midway and in southern California have had a material effect upon the daily surplus. For the first half of the year the surplus averaged only 2085 bbl. per day; for the remaining months, it has been as follows: July, 2310; August, 24,018; September, 31,412; October, 17,942 bbl. daily. Stocks on hand Jan. 1 will approximate 50,000,000 bbl. The increase in daily surplus during the last half of the year has been due largely, if not entirely, to the wells of the Standard Oil Co. The pronounced increase in the production of light refining oil, due to the marked increase in the Midway field, has created a new condition in the business. At the present time the relative production of oils is about 40% fuel oil and 60% refining oil. This has worked an additional hardship upon producers of heavy grades of oil, owing to the fact that the residuum from the refining oil competes directly with the low-gravity fuel oil.

There has been no material change in the fields of the state other than the southern California fields and Midway, both of which have shown material advancement. The production for the year is as follows, November and December being estimated:

CALIFORNIA 1913 OIL PRODUCTION IN BBL.

San Joaquin Valley	
Midway.....	31,640,388
Coalinga.....	19,097,200
Kern River.....	11,335,598
McKittrick.....	4,623,833
Sunset.....	6,130,667
Lost Hills-Belridge.....	5,133,534
	<hr/>
	77,968,220
Coast	
Santa Maria.....	4,925,845
Fullerton.....	6,277,599
Salt Lake.....	2,617,926
Whittier-Coyote.....	3,646,162
Ventura.....	887,650
Los Angeles.....	384,352
Newhall.....	121,813
Summerland.....	59,400
	<hr/>
	18,920,747
	96,881,967

Total for state.....  
 \* Does not include oil used in the fields for fuel.

The price of oil as determined by the Independent Oil Producers Agency is 36½c. at the wells with some slight tendency to advance. It will apparently, however, require several years yet to overcome the enormous surplus production under which the state has been laboring for several years past. The Southern Pacific still holds the Associated and little is heard of the impending sale of this corporation. The Associated has during the past year paid two dividends and is expected to continue upon a dividend-paying basis. These dividends have been at the rate of 1½% paid at six-month intervals.

There is considerable discussion of the possibility of consolidating the oil interests into a few large corporations but nothing has been worked out along these lines. The Common Carrier Pipe Line Bill has been vigorously championed by Francis J. Heney before the Railway Commission and there has been some apprehension that the gentleman might attack the Independent Agency as a "bad trust." Because of the general unsatisfactory financial conditions and because of the fear of attack there had been no headway made during the year in bringing together the smaller corporations.

In the meantime the Standard Oil Co. serenely pursues its way, becoming stronger and stronger as the years

go by. Comes the Royal Dutch as a worthy rival of the Standard, and with the Associated and the Union occupying other points of vantage there seems to be little present hope of any combination that will be of material benefit to the many small companies throughout the state.

Water, the bug-bear of the oil fields, has made itself unpleasantly prominent in several places during the past year and in several cases the companies are not financially able to handle the situation properly. In summarizing, it may be said that the hoped for advances in prices in 1913 did not materialize, due largely to the bringing in of a number of large wells in Midway and in southern California.

The feeling is constantly growing, however, that the future holds out tremendous possibilities for the oil companies producing in California who have sufficient financial ability to maintain their position in the front rank. While production has increased materially, consumption has kept pace with it and there seems to be no doubt but that the day of large returns for the properly financed oil companies is not far away.

During this period the Standard has apparently progressed as well as the most sanguine stockholders could have hoped for. The Associated has been getting itself into a stronger position and has resumed dividends and the Union is now undergoing the rehabilitating process. The financing of the General Petroleum rounds out the cycle, indicating that for these companies at least the era of prosperity ought not to be long deferred.



Texas and Louisiana Oil in 1913

BY W. E. WRATHER\*

A much more hopeful tone is evident among the oil producers of Texas and Louisiana at the close of 1913 than prevailed at the beginning of the year. A year ago the sole dependence for production seemed to be the older fields, which, with the exception of Electra and Caddo, were on a steady decline. Four new pools were discovered during the year: Mansfield, Edgerly, Orange and Moran; the first two in Louisiana, the latter two in Texas; and at least the three first named bid fair to become consistent producers. Edgerly and Orange (the latter sometimes known as Cow Bayou) are in the coastal heavy-oil belt; Mansfield belongs to the Cretaceous light-oil district of northwestern Louisiana; and the Moran sand is in the Pennsylvanian section of northwest Texas.

The Mansfield pool appears thus far to be the most important discovery of the four. The first well, completed early in May, has settled down from 1500 bbl. to a consistent producer, making about 500 bbl. per day. For the succeeding five months it remained the best well in the field. New wells were small, and much pessimistic comment was heard, but in the latter part of November two wells were finished, one making 500 bbl. and the other 650 bbl. They are located, respectively, ¼ mile southwest and ⅜ mile northeast of the discovery well. They remove the field from the doubtful class and augur well for its future. In October, a huge gasser, rated at 40,000,000 cu.ft. per day, was finished in a 2800-ft. sand, 3½ mile north of the discovery well. This is of interest as being the deepest important gas well ever found in

\*Beaumont, Texas.

either Texas or Louisiana. The 800-ft. gas sand furnishes relatively small wells. The horizon in which the deep oil is found is much thicker at Mansfield than at Caddo. Oil has been found at Mansfield in sands ranging in depth from 2400 to 2900 ft., though the main sand thus far is near the top. At Caddo the range is from 2150 to 2300 ft. The territory is principally controlled by the refining companies: The Gulf Refining Co. of Louisiana, the Producers (Texas Co.), the Standard Oil Co., and a new concern, the Pasadena Petroleum Co. (a consolidation of the Busch-Everett and Texas Co. interests).

Moran also produces light-gravity oil, though its future will remain in the balance until more drilling has been done. For several years the locality has furnished light gas wells, which have been drawn on to supply nearby small towns, but oil was first discovered in October. The only oil well thus far developed is now making about 60 bbl. of 35° (Bé.) gravity oil from a 2000-ft. sand. Deeper holes have been drilled within a short distance of the producing well without finding any oil and the feeling is none too optimistic, though much new work is being undertaken. The sand is in the Cisco beds, in the top of which most of the important workable coal of Texas is found. The field generally is classed with Electra, though it is located about 110 miles south of that point.

An important 1050-ft. gas well was completed in southern Throckmorton County, about 35 miles north of Moran, and gas in varying quantity is reported from several adjacent counties, which renders this section an attractive one for further wildcatting. A number of scattered tests are drilling, and leasing is active throughout the territory.

Orange and Edgerly, only 25 miles apart, one in southeast Texas, the other across the Sabine River (to the east) in Louisiana, have not been sufficiently drilled to obtain a fair estimate of their possibilities. At Orange only one well is producing, from an unusually deep sand at 3150 ft., but at the end of its fourth month it is flowing about 180 bbl., a decline of only 70 bbl. since its completion last August. Edgerly is the scene of considerable activity, although the production of the pool is not more than 500 bbl. Some months ago oil was found in small quantities between 1500 and 1600 ft., and in August a 2350-ft. well made a daily yield of 600 bbl. of heavy black oil, though it settled down within a few weeks to a small well. In October a deeper sand, at 2750 ft., was discovered and a well was brought in flowing around 1000 bbl. of 18° (Bé.) gravity black oil. This well now makes some water, with from 300 to 400 bbl. of oil. In December, a sand was developed at 3000 ft., and in 44 hr. this well made 5900 bbl., the sand choking off the flow. The depth of the well and volume of the flow indicate a rich oil deposit. It appears reasonably certain that both Edgerly and Orange will become profitable pools.

The discovery of deep oil sands at the above places has given rise to the belief that the deep sands of the Gulf Coast will eventually produce much more oil than has heretofore been thought probable. This view has been held for several years by geologists familiar with the section, among them L. Hager and W. Kennedy, and this idea led to the discovery of oil at Orange under Mr. Kennedy's direction. Deeper drilling along the coast will undoubtedly be stimulated in the future because of this development.

On the outskirts of both Humble and Batson deep oil has been found during the year. About a mile east of the Humble pool proper, several unusually good wells have been completed at 2750 ft. One temporarily made at the rate of 10,000 bbl. per day, but the casing collapsed and the well was again drilled in and is now making 4000 bbl. The oil is of considerably lighter gravity than that in the older part of the pool, and seems to come from sands which dip away from the center of the dome. The performance of the wells to the east encourages the belief that the immediate territory may prove prolific, unless drowned out by salt water, as in the deep sands north of the field.

At Batson the deep oil seems to occur under the same conditions as at Humble, though scarcely so deep. The gravity ranges about 34° Bé., but the area on the west side of the pool, where deep oil has been found, seems limited and the development is relatively unimportant.

In the other coastal pools little of interest has happened. Vinton, within sight of the new Edgerly pool, is on a steady decline. A local, prolific sand at 2300 ft. for a time sustained production, but deeper drilling developed only salt water. Pine Prairie long ago ceased to be a possibility. It furnished only one producing well, which has declined to a nominal output, and new work has about ceased. Goose Creek occasionally furnishes a fair well, but the territory is very erratic. At Pierce Junction, near Houston, some gas and small showings of oil have been found, but nothing of commercial importance. It is worthy of mention, however, that another typical salt dome was found during the year in Brazoria County, 8 miles south of Angleton, though it showed no oil and only small quantities of gas.

In north Texas the production continues to increase. Electra's output is estimated at 28,500 bbl. daily. The deep sand (1560 to 1900 ft.) continues to furnish the best wells and from them comes the bulk of the production. Until recently the 1900-ft. sand was thought to be most prolific on the southwest side of the field, but an 1800-bbl. well near the center of the pool leads to the belief that it may be present further east, although drilling thus far has demonstrated that it will be spotted when developed, which will probably not be until the overlying shallower sands are exhausted.

An occasional 500-bbl. well is found on the southwest side of Petrolia, though the field has remained throughout the year predominantly a gas field. The present production is not more than 1500 bbl. Burkburnett furnishes around 1200 bbl. daily, but results of late are not encouraging. A small area of shallow (500-ft.) sand has been developed south of Iowa Park, which, though not in itself of much importance, points toward the possibility of finding other such areas.

The history of the Caddo pool was practically a repetition of that of the preceding year. Several phenomenal wells have been finished in different portions of the field, though seldom, if ever, has it been possible to bring in a second well of similar size in the immediate vicinity. The bed of Ferry Lake has proven to include some of the best territory in the field, and the scattered derricks erected on cribbing or piling present an interesting and unusual sight. The best results of the year have been obtained in the south end of the pool around Mooringsport, in a section which was drilled over with less success when the pool was first discovered. Due to the heavy gas pres-

sure in the oil sand, and the light gravity of the oil, fires are easily started and are of far too frequent occurrence. One of the most sensational fires ever seen in the field was that of the Star Oil Co. on the Loucks lease west of Mooringsport. The well caught fire when making 10,000 bbl. (estimated) of oil per day, and the coöperation of all the producers in the field was necessary to extinguish the flames, which formed a solid column of fire over 200 ft. in height. The daily light-oil production has ranged between 17,500 bbl. (for January, the lowest of the year) to 32,500 bbl., the fluctuation being principally due to the completion of large wells, which soon declined to a normal figure. The heavy-oil production has averaged about 3000 bbl. daily.

Another good well has just been completed at Mansfield, La. It is the Pasadena Petroleum Co.'s No. 1 on the Wemple land, and started flowing at the rate of 3600 bbl. per day.

✻

## Oil and Gas in the Midcontinental Field

BY ERASMUS HAWORTH\*

The production of oil during 1913 in the Midcontinental Field, and also in the Texas Panhandle, was considerably greater than ever before known, reaching a total of 75,662,212 bbl. This increase is due to the activity in drilling, which in turn was brought about by the increase in the price of oil. Late in 1912 the price of oil began to advance rapidly and reached 83c. by the middle of November, and 93c. by the close of 1912. Developers and prospectors got a good start with their new operations before 1913 came in. The price continued to advance and reached \$1.03 early in 1913, where it has remained to the present time.

The independent refineries generally were compelled to pay above the market price in order to obtain as much oil as they desired, this premium in some instances reaching as much as 10c. per bbl. As a rule the large producers do not care to sell to the small refineries, lest it might interfere with their sales to the larger consumers. Again, the small refineries have limited pipe-line facilities so that their ability to handle oil is by no means to be compared with the facilities of the large purchasing companies. The independent refineries greatly increased during 1913, both in number and in capacity, so that in the aggregate they are assuming considerable proportions. This is more emphatic since the Waters-Pierce Oil Co. opened its refinery at Sand Springs, near Tulsa. The enlarged development throughout the year failed to open a single new pool of any remarkable size. A number of lesser pools were discovered and many good wells obtained substantially in the heart of the old fields. In Kansas, Chautauqua County still holds the lead for the state. Many new wells have been obtained here. In Montgomery County the greatest development has been around Wayside, where oil was produced more than 10 years ago. Most of the new wells have been drilled deeper than the old wells were with good results, and some of the old wells were deepened with good results likewise. A few of the new wells started with a production of from 50 to 100 bbl. per day, but a majority of them were from 5- to 30-

bbl. wells. Good interest has been renewed in the Rantoul and Paola areas. The Rantoul field lies principally in the southwest corner of Miami County, reaching across into Franklin County. Operators seem to have concluded that this is a favorable area and much development has resulted with many new producing wells of small capacity being obtained ranging from 5 bbl. to 100 bbl. capacity.

An interesting pool has been uncovered in the vicinity of Inola, Oklahoma, southeast of Claremore. Here, at a depth ranging from 400 to 650 ft. a number of good wells have been obtained, some of which produce as much as 300 bbl. per day. Special interest attaches to this field on account of its being so far to the southeast and substantially outside of what has hitherto been considered the productive area. In September and October much interest centered in a small pool at and near "Lost City," a prominent bluff with peculiarly arranged rocks giving it the name, just south of Arkansas River, about five miles up stream from Tulsa. Some of the largest wells ever known in Oklahoma were obtained here, producing more than 2000 bbl. of oil a day. Of course drilling became active, which practically has resulted in outlining the pool and showing that it covers a small area.

Up around the Cleveland area some quite remarkable developments have been made. A number of wells have been obtained that started above the 1000-bbl. mark, with a few of them equaling 2000 bbl. per day for a short time. Some of these have been on the north side of the river in the Osage and others on the south. This resulted in high bonuses being paid for certain leases in the Osage country, which were auctioned by the government in November, at which as high as \$153 per acre was paid. It is too early to predict the return such high-priced land will yield, but the first few wells brought in are not especially encouraging. To the southwest in the Cushing field, which became so prominent in 1912, drilling activities have continued, but relatively with less vigor. The developments seem to be working north and east from the original pool. A number of dry wells have been found and also some remarkably large gas wells, principally along the eastern and northern border of the oil pools.

Probably the most remarkable development for all Oklahoma, at least the greatest sum total production of oil, is confined to Washington and Nowata Counties. The old fields in Washington County around Bartlesville, Dewey, Copan and Wann are a surprise to everybody. The Wann pool lies west of Wann in Washington County and wells have been obtained recently producing as high as 600 bbl. per day, natural. It seems as though it is difficult to drill a random well anywhere in this vicinity without being in danger of striking either oil or gas.

Late in the year interest was centered around a new pool a few miles southeast of Newkirk, which lies 10 miles south of Arkansas City, Kan. The storm center was on the Murdock farm in Sec. 2, T. 27, N, R 3 W. A small anticline was discovered here and a well drilled, which was variously reported at from 100 to 600 bbl. capacity. This was followed by other wells in the immediate vicinity until at the present time a half dozen producers have been obtained. Storage capacity has not yet been provided, and purchasing parties have not yet reached the field with their pipe lines, so that the one outlet for oil is the freight cars on the Santa Fé. It is entirely too early to estimate the extent and capacity of this pool. It is interesting to note, however, that it has created more

\*State geologist, Lawrence, Kan.

interest than any other discovery made in Oklahoma during the year. For two or more years previously developments in oil and gas in and around Ponca City were carried on with moderate results, but without raising the production of oil to as much as a thousand barrels per day. It is hoped by developers that the Newkirk pool will prove to be a northern extension of the Ponca City pool. Developers and speculators rushed to the new field and covered the whole country with leases, even northward for 20 or 30 miles into Kansas, making it possible to hear lively oil gossip around the hotels of Arkansas City, Winfield, and other Kansas towns far surpassing anything ever before known. At this date practically no drilling has been done in this area outside of Sec. 2, near Newkirk, above mentioned, but from present indications it looks as though a great many wells will be drilled in the near future. It is interesting to note geologically that a line of mild dynamic disturbances extends from the Newkirk area north by a little east by way of Dexter, Augusta and Elmdale, entirely across the state of Kansas, and that the few gas wells obtained at Winfield, Dexter, Augusta and Elmdale have been produced along little anticlines existing in this disturbed area. Companies are forming and leases are being taken even as far north as the Kansas River, in the vicinity of Wamego.

The following table gives the total production of oil for 1913 for the Oklahoma-Kansas Midcontinental oil fields and the Panhandle fields of Texas, around Electra and Petrolia:

1913 PRODUCTION, MIDCONTINENTAL FIELD	
Oklahoma-Kansas:	
Prairie Oil & Gas.....	38,675,619
Gulf Oil & Pipe Line (est.).....	19,712,000
Texas Oil (est.).....	7,623,800
Independent Refineries (est.).....	10,375,000
<b>Total Oklahoma-Kansas .....</b>	<b>67,386,419</b>
Texas Panhandle Field .....	8,275,793
<b>Total Midcontinental .....</b>	<b>75,662,212</b>

With the close of the year oil stocks in the hands of the purchasing companies are as large as have been known. The Prairie Oil & Gas Co., on Nov. 30, had 42,548,553 bbl. in stock; the Gulf Oil & Pipe Line had 5,989,820; the Texas Oil Co. had 2,781,290 bbl. in stock, making a total considerably over 51,000,000 bbl. held in stock by the large purchasing companies in the Midcontinental field proper. To this should be added approximately 100,000 bbl. in the Texas Panhandle fields, held by the Magnolia Petroleum Co. and the Texas Oil Co. Producers also have their tankage on their leases loaded substantially to the limit, and it looks as though production will have to be curtailed before relief can be afforded. The Prairie Oil & Gas Co. is extending its pipe lines for deliveries. Already they have asked operators to make a check in production until new delivery pipe lines now under construction can be completed, which they estimate will be about the middle or close of January, depending somewhat upon the weather. It seems, however, that this request has had the opposite effect, because every producer is anxious to deliver every barrel possible before a reduction in price sets in, and in this way the warning is likely to increase production rather than diminish it.

The gas situation throughout the Midcontinental field, and the large cities to which it is piped, is in unsatisfactory condition. Litigation begun in 1912 is still unadjusted. The Kansas Natural Gas Co. applied for receivers in the Federal courts and Federal receivers were appointed. Previous to this, however, the state of Kansas

had applied to District Judge Flannely, of Independence, for state receivers, which request was granted. It became necessary, therefore, for the United States Appellate Court to decide which receivers should handle the property. A decision upholding the state receivers was made by Judge Marshall, sitting in Denver in October, from which the Kansas Natural appealed to the appellate court. The latter sustained Judge Marshall's decision, but the time has not yet expired for possible appeals. This means, therefore, that throughout the entire year, the Kansas Natural's property has been tied up in courts so that no extra development work could be made and no pipeline extensions could be built. The amount of gas piped to the northern cities, Kansas City, St. Joseph, Atchison, Topeka, etc., has been unsatisfactorily small and great complaint has resulted. Many Oklahoma and Kansas producers insist that the new Oklahoma developments have produced enough gas to last the northern cities indefinitely, but there are few new wells to which pipe lines have been laid.

In almost every instance where new gas wells have been located with pipe lines they have proved unsatisfactory and short lived. A most remarkable gas pool was brought to notice in May, June and July. A small gas pool was tapped near Dewey which produced most wonderful wells. One of them started with a capacity of over 46,000,000 cu. ft. per day, and a number of others at 20,000,000 or better. About 16 or 18 wells were drilled in rapid succession, 9 or 10 of which were producers. Pipe lines were connected and in three or four months' time the whole supply was exhausted, having produced little, if any, more than gas enough to pay for drilling. So rapid a decline of such large wells is almost unprecedented.

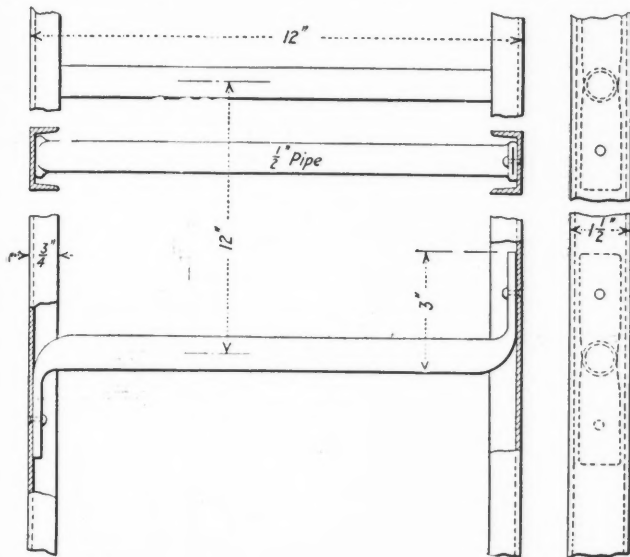
The Kansas receivers for the Kansas Natural Gas Co. are Mr. Litchfield and Mr. Landrum, experienced oil and gas men. It is currently reported that they are confidently expecting to supply all the gas to the northern cities the pipe lines will carry. In the meantime, a number of local companies have been formed for handling gas and consuming it close to home so that many are afraid the big companies will be unable to obtain an adequate supply after litigation ends. It is also pointed out by some that it is most natural, and hence probable, for much of the gas in the southern part of the country to be carried south. For some time pipe lines have been laid from the Texas Panhandle fields about Wichita Falls and Petrolia, to Dallas, Ft. Worth, and other Texas cities. The development here has reached north across Red River some miles toward Oklahoma City. The Oklahoma City Pipe Line Co. has had a large gas pipe carrying gas from the heart of the Midcontinental fields southwest into Guthrie, Oklahoma City and other points. Many believe that the Wichita Falls field ultimately will be connected up with the Midcontinental fields, as the gap is ever growing narrower. The actual distance between the pipe lines at Oklahoma City and those extended north from Wichita Falls is only 50 or 60 miles. Franchises already obtained in the Texas cities permit a higher selling price than is allowed in Kansas City, or any of her neighbors. How easy it would be, therefore, some say, to connect the big wells in the Cushing field with the Oklahoma pipe line and then span the 50 or 60 miles between the terminus of the latter and the Texas pipe lines, and in that way carry a large proportion of gas southwestward where better prices may be obtained.

# Details of Practical Mining

## Portable Steel Ladder

BY L. O. KELLOGG

The Penn Iron Mining Co., on the Menominee range, is adopting an all-steel ladder underground. The illustration shows the type used in stopes and manways where the installation is more or less temporary. The ladder is 12 ft. long, 1 ft. wide and weighs a little under 50 lb. The sides are of 1 1/4 x 3/4-in. channels with the flanges inside; the rungs are of 1/2-in. pipe. The ends of the pipes are bent at right angles in opposite directions, flat-



ENG. & MIN. JOURNAL  
LIGHT ALL-STEEL LADDER OF PIPE AND CHANNEL

tened and riveted to the channels, the rivets being countersunk on the outside. The ladders are of unusually light construction, but are found to stand up well in service and are extremely convenient to carry about and place as needed. They are found preferable to the type first tried, built of heavier channels and 3/4-in. pipe and weighing nearly twice as much. For permanent installations, as in the shaft, a much heavier ladder is used, built also entirely of steel.

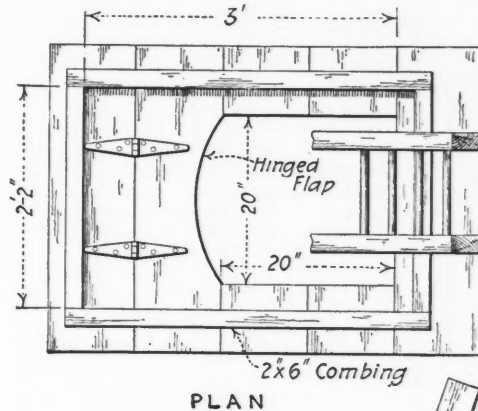
## Drill Repairs and Air Consumption

In the course of a study of the air consumption at the Village Main Reef property on the Rand, the effect of the state of repair of the drills was investigated. The machines on various levels were isolated, and a meter in the air-supply pipe gave the consumption over the total time the machines were running (*Journ. So. African Institute of Eng.*, November, 1913). In one case tests were made with the machines in ordinary repair, and again when newly repaired. The speed of drilling did not greatly vary, being 1.29 in. per min. in the former

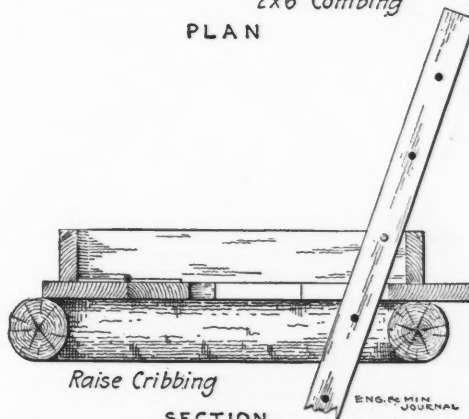
case and 1.30 in. the latter. The air consumption, however, was 153 cu.ft. per min. of drilling time in the first case, and 120 cu.ft. in the second, a saving of over 20%.

## Protective Combing for Manway Top

Cribbed manways are raised through vertically from level to level in the mines at Ely, Minn., operated by the Oliver company. The tops of these are covered with planks spiked to the cribbing and a rather small open-



PLAN



SECTION

MANNER OF PROTECTING RAISE TOPS

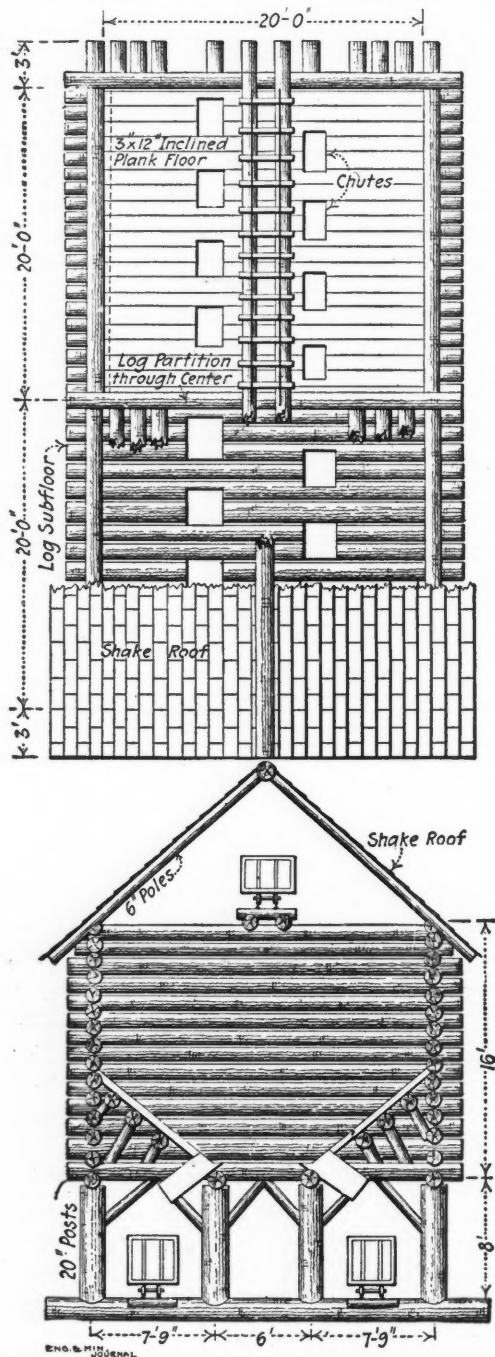
ing is left around the ladder. In order that material may not accidentally be kicked down the manway by anybody approaching its top, a low railing or combing is nailed around the opening. This is of 2x6-in. material, constructed in the manner shown.

It was found that the opening at the manway top, while large enough to permit the passage of a man, made handling of the Draeger resuscitation apparatus difficult, if circumstances should compel it to be taken into the stopes. To get more room, therefore, another board on the side of the opening opposite the ladder was cut away and fitted with hinges, so that it could be thrown back when necessary, although usually kept closed. The dimensions and arrangement of the opening, combing, etc., are somewhat different in different manways, but the illustration shows a typical case.

### A 700-Ton Ore Bin of Logs

By W. L. Kidston\*

The ore bin illustrated was built by W. A. Dickey, at the Threeman mine on Landlock Bay, Alaska, about five years ago, and besides being cheap for its size, has shown its stability by withstanding an heavy earthquake



PLAN AND SECTION OF ROUND-TIMBER BIN

shock and showing no sign of strain, although at the time of the shock one side was full of ore and the other about empty.

The bin is built of 12- to 16-in. logs, 24 ft. and 46 ft. long. The large logs cost \$1.50 each, delivered, and the smaller ones in proportion. The logs are notched down just as for a log house and are chinked with cord-

\*810 West 61st St., Seattle, Wash.

wood sticks at \$3 per cord; labor cost \$3.50 per day and the total cost of the bin was \$800. Its capacity is 700 tons. The bin is divided in the center by a course of logs similar to the ends and notched to prevent spreading from interior pressure. The sloped sides near the bottom are planked with 3x12-in. lumber. The roof is of shakes. Finger chutes of the Treadwell pattern, not shown in the sketches, are used on the eight discharge openings; the latter are staggered on opposite sides of the center so that no two are exactly opposite. The ore comes from the mine, a distance of 300 ft., and is dumped into the top of the bin from the mine cars. From the bottom the ore is carried to ship at the dock 600 ft. distant. Seven men load 60 tons per hour. The pitch of the roof is exceedingly steep in order that the snow may slide off.

### Car-Transfer System in Rock House

The accompanying drawings illustrate a rock house used for ore crushing and storage. The ore is hoisted in cars on cages instead of in skips, and auxiliary cars are

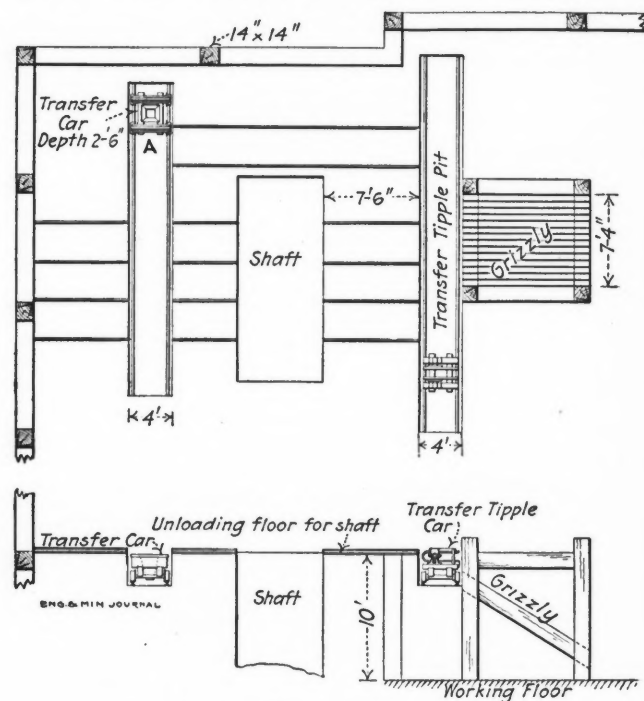


FIG. 1. LAYOUT OF CRUSHER HOUSE

used to carry the underground cars to the grizzlies, dump them and return them to the cage. Fig. 1 shows a plan and section of the working floor, or feeding floor for the crushers, together with the caging or transfer floor around the shaft. The loaded car is pushed from the cage, trammed a few feet, and loaded on the transfer car shown in Fig. 2. This is in effect a movable tippie.

It operates on a-track laid in a pit. The underground car mounted on this transfer car is trammed to a point opposite the grizzly, dumped over the latter and trammed further to a track leading at right angles past the shaft. Here it is pushed from the tippie transfer car and trammed on its own wheels to another transfer car, which also operates in a pit on the other side of the shaft. Loaded on this, it is trammed to a track leading into



the shaft on the side opposite to that from which it was unloaded and is then ready for loading on the descending cage. Fig. 3 shows this second transfer car. Its peculiar construction is to take care of tank cars, in which water is hoisted from the mine, and provide means of emptying the water into a discharge launder. The underground car itself is shown in Fig. 4.

### Diamond-Drilling at Alaska Treadwell

The cost of diamond-drilling work naturally varies widely, not only with the district in which the drilling is done, but between different formations in the same district, and between different holes in the same formation.

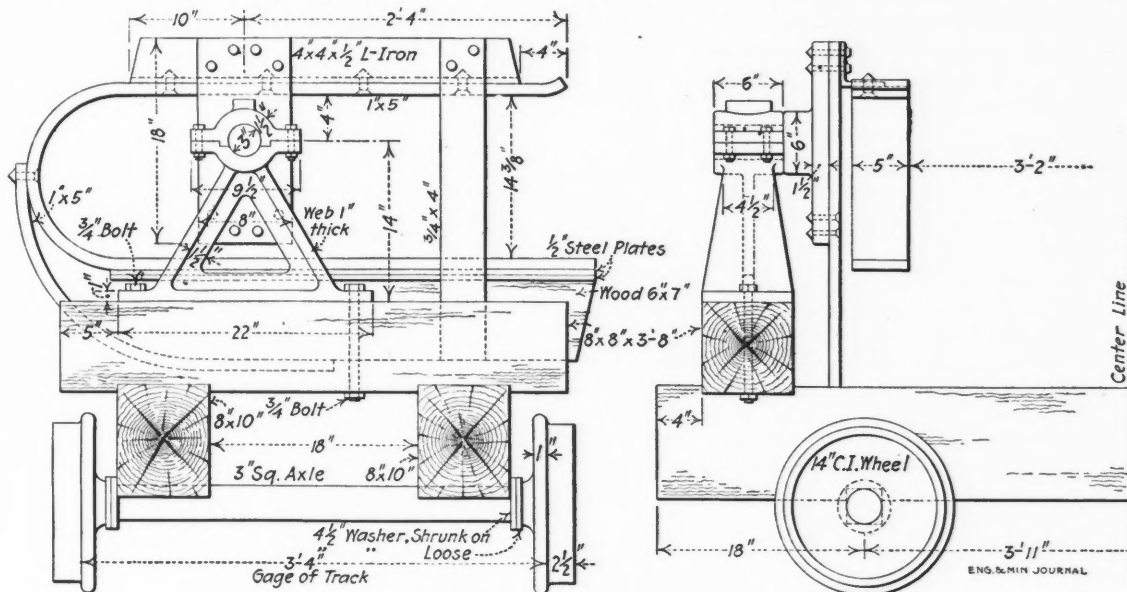


FIG. 2. DETAILS OF TRANSFER TIPPLE CAR

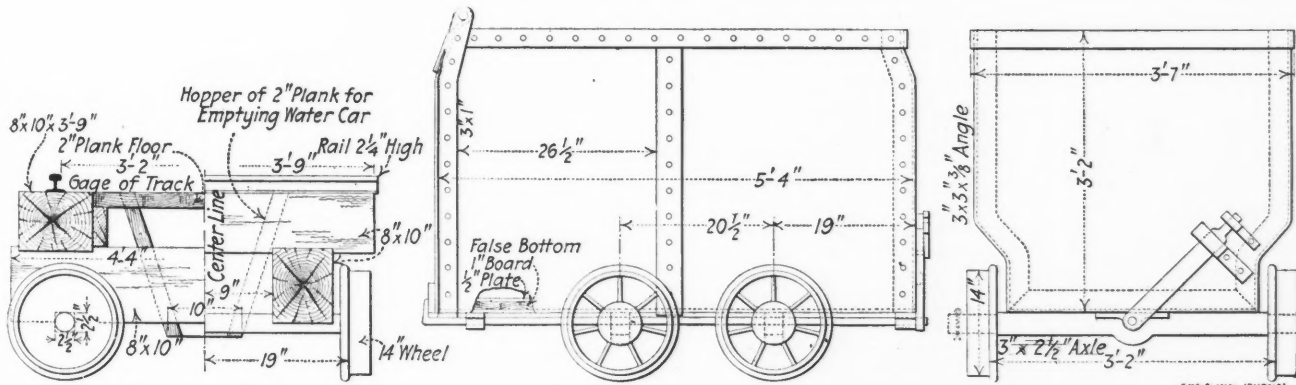


FIG. 4. ORDINARY MINE CAR

FIG. 3. DETAILS OF TRANSFER WATER CAR

This method of hoisting, of course, is far inferior to the use of skips in point of economy. Its use in this case seems to be a survival of old practice.

### Sand Filling Deep Mines

The sand filling practiced on the Rand has so far been confined to the relatively shallow mines. In the Journal of the Chem., Met. & Min. Soc. of South Africa for September, 1913, the question is raised as to available methods of filling the deeper mines. A method proposed contemplated the drilling of a borehole near the shaft, a 50° raise from the shaft to intersect the hole, 500 ft. from the plane of the reef and a rock chamber to catch the sand at the intersection. This chamber would give sufficient head to force the sand along the strike without undue dilution with water and the hole would thus command a large area of reef. The sand from the chamber would be carried in a pipe down the raise.

Skillful or careless operation of the machine; the use of diamonds of the first quality, or those of low grade which wear rapidly, as well as the quality of the ground being drilled, are some of the factors which affect costs.

At the Alaska Treadwell group, on Douglas Island, Alaska, a Sullivan diamond drill was used in 1913 to outline portions of the deposit. The drill was a "Champion" screw-feed machine with differential feed gears, having a capacity of 1500 ft. of depth, removing a core 1 1/8 in. in diameter and employing standard "A" fittings, that is, hollow rods, core barrel, core shell, split spring ring lifter and bits.

Diamond-drilling work began on April 6 at the Mexican mine, and continued until 4318.5 ft. had been done. All drilling performed was crosscutting from the main drift of the mine, largely horizontal. The space required

Note—An abstract from an article by A. Schoenberg, "Mine & Quarry," January, 1914.

for operating the machine was 6x6x15 ft., the rods and core barrel being 10 ft. in length. The rocks were diorite, quartz, greenstone and slate. The diorite and quartz were extremely hard; the greenstone was in general the best material for drilling. While not so hard as the diorite and quartz, it was still hard enough to provide good cores. The slate encountered was soft, but quartz seams running through it made rough cutting, hard upon the machine and hard upon the diamonds. The diorite was so hard as to put a glass polish on a bit set with diamond chips, in from 4 to 6 ft. of drilling. The diamond setter, J. M. Gibeau, got good results by setting some small diamond chips which had been saved by the mine from work done about 16 years ago; but although these were set up extremely sharp, the diorite rapidly polished them, and progress in this material was slow.

The following table shows the cost for five months, to Aug. 31, of operating the machine on the 1400-, 1300- and 1100-ft. levels of the Alaska-Mexican mine. The distance drilled was 3048.5 ft.

	Total cost	Cost per ft.
Labor .....	\$2434	\$0.798
Diamonds .....	19.2	0.637
Repairs .....	47	0.012
Supplies .....	254	0.083
Assaying .....	8	0.002
Power .....	655	0.211
	<u>\$5340</u>	<u>\$1.743</u>

Number of carats used, 21.57.  
Feet drilled per carat, 141.3.  
Carbon cost based on a value of \$90 per carat.  
The power is estimated as equivalent to that consumed by two machine drills at \$65 each.

No exact data are available on the cost of drilling for September, but the following is given as a close estimate:

	Total cost	Cost per ft.
Carbon loss .....	\$181	\$0.31
Labor .....	634	1.085
Power .....	131	0.224
	<u>\$945</u>	<u>\$1.619</u>

Drilling for the month, 584 ft.

During August the total footage was 900.5; the carbon loss was \$0.125 per ft.; the total cost for that month was less than \$1 per foot.

#### EFFECT OF VARIOUS PISTON CLEARANCES ON DRILL PERFORMANCE

Slackness of Fit, In.	Strokes per Minute					Cubic Ft. of Air Consumed per Min.			Lb. of Air Consumed per Double Stroke						
	70 lb.	80 lb.	90 lb.	95 lb.	97 lb.	70 lb.	80 lb.	90 lb.	95 lb.	97 lb.	70 lb.	80 lb.	90 lb.	95 lb.	97 lb.
0.006	236	231	256	256	...	112	138	165	178	...	0.0292	0.0368	0.0408	0.0430	...
0.010	232	244	260	...	...	120	152	178	...	...	0.0319	0.0385	0.0423	...	...
0.015	230	239	251	...	270	147	168	194	...	220	0.0396	0.0435	0.0478	...	0.0504
0.026	235	252	262	...	275	152	185	207	...	227	0.0400	0.0452	0.0490	...	0.0510

The only alternative to proving up this ground with the diamond drill was running tunnels or exploratory drifts. The cost of this is estimated at from \$8 to \$12 per ft., a conservative figure. As 4318.5 ft. was drilled, approximately \$43,000 would have been expended for the same amount of prospecting by the tunnel or drift method. In other words, the company saved approximately \$35,000, while the information gained by the diamond drill was accurate, as a high percentage of core was saved. The time taken to do the work in this manner was about one-quarter the time it would have taken if drifting or tunneling had been employed.

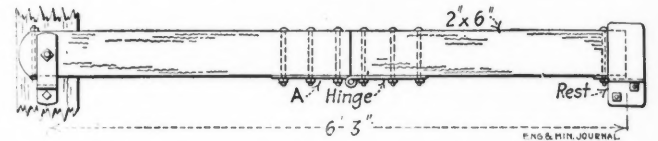
The deepest hole drilled was one for 106 ft. horizontally through slate and quartz mixed, from which over 900 ft. of core was secured.

In one of the holes a flow of water was struck, which gave a pressure of about 300 lb. per sq.in., and about 50 gal. per min. when the rods were removed. After finishing the hole, a pipe was swaged in and a valve connected, thereby preventing the water from running into the mine. If a tunnel or drift had been the method of prospecting,

the water could have been stopped only at great expense, and if allowed to flow it would have necessitated pumping from the 1100-level to the surface.

### Hinged Shaft Bar

The 2x6-in. wooden bar across the man-cage compartment at the Zenith mine, Ely, Minn., is hinged in the middle. This permits it to be lifted and lowered somewhat more quickly, makes it less likely to fall accidentally when standing open and requires less headroom to accommodate it. The manner in which it is pivoted and supported is shown in the illustration. The hinge is bolted to the lower side, so that by placing the hand under the bar at the point A, the bar can be lifted with one



BAR ACROSS MANWAY COMPARTMENT

motion. The hinge is made in the shop and is unusually stout. The ends of the bar are run through vertically with 1/2-in. bolts as a precaution against splitting and the loose end has an iron wearing plate underneath.

### Piston Clearance in Drills

The fit of the piston in the cylinder of a rock drill is of the greatest importance in influencing the air consumption of the machine. The Village Main Reef mine on the Rand carried out some tests to determine the exact effect of various clearances (Journ. So. African Inst. of Eng., November, 1913). A cylinder was reamed out true to a diameter of 3.183 in., and different pistons ground

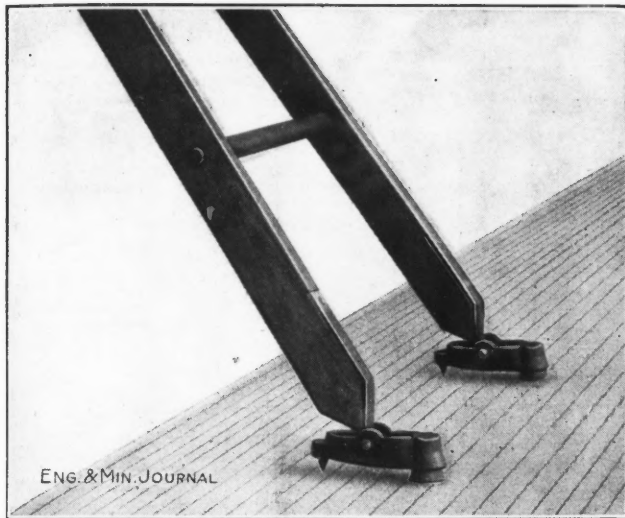
to various degrees of slackness of fit. A meter was inserted in the air pipe to the shop and the machine, an Ingersoll, tested with the different pistons. The results of the tests are shown in the table. While even the loosest piston was not a bad fit, as generally accepted for rock drills, the difference in air consumption between a drill with 0.005 in. clearance and one with 0.025 in. was enormous. The results are not absolutely consistent but such is hardly to be expected and it is shown conclusively that a neat fit of the piston is essential to economy. Nor will this close fit make trouble by causing the piston to stick, since none was experienced at the mine in question in several years. Sticking of the piston is caused by too tight a front head or by a bent piston rod.

An Air-Driven Auger for Removing Timber has been tried with success at the Central Mine, at Broken Hill, Australia ("Proc." Aust. I. M. E., No. 10, 1913). Under the conditions of work it becomes necessary to drive new crosscuts over the old and the removal of the old timbering has been always a source of delay and expense, especially as neither an ax nor a saw could be used to advantage. Experiment with the Ingersoll-Rand augers was successful and two are in constant use. A plugger drill with a wide chisel blade was tried with fair success, but was less comfortable to use.

## Details of Metallurgical Practice

### Safety Ladder Feet for Concrete and Iron Floors

Often a ladder equipped with sharp-pointed or spiked feet will slip on a concrete or iron floor, though holding perfectly on a wooden one. To provide ladder feet that will hold under any conditions, the Eastman Kodak Co.



SAFETY FEET FOR LADDER

has designed the style shown in the illustration, taken from the *American Machinist*. This consists of castings hinged to the ladder legs as shown. Each casting carries a spike at one end and a rubber pad at the other. The spike will hold on wood or dirt surfaces, and the rubber on surfaces where the spikes would slip; the two make an ideal combination that needs no adjusting when setting the ladder. The spikes used are threaded horseshoe calks of a type easily purchased in the open market, and the rubber pads are standard large-size crutch tips.

### Pipe Fitting

F. W. Fisher, in *Power*, gives some good advice about pipe fitting. Reduced tees, ells, couplings, etc., he says, should be properly figured so as to have as few joints as possible in a pipe line, although but little attention is sometimes paid to neat workmanship, so long as the gas or liquid to be conveyed reaches its ultimate destination, less several per cent. of its original velocity. Many engineers have bushed fittings to save a few minutes time, only to regret it later. When the pipe man comes for an odd fitting, do not tell him to "bush it," but take time to get what is correct.

Go over a pipe line and observe the unnecessary joints. Don't tear the line out to remedy the trouble, but in future use only the joints that are absolutely required. An idea of properly built pipe lines can be had by examining some automatic sprinkler installation in your neighbor-

hood, which, if well designed, will have no extra joints and the lines will be properly fastened or suspended.

Pipes threaded with new dies will enter a fitting much farther than those cut with old dies. Second-hand fittings have caused engineers to "lose their religion" when steam was turned on a repaired line only to give an imitation of a Chinese orchestra, but these occurrences can be lessened by using a little judgment in selecting the fittings. All second-hand fittings should be closely examined when dismantling a line and again when ready to use a second time. Sound your fittings the same as tubes or flywheel, and save hours in time and lessen the leaks and danger of bursting fittings.

When a joint is unusually hard to break, what do we do? Hammer the fitting, use an oversized pipe wrench, and add a few feet of pipe to the handle for extra leverage, and yank away. Easy for you, but rather hard on the fitting. Such fittings should be carefully examined before going back to the supply room. If the pipe threads enter the fittings too far, throw it away, unless you want to do the work over.

Unions cost money, it is true, but use them when passing through places difficult to repair. Do not build a line two or three hundred feet long without unions, as a leak may occur near the center. Never make up joints dry, but use some ready-made pipe compound, graphite and oil, white or red lead, and save yourself many a cuss word when making changes in a line you never expected to take down.

### Support for Heavy Steam Pipe

The illustration shows a structure used by the Oliver mines at Ely, Minn., to support the main steam pipe be-



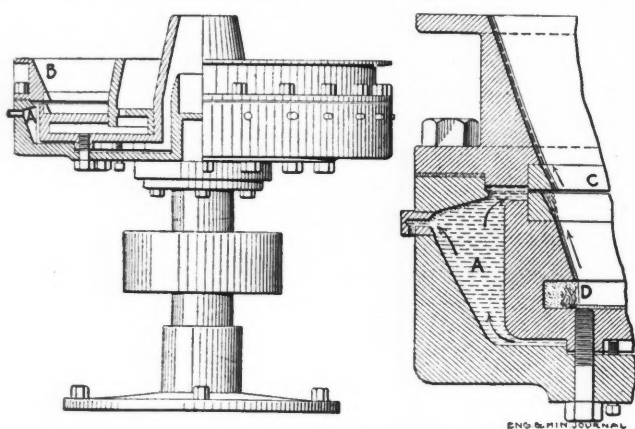
STEEL ANGLE STRUCTURE TO DAMP STEAM-PIPE VIBRATION

tween the boiler house and the engine room. The introduction of these supports eliminated the greater part of a vibration which was bad for both steam pipes and buildings. Such a structure is built generally of whatever ma-

terial happens to be most convenient. The one here shown is constructed altogether of steel angles; the corner posts are 5x5-in. angles, the four longitudinal braces 3x5 in. and the rest 3x3 in. Each corner rests on an iron plate on the concrete pier and is held down by two 1-in. bolts. The dimensions of the steel structure are 6 ft. 6 in. by 15 ft. 8 in. over all at the bottom and the height from the concrete to the top of the upper horizontal angle is 11 ft. 6 in. The batter is about one in five. The concrete piers are 18 in. by 8 ft. 6 in. on top, 3x10 ft. at the ground and 3 ft. 6 in. high above the ground.

### Boss Centrifugal Concentrator

A centrifugal concentrator which seems to offer possibilities for successful results, has been invented by M. P. Boss, of San Francisco, who has been granted patent No. 1,071,870 for it. The machine, as will be seen by reference to the accompanying diagram, contains a shaft



BOSS CENTRIFUGAL CONCENTRATOR

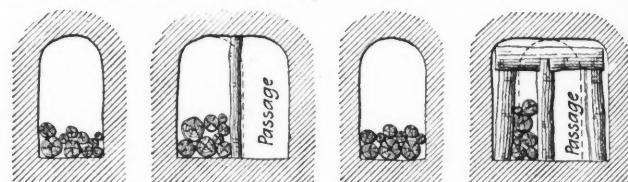
mounted in an appropriate step bearing, the shaft carrying a pulley, and at the top a pan, as shown in Fig. 1. Mounted on the top of the rim of the outer pan is a crown ring which shelves inward. Beneath the shelf is the rim of the inner pan. Wearing rings are attached, one to the rim of the inner pan and one to the crown ring, the relative positions of these being such that between these two rings is an annular, relatively narrow, open space, which is adjustable in the width. In operation, the pulp is fed into the pan, and the coarse material goes first to a recess which is shown at *D* in Fig. 2. From this point it overflows and proceeds up the inclined wall of the pan until it reaches a point where the crown ring joins the pan, the annular space being used to extract the concentrates.

The whole theory of this machine is that water is admitted to the outer chamber *A* under pressure, so that there is a back pressure through the annular orifice back into the pan. Outlets are provided, as is shown at the periphery of the pan, for the extraction of the concentrates and water, and it will be readily seen that if water is admitted to the outer chamber *A* in greater quantity than will be discharged by the peripheral openings, it will back up through the annular orifice into the pan. The centrifugal force throws the heavy concentrates out through the orifice against the current of water. By regulating the water pressure, it is apparent that it is possible to secure any concentration desired.

### Storing Timber in Mesabi Mines

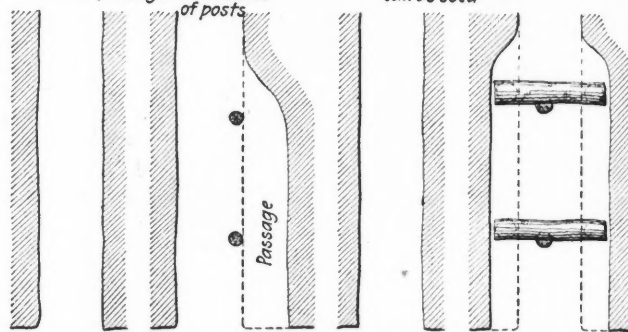
BY CLARENCE M. HAIGHT\*

In the underground mines on the Mesabi range large quantities of timber are used. To distribute this timber through a mine it is customary to drive a timber drift transversely across it, which reaches the drifts leading to the various working places. At each of these working drifts the amount of timber ordered for the time is taken from the timber truck and piled in the drift.



Posts put in at side of drift  
Room for passage cut outside  
of posts

If necessary, timber sets  
can be used



Timber Drift

Timber Drift

ENG. & MIN. JOURNAL

SPECIAL DRIFT FOR MINE-TIMBER STORAGE

This timber lies in the drift until it is used. During the time it is there all men entering or leaving the drift have to crawl over the pile; sometimes there is little room for them to get through. In some mines this is avoided by placing two posts in the drift, parallel to the center line and about five feet apart. The timber is piled on one side only of these posts so that a clear passage for travel is left on the other side. In the narrow sub-level wheelbarrow drifts it may be necessary to widen the drift to accommodate the timber and still leave room for passage, but as ore is mined to do this, there is no loss in opening into rock. These additional timbers are not expensive, either in themselves or to place in position, yet they save time and much uncomfortable climbing for all who have to pass, and also decrease the chances of accident. The larger drifts do not have to be enlarged.

### Reduction of Manganese Compounds

According to the experiments of Friedrich Heusler (U. S. pat. 1,078,199), the yield of manganese from its ores by reduction with carbon is found to be increased by calcining a portion of the ore at a high temperature. About 50 parts of the calcined material to 100 of the raw ore are mixed with enough lime for a flux, and soot or oil, and heated in a graphite crucible to a high temperature.

The success of the method is somewhat surprising, as a charge of 100% of calcined ore does not reduce readily. The beneficial effect of calcining may be increased by conducting it in an atmosphere of reducing gas.

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

## Notes from Current Literature

### Oxidation of Carbon at Low Temperatures

This subject is discussed by K. A. Hofmann, K. Schumpelt and K. Ritter (*Ber.*, 1913, p. 2854; abstr. *Journ. Soc. Chem. Ind.*, Oct. 31, 1913).

Amorphous carbon is readily attacked by a sodium chlorate solution which has been rendered active by a little osmium tetroxide. The reaction proceeds at 100° C., yielding carbon dioxide, mellogen and mellitic acid. It is accelerated by the addition of 1% of acetic acid or of mono-sodium phosphate. With sugar charcoal about 70% of the theoretical quantity of carbon dioxide is evolved along with appreciable quantities of carbon monoxide and formic acid. Calcium hypochlorite (Griesheim) in dilute aqueous solution also attacks amorphous carbon with similar results, and the evolution of carbon dioxide and steam is so violent that the authors suggest that it may be used as a source of mechanical power. Diamond is also attacked by the hypochlorite, yielding a white suspensoid. Amorphous carbon is readily attacked by caustic soda at 120° to 150° C. in the presence of air yielding dark brown or red colloidal substances, then formate and oxalate and finally carbonate. Apart from certain differences in the initial velocities of reaction, all the various forms of amorphous carbon exhibit similar behavior.

### Treating Cobalt, Nickel and Silver Ore or Matte

According to Gebr. Borchers (Brit. pat. 18,276, of Aug. 8, 1912), complex combinations of cobalt, nickel and silver are first treated with an alkali bisulphate at a temperature below 200° and then roasted at 600° to 700° C. in an oxidizing atmosphere. The mass is allowed to cool, crushed, if necessary, sprayed with sulphuric acid, and the treatment repeated until the metals have been sufficiently converted into soluble form. The mass is then drawn out of the furnace, allowed to cool, and lixiviated. Very refractory ores are first heated one or more times with carbon at below red heat, and in presence of enough air to burn the carbon.

### Radium Purchases in Germany

The clinical institutes attached to the universities of Berlin, Halle and Kiel have been granted large funds by the Prussian Government for purchasing radium, of which the Prussian state at present owns one gram (*Min. Journal*, Dec. 6, 1913). In next year's budget, 500,000 marks will be provided for the acquisition of radium and mesothorium. In addition to these amounts the municipal authorities, or leading private residents, of several important cities have provided large sums for the same purpose, notably Leipzig, 250,000 marks; Düsseldorf, 250,000 marks; Dresden, 200,000 marks; Berlin, 242,000 marks. The total amount granted exceeds 2,500,000

marks. Three hundred milligrams of radium have already been bought up, and negotiations are pending for further quantities. For the manufacture of mesothorium there are now four works existing in Germany. They are over-run with orders, and their full capacity is engaged until the end of 1914, when the production of from 5 to 6 grams mesothorium will have been completed.

### Some of the Uncommon Constituents of Glass

In recent numbers of *Sprechsaal*, L. Spinger has been discussing the use of BaO, ZnO, MgO, Al<sub>2</sub>O<sub>3</sub>, B<sub>2</sub>O<sub>5</sub> and P<sub>2</sub>O<sub>5</sub> in the manufacture of glass.

Barium oxide, first used by Döbereiner at Jena in 1829, is used generally as carbonate, less often as sulphate or nitrate. It increases the specific gravity, refractive index, elasticity, and tenacity of glass, and imparts an attractive surface, but renders it more difficult to work, and also lessens the specific heat. Compared with calcium oxide, it is more expensive and does not impart chemical resistance, in this respect resembling more closely the alkali oxides. Barium glasses fuse more quickly than similar lime glasses. Barium finds its chief application in rolled glass, but is also used in hollow ware, crystal and table glass, and in special glasses, such as the Jena phosphate crown glass, which is essentially a barium metaphosphate containing 28% BaO and 60% P<sub>2</sub>O<sub>5</sub>. It can act as a substitute for lead oxide in crystal glasses, a suitable formula being: 4 Na<sub>2</sub>O, 4 BaO, 4 CaO, 3C SiO<sub>2</sub>. In table glass it can replace lime and soda.

Zinc oxide, which was used in Belgian factories in the middle of the last century, is introduced as oxide under the names of zinc white, snow white, or crown white; also as blende mixed with Glauber salt, and as calamine. The power of refraction it imparts is less than that produced by lime and much less than by lead and barium. It acts as a basic oxide like magnesia in producing a low coefficient of expansion, for which reason it is used with boric acid in the manufacture of flashed glass. Zinc glasses have high tensile strength and high resistance, physical and chemical; they tend to crystallization and devitrification. They are used chiefly for laboratory and optical purposes. Magnesium oxide is introduced as the carbonate, usually with lime in dolomite, but many feldspars, granites, basalts, etc., contain as much as 10% MgO. Calcspars, with a magnesia content of 18%, have been used. It has thus found application in glass from the earliest times without contemporary recognition in the literature of the subject. It finds its greatest employment in the French factories. Magnesia increases the fluidity and lowers the viscosity of molten glass and influences fusibility favorably, also the tendency to devitrification and the chemical resistance; the most suitable amount is 2 to 10%. Aluminum oxide renders glass difficultly fusible, but prevents devitrification. It is introduced as clay, bauxite, or feldspar, but the range of raw

materials was extended at the end of the last century to include lavas and other similar aluminum silicates. The presence of alumina enables the lime content to be increased without making the glass rough. It makes glass chemically resistant. Alumina is used chiefly in the manufacture of flasks, acid receptacles, etc., the content being 4 to 10%.

Boric acid, which is found to be a constituent of old Venetian glass, is introduced as the crystalline hydrate or as borax. It imparts high refractiveness, and in the spectrum reduces the proportion of blue to red, a relation which had previously been exaggerated in flint and crown glass. The coefficient of expansion, the tendency to devitrification, and the melting point are lowered by high boric acid content. When boric acid is used in conjunction with other acid oxides, the glasses, as for example borosilicate glass, are very resistant to chemical action if the proportion of boric acid be not greater than 10%. Boric acid is employed in crystal and optical glass. Phosphoric acid is introduced as bone ash or other phosphate. It is used for optical purposes, often in conjunction with boric acid. Phosphor-crown glass may contain as much as 70%  $P_2O_5$ . Arsenic and antimony are used in glass making to assist the progress of chemical reactions and as decolorizers. Jena cylinder glass has a high boric-acid content with 4%  $Sb_2O_3$ .

### Potash in Spain

The *Cologne Gazette* reports that a French syndicate has found a deposit of potash salts in a drill hole sunk near Barcelona, Spain. The deposit, as far as can be learned at present, is quite irregular, but it has been satisfactorily established that it contains carnallite ( $KMgCl_2 \cdot 6H_2O$ ), and sylvinite, a mixture of sylvite (KCl), kieserite, and rock salt.

It is said that the German potash pool has been aware of the existence of potash salts in Spain for some time, and is prepared to face the facts. Professor Friedrich, of the Technische Hochschule, Breslau, Silesia, has received a call as a member of the directorate of the von Giesecke Mining Co., and will act as supervising engineer of the metallurgical department.

### Volatility of Zinc and Cadmium

T. K. Nair and T. Turner (abstr. *Journ. Soc. Chem. Ind.*, Sept. 30, 1913) in attempting to remove zinc by volatilization *in vacuo*, on a practical scale from a charge of about 150 kg. of a zinc alloy, found that small imperfections in the vacuum considerably diminished the rate of volatilization. Laboratory experiments with zinc and with cadmium showed that at a given pressure, appreciable volatilization does not take place until a definite critical temperature is attained, but from this point the rate of volatilization increases with rise of temperature independent of the initial pressure. A rise of temperature about 90° C. above that required for 10% volatilization will increase the volatilization to 100% in the same period of time. The critical temperature is raised by gaseous pressure; air has a somewhat greater effect than carbon dioxide and the latter somewhat greater than hydrogen, but at low pressures the differences are negligible in practice. Down to about 50 mm., each millimeter reduction of pressure causes a small but equal low-

ering of the critical volatilization temperature, but at lower pressures the effect is much more marked, and when a perfect vacuum is nearly attained, a reduction of pressure of 1 mm. has an effect 70 times greater than at higher pressures. It was observed that zinc is oxidized to a much greater extent by air in motion than by still air.

### Graphite in Madagascar

A recent consular report from Madagascar says that the production of graphite is on the increase, and indications are that Madagascar will soon be a serious competitor of Ceylon in the production of this mineral. The production in 1912 is estimated by the chief of the Madagascar Service of Mines to have been 5000 tons, compared with 1500 tons in 1911, and the 1913 production will be at least 6000 tons.

It should be remarked, however, that the quantity exported in 1911 was 1281 tons; in 1912, 2638 tons; and for the first six months of 1913, 2383 tons. The number of graphite workings existing at the close of 1912 was 942, and during the first three months of 1913 this number was increased to 1392. There are evidently unlimited quantities of graphite in Madagascar, but, for lack of machinery and capital, very little development work has been done. The claims in operation are increasing in number, and there is a demand for machinery for cleaning and classifying the graphite. There is also a demand for American purchasers of graphite, and this office is constantly being asked whether or not American concerns are going to send someone to the island to purchase graphite in competition with English firms represented.

### Some Properties of Industrial Electrolytic Iron

L. Guillet and A. Portevin, in *Compt. Rend.*, clvi, 702, abstracted in "*Journ. Franklin Inst.*," January, 1914, state that the metal on coming out of the electrolyte is saturated with hydrogen and is hard. When heated for two hours in magnesium oxide it loses a great part of its hardness. The critical points obtained by heating are 791° and 937°; those obtained by cooling are 902° and 778°. The critical points of heated metal are practically the same. In the crude metal there is an absorption of heat at 530° and 590°, which points do not appear on cooling or reheating, being evidently due to the presence of hydrogen. Conductivity tests on raw iron give 10.22 microhms, while the treated metal gives a value of 11.92 microhms, these abnormally high values being due to hydrogen in the metal.

### Scandium from American Wolframite

Meyer and Crookes have shown that wolframite residues from the Zinnwald contained sufficient scandium to make them a productive source of this element. H. S. Lukens (*Journ. Am. Chem. Soc.*, 1913, p. 1470) following Meyer's methods, has succeeded in isolating pure scandium oxide from American wolframite residues from Colorado. About 1.6 grams of crude scandium oxide were obtained from 3.2 kg. of the residues.

# Ventilation at Cripple Creek

By S. A. WORCESTER\*

*SYNOPSIS*—Poisonous gases occur in many Cripple Creek mines, through the agency of which not a few lives have been lost. Some mines of value have had to be abandoned on account of these gases, as ordinary exhaustion methods have not proved efficient in clearing them out. Pressure has been successful in forcing the gases back into the fissures from which they issued.

The occurrence of mine gases in this district has been described in a lengthy chapter by the U. S. Geological Survey, which gives a number of analyses of the gases found in different mines. This paper was printed in 1906, and a number of mines not mentioned as gaseous have since suffered from gas as the result of extended workings. At the Ophelia Tunnel, a blower of 15,000 cu.ft. capacity, placed 4000 ft. from the portal of the 7000-ft. tunnel, keeps the outer workings fairly free from gas in good weather, but shows no perceptible effect on the remaining 3000 ft. of tunnel which is inaccessible, except in most favorable weather. At times of low barometer the entire tunnel fills with gas and all work is suspended.

## EXPENSIVE ATTEMPTS MADE TO VENTILATE GASSY MINES

At the Blue Bird mine a large sum of money has been spent in making a connection 1100 ft. long, to the Portland mine. This obtained a strong draft, which, however, weakens or stops entirely in unfavorable weather, so that gas still interferes with working at times. At the Moon-Anchor mine, an expensive 300-ft. connection was made from the bottom of the 1000-ft. shaft to the adjoining Conundrum mine, expecting to effect a natural draft, and ventilate both mines. This connection is said to have cost \$15,000, and when it was completed no draft whatever resulted. The heavy gas in the Conundrum, having about 10% carbon dioxide, seemed to prevent circulation as effectively as water. Many thousands of dollars have been spent in ineffectual attempts at ventilation by drifts, raises and other connections.

I have in mind more than 20 fatalities caused by mine gas in this district, and an accurate count would doubtless place the total much above 30. The losses from health having been permanently impaired by working in vitiated air are possibly more serious than the deaths, although they attract less attention. Work is practically abandoned in all gaseous territory at times of low barometer, and notably at equinoctial seasons, except at mines which are ventilated by the pressure system.

## PRESSURE SYSTEM ADVISED FOR MOOSE MINE

On my arrival in this district, I was commissioned to examine the Moose mine with a view to devising a system for ventilating its workings. Gas used to issue from the mouth of the 1050-ft. main shaft in such volumes as to fill the shaft house to a height 2 ft. above the floor, as measured with a lighted candle. An exhaustor of 5000 cu.ft. capacity per min. had no appreciable effect in lowering the gas in bad weather, and the mine had not been operated for some years. After waiting perhaps 10

days for favorable weather, the exhaustor was kept running all of one clear night, and I was able to look around the bottom level early in the morning, at which time the air is usually best in all of the gassy mines.

After looking over the situation carefully, I advised a pressure system of ventilation, with two pairs of steel doors placed about 25 ft. apart in the main shaft, substantially air-tight for 1 lb. pressure per sq.in., and forming an air lock. The exhaustor connections were to be reversed so as to use it as a pressure blower. My theory, which has since proved to be entirely correct, was that gas could be forced back through the fissures from which it entered the mine, and that air could also be forced through the fissures, giving all needed circulation. My calculation of the pressure required was based on the observed barometric variation of a little over one inch. I believed that a pressure approaching 1 lb. per sq.in. might be needed in bad weather, and designed the shaft doors to suit. The cycloidal blower was quite capable of operating at this pressure. I recommended, however, that before installing anything expensive, a temporary wood bulkhead be used to test the pressure method, at an estimated expense of \$60. On receiving my report and estimates, the management informed me that my idea was not practical and refused even to try the inexpensive experiment, although stating that several thousand dollars had been spent in attempts to ventilate the mine, and that a large sum had been offered for the invention of a successful method.

## THEORY EXPERIMENTALLY DEMONSTRATED

Some time later I found an opportunity to test my theory at shaft No. 11, of the Work Mining & Milling Co., at Anaconda, Colo. About eight months previous, two men had been killed by gas in this shaft, and since that occurrence the lower workings had been inaccessible, the deadly gas standing 100 to 130 ft. from the bottom. The next to the lowest level was 130 ft. above bottom, and a temporary bulkhead of double one-inch lumber, with paper between, was placed on this level. The 2-in. compressed-air line was opened just below the bulkhead. A downward opening trap-door was placed at the ladderway.

Just as I was ready to apply pressure, a sudden snow-storm commenced and the gas below the bulkhead rose, so that on opening the door slightly, gas issued from it and extinguished a large oil torch held near it. The door was closed and the compressor started, forcing about 500 ft. of air per min. through the bulkhead. After 10 min., I opened the trap door and passed through, contrary to the earnest advice of my two helpers, who were much afraid of the gas. I found by trying with a lighted candle that the gas had been forced down 35 or 40 ft. and was steadily going down. After 30 min. blowing I went to the bottom and found the gas about 5 ft. deep, the candle being put out at within an inch or so of a certain height at every trial. After 1½ hr. blowing, the last trace of gas was ejected from the lowest working, although the weather was most unfavorable, and the temporary bulkhead leaked considerably. One surprising feature of this experiment, which cost but \$40, was that the pressure developed was but ¼ in. by water gage. This

\*Mechanical engineer, Victor, Colo.

was explained, by the immense fissures and vugholes in the vein, affording easy escape for the gas. As the shaft was in solid ground, a concrete bulkhead was built in the level, close to the shaft, with a door allowing passage of men, cars, etc. The temporary shaft bulkhead was then removed, leaving the hoistway clear. In practice it was found that the exhaust air from one piston drill gave sufficient pressure to expel gas and prevent its entrance while drilling. A little moderate blowing with the compressor soon ejected all powder smoke after firing a round. The pressure system has, since this experiment, been applied to 10 mines under 10 different sets of conditions, demonstrating fully its value, gaining for me a valuable experience in the details of its application.

#### VENTILATING WITH AIR-JET BLOWERS

My second application of pressure ventilation was made at the Moon-Anchor-Conundrum crosscut, before mentioned. When the crosscut was but partially completed the gas became so troublesome that working was enormously expensive and almost impossible, although a 10-in. exhauster was in constant operation for 24 hr. daily. Pressure ventilation was decided on, and a concrete bulkhead, with a door, was placed at the entrance to the crosscut. For furnishing air pressure, a 6-in. short pipe was carried through the bulkhead and a 1-in. compressed-air pipe was placed so as to blow centrally into the larger pipe. One-inch caps, having jet orifices  $\frac{1}{8}$ ,  $\frac{3}{32}$  and  $\frac{1}{8}$  in. in diameter were used on the pipe, the smallest in very good weather, and the larger ones when conditions demanded more pressure. This jet probably forced five to ten times as much free air as compressed air through the bulkhead. While the air jet is not an economical device for permanent equipment, it was simple and cheap and certainly the best thing available for this temporary work, which was finished when connection was made to the Conundrum workings. When the door was being hung it was difficult to keep lights burning and all lights went out the instant the door was closed. The air-jet was at once started, and within 30 minutes the last trace of gas was forced out through the numerous fissures and vugholes, and candles were burning brightly at the breast of the 200-ft. drift. The water gage showed a  $\frac{3}{4}$ -in. water column in the tube, indicating a little less than  $\frac{1}{2}$ -oz. pressure per sq.in. in the drift.

I have since applied this air-jet method of pressure ventilation at four mines, using in each case about enough compressed air to operate one hammer drill. At the Chickenhawk mine the bottom level south was made inaccessible by shooting into large fissures which gave out much gas, and one miner was suffocated while attempting to bring out some tools. A few days after this fatality a bulkhead, with door and air jet, was installed at the mouth of the drift, and the level ventilated completely. When building the bulkhead, work was possible but a short time early in the morning. About nine o'clock the gas commenced to pour out of the top of the drift, perhaps a foot deep, as measured with the lighted candle. By eleven o'clock the drift would send out a full stream of gas and work had to be stopped before then.

At the Prince Albert tunnel, 1400 ft. in length, with about 400 ft. of connected workings, a peculiar gas was found. Candles always burned brightly, but miners could work but a short time before being overcome. After this had occurred a number of times a bulkhead was installed

about 75 ft. inside of the portal and a pressure of  $\frac{3}{4}$  in. of water expelled the gas and prevented further trouble. At the Empire State shaft of the Isabella Mines Co., the north 600 ft. of the eighth level was always filled with gas, which came from minute fissures. Good draft through an upraise furnished air 600 ft. from the breast, and a bulkhead, with door and air jet, was placed just beyond the raise. On account of the small fissures a pressure of 5 in. of water was necessary at times. As the door could not be opened by hand against this pressure, it was the practice to shut off the jet, whenever the door was to be opened. Usually, however, a  $1\frac{1}{2}$ -in. pressure was sufficient, and the door, 3x6 ft. in size, could be opened against this pressure with a little exertion. After using the pressure a short time, a good orebody was encountered. A raise was at once run through the ore to the seventh level, and this connection gave a good air circulation, so that pressure ventilation was no longer needed.

At the Little Nell, Agnes and Raven & Beacon mines, the entrance doors are placed from 15 to 25 ft. below the surface, in the vertical main shafts. Double doors are used, meeting at the center of the shaft, with half-round notches, allowing the passage of the hoisting rope. The doors are operated by small wire ropes passing over pulleys to the engineer's station.

At the Little Nell mine a 5000-ft. fan was installed, maintaining a  $\frac{5}{8}$ -in. pressure. The engineer has frequently started the fan while the miners are getting on the bucket, and while the gas was pouring out of the shaft so that he could smell it plainly. By the time he reached the hoist, the gas was forced some distance down the shaft. He lowers the men slowly, about 500 ft. in four minutes, and the gas is forced down faster than the men descend. The last traces of powder smoke have been blown out within 25 min. after firing a large round of shots, at this mine. These results are possible because the veins are full of large fissures.

#### VARIOUS METHODS IN VARIOUS MINES

The entrance to the Conundrum mine is through a 300-ft. tunnel, at the end of which is a large hoist station, with a 30-hp. electric hoist, and dumping bins, from which the ore is trammed through the tunnel to the surface. The entrance bulkhead is located about 200 ft. from the surface and a fan of about 30,000 cu.ft. capacity is set close to, and discharging directly through the bulkhead, and is driven by an induction motor. The motor is started by a home-made time switch, which applies the current gradually. A pressure of nearly 2 in. is maintained, and some exertion is necessary to open the 3x6-ft. door against this pressure. Eleven bulkheads were necessary for closing in this mine, which connects to the adjoining Midget on four levels, the same vein passing through both mines.

At the Midget mine a fan of about 40,000 ft. capacity, driven by an induction motor, forces air directly down the manway. Bulkhead doors in the main vertical hoisting shaft are operated by a lever at the hoist. The engineer opens the doors two or three seconds before the passage of the skip. The eighth, ninth and tenth levels of this mine had been closed off by a solid cement bulkhead in the main shaft 40 ft. below the seventh level. This, however, failed to prevent frequent trouble with gas in the upper levels, and at times the whole mine was filled



with gas. A miner who was sinking the main shaft about 11 years ago, was killed by the gas, and his body removed with grappling hooks. Since that time no man had been able to reach the bottom, 42 ft. below the tenth level. As soon as the pressure system was in operation, I removed the bulkhead below the seventh level and went to the bottom of the shaft, with candles burning brightly and no trace of gas.

#### SYSTEM IS SIMPLE AND CONVENIENT

No air locks or complicated door arrangements for preventing loss of pressure when doors are opened, are used at any of these mines. In practice it is found that releasing pressure on the mine for the brief time necessary for passage of cars, buckets and skips, causes no considerable influx of gas. The slight pressures required are restored almost instantly as soon as the doors are closed. No disagreeable effects are felt on entering or leaving the mines, or working under these slight pressures. It should be understood that this system of ventilation is useful only in fissured or porous formations, allowing the passage of gas or air. One stope in the Midget mine is in very solid rock, and distant about 300 ft. from the nearest bulkhead. No mine gas is found in this stope, but powder gas hung persistently until a 6-in. air pipe was carried from the stope to the bulkhead and through it. The mine pressure now forces the gas out through this pipe, and no more trouble is experienced from this source. The pipe is closed at the stope end, except for a short time after blasting.

The method has now been successfully used in 11 mines, and it is becoming a common practice for mine owners to specify its installation when granting leases for gaseous territory. It differs from all open methods of ventilation in a number of important advantages. First, and most important, it expels gas completely and fills the mine with pure air, instead of permitting gas to enter without hindrance and making the mine atmosphere a more or less noxious mixture, as with all open systems of ventilation. By keeping doors closed as much as possible and using a check valve at the air inlet, it renders the entrance of gas very slow after blowing has been stopped, giving ample time for the escape of miners in case of stoppage of the blower. In some cases work has been continued several hours after stopping the blower. It ventilates most effectively the much fissured and porous veins, which produce the largest and most dangerous quantities of gas.

As the air is supplied at the entrance of the mine, no air courses, overcasts, brattices, pipes or other special apparatus is required beyond the entrance, because the shafts, levels, tunnels, etc., carry the air to the working faces of the mine. Workings in fissured and normally gaseous veins offer a rapid escape for powder fumes, with this system, in the most direct and simple manner possible, the fumes passing directly out at the working faces, without spreading through the mine. When entering the mine shortly after blowing has started and before all of the gas has been expelled, a retreat to good air is always possible within a short distance, and there is no danger of being trapped by gas in the rear, while the air is good at the breast.

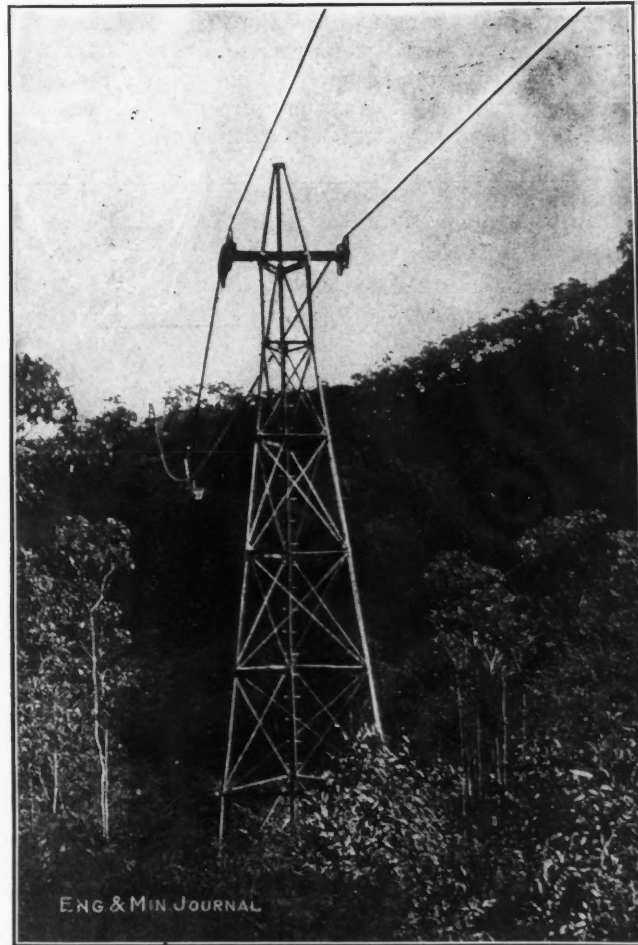
This system permits almost unlimited extension of "blind" workings in fissured ground, without any extension of the original plant, whereas all other methods require pipes or air courses to be carried close to the work-

ing faces. The expenses of construction, operation and maintenance are always much less than those of any other system which is effective in fissured and gaseous ground. In short, I know of no other method of ventilation which approaches this in efficiency, economy and convenience, for fissured and gaseous mines.

✽

### Aerial Transportation at the Irvine Bank Mine, Queensland

An aerial transportation system which has been installed at the Irvine Bank mine in Queensland, Australia, has some points of interest which it is worth while to mention. The property is a tin mine, the metallurgical works



TYPE OF TOWER CONSTRUCTION

of which is situated at some distance from the mine itself. The country is rugged, and wagon transportation is too expensive to be seriously considered.

In order to transport the ore at the lowest possible cost, a cableway has been installed upon which the ore, loaded in the buckets at the mine, is carried to the discharging station. The distance between the two stations is 6921 ft., and the fall between the two, 273 ft., the fall being in favor of the load. The buckets are filled at the loading station by chutes, which enable one man to deal with the output required, and at the unloading station they are tipped by releasing a catch, the buckets being constructed with the usual type of trunnions. The hourly capacity carried on the line is 15 tons at a speed of 390

ft. per min. The speed is purposely moderate so that should increased capacity be required at any time, a simple increase of the speed of the ropeway is all that is necessary to furnish it. The power required is small, only 6 hp. being used, this figure including all losses due to belts, gearing, etc.

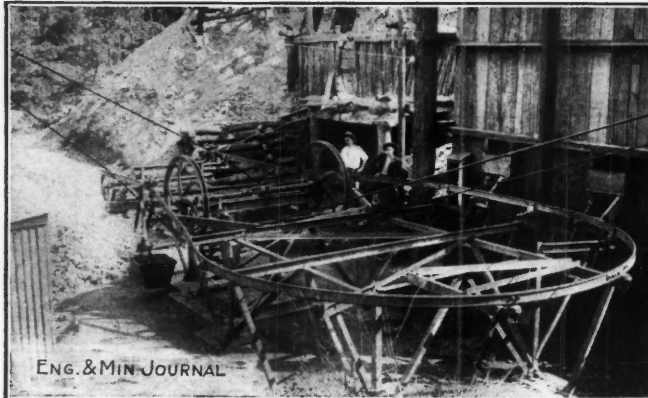
There are 15 trestles on the line, having an average height of about 20 ft.; the lowest is about 14 ft. high, and the highest about 59 ft. These trestles or towers are built of 60° section bars of special design, which are rolled for the purpose. They are so designed as to be easily transported over the roughest ground and put together by unskilled labor at the site of the work. All members are bolted.

Most of the trestles are fitted with four sheaves on the full side and two on the empty side, the four sheaves being hung on swinging beams, whereby an even pressure is taken on each sheave, irrespective of the angle the rope makes in passing over supports. The sheaves are lubricated automatically, it being only necessary for a greaser to fill the oil cups about once in a fortnight.

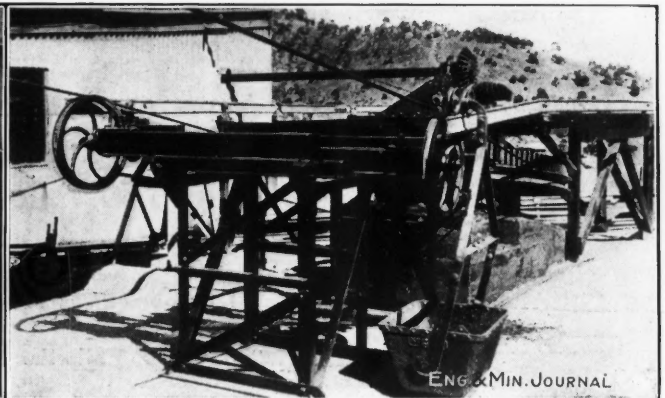
tion is of iron, whereas in American construction the trestles are often built of wood.

### El Paso Consolidated

The El Paso Consolidated Gold Mining Co., for the year ended Dec. 31, 1912, made a net profit of \$243,429, after allowing for \$24,515 for amortization of drainage-tunnel account and loss on accounts receivable. The company's income for the year was as follows: Ore sales, gross, \$820,960; interest, \$2866; miscellaneous receipts, \$22,931; profit on sales from storehouse, \$2548; total, \$849,305. Operating expenses were as follows: Maintenance, \$11,556; mining, \$186,913; shipping and selling, \$233,022; general, \$30,796; legal \$4069; payment to lessees, \$129,593; taxes, \$5415; Fuller crosscut, \$376; maintenance mine residence, \$1376; buildings, \$1236; surface plant, \$4626; miscellaneous, \$475; railroad track grading, \$1094; total, \$610,548. This leaves earnings in excess of operating expenses, \$238,757. Appreciation of inventory, included in the statement, brings the total



Loading Station



Unloading Station

#### ROPEWAY AT IRVINE BANK TIN MINE, QUEENSLAND

This is a single-rope system, and one of the most important items to its successful working is the means whereby the rope itself is kept taut. This is done by mounting the tail sheave on a trolley, which in turn is attached through a series of ropes and pulleys to a tension winch, the actual tension being applied through a floating weight, so that the load is always constant. If the ropeway is overloaded, the weights under the tension winch are merely raised.

While no exact costs of operation are available at this time, it may be said that the system can be managed with two men and a boy, that is, one engine man, one boy for tipping buckets, and a man at the loading station. The cost of maintenance under ordinary circumstances of a ropeway of this capacity should be not more than 1c. per ton-mile. This includes wear and tear of rope, necessary renewals on the line, painting, supplies, etc. Total cost, operation, maintenance, amortization, etc., should be under 5c. per ton-mile.

This ropeway is after the system invented and patented by E. Roe, and was furnished by Ropeways, Ltd., London. The accompanying illustrations show details of the system in operation. A point in which this system differs from the usual American installation of the kind, is that it is a single-rope system, and also that all the installa-

up to \$243,429, from which was deducted the amortization mentioned.

The Roosevelt drainage tunnel has completely drained the mine. Development work performed consisted of 5524 ft. of drifts and crosscuts, 265 ft. of shafts and 250 ft. of raises. One criticism that may be made of the report is that no mention is made in any part of the report of the tonnage treated or mined. A report of any mining company free from any reference to the amount or grade of ore handled causes one to wonder why, surely it cannot be an oversight. On the other hand the financial statements of the company are good and its net profit as given really does not include all that is available from the year's earnings for dividends. Usually it is the reverse in such statements.

A Mining Company Owning 20 Concessions for iron, lead and copper in the county of Olpe, Westphalia, has had the good fortune to find that the rock taken out in prospecting its claims contains commercially payable quantities of platinum. It, thereupon, has secured possession of the ground by purchase, as the Prussian mining law vests the ownership of the platinum, in the owner of the ground. The area prospected comprises 2,000,000 sq.m. Samples taken from 3 adits respectively 400 and 800 m. apart, and from bore holes and prospecting pits, ranging from 3 to 12 m. in depth, aggregating 20 tons in weight, assayed from 18 to 35 grams per ton. According to the "Cölnische Zeitung," Dr. Hommel, lecturer in the Clausthal School of Mines, vouchsafes the correctness of this statement.

## Strike Investigations in Colorado and Michigan

WASHINGTON CORRESPONDENCE

The United States Committee on Industrial Relations has voted to carry on a direct investigation on the spot in the Calumet copper region and in the Colorado coal-mining region, respectively, for the purpose of ascertaining the nature of the conditions prevailing in those two parts of the country where very aggravated mining controversies have been in progress. This action on the part of the Commission has been loudly called for during the past few weeks in both Houses of Congress, it being claimed that such an investigation should properly be undertaken by the commission in question, in order that the facts as to the merits of the strike in each place might be definitely known. It has been alleged that the action of members of Congress is thus demanding such an investigation was certainly to be regarded as a severe reflection upon the Department of Labor to which would naturally fall, as in the past, the duty of investigating such disorders and, if possible, offering arbitration or mediation with reference to them.

The Department of Labor, under its present head, has been reluctant to do anything of the kind and has almost refused to do anything that might seem to involve a possible criticism of or difference of opinion with organized labor in the United States. The present head of the Department of Labor has at various times announced himself as a convinced trade unionist, asserting that his opinions on that subject remain the same as in the past—a position which has greatly tended to weaken him with employers who have regarded the arbitration function as one which was properly to be carried on by a non-partisan investigator. The findings of the industrial commission will not be likely to be made known for a good while to come as the fieldwork is expected to occupy special agents for a considerable time.

✽

### California Oil in October and November

The net production of petroleum in all fields in California in October was 7,839,917 bbl.; in November, 7,971,873 bbl. These figures show a decrease from September and also from August and July. In these three months the net production was above 8,000,000 bbl., the highest being in August, when the total net production was 8,411,404. The October shipments and losses showed a total outgo of 8,396,125 bbl., an increase over September of 1,081,767. In November the total outgo was 8,413,914 bbl., an increase over October of only 17,789, which was out of proportion to the increase in production of 131,956, especially in relation to the October decrease in production and increase in outgo as compared to September. Stocks on hand at the end of October amounted to 49,309,700 bbl.; at the end of November the amount was increased to 49,843,376. October field records show 17 new rigs, 46 completed wells, 310 wells drilling, 388 wells on which drilling was suspended, 5675 wells producing, 1250 wells capable of producing but idle, 15 wells abandoned. November field records show 17 new rigs, 39 wells completed, 284 wells drilling, 417 wells on which drilling was suspended, 5607 wells producing,

1610 wells capable of producing but idle, 18 wells abandoned.

#### CALIFORNIA OIL BY FIELDS

District	Bbl. Oct.	Bbl. Nov.
<b>Fresno County—</b>		
Coalinga.....	1,551,062	1,328,290
<b>Kern County—</b>		
Midway.....	2,896,769	3,090,389
Kern River.....	507,112	448,681
Maricopa.....	432,407	482,806
McKittrick.....	349,176	330,984
Lost Hills.....	289,465	271,486
Belridge.....	202,032	178,526
<b>Total Kern County.....</b>	<b>4,676,961</b>	<b>4,802,872</b>
<b>Santa Barbara County—</b>		
Santa Maria.....	379,785	372,853
Summerland.....	4,350	4,350
<b>Total Santa Barbara County.....</b>	<b>384,135</b>	<b>377,203</b>
<b>Southern Fields—</b>		
Fullerton.....	520,119	487,917
Coyote.....	331,380	621,388
Salt Lake.....	212,595	192,336
Ventura.....	74,724	72,015
Whittier.....	51,451	53,518
Los Angeles.....	26,905	26,905
Newhall.....	10,585	9,429
<b>Total Southern Fields.....</b>	<b>1,227,759</b>	<b>1,463,508</b>
<b>Total all fields.....</b>	<b>7,839,917</b>	<b>7,971,873</b>

✽

### Radium in Congress

Coincident with the reopening of Congress a batch of bills providing for the application of the conservation idea to radium lands has been introduced. The bills in question generally authorize the President to withdraw such lands as in his judgment contain radium ores, so that they may not pass into private control under the public entry provision. The leader of the group of measures is a joint resolution offered by Representative Foster, chairman of the House Committee on Mines, which permits the President to withdraw from entry all lands containing earnotite, pitchblende or any other radium-bearing mineral. Western members of Congress are opposed to any provision that will authorize the President to withdraw more lands than are now permitted to be taken out from private occupancy, and the radium agitation is likely to serve for a fresh test of strength in the conservation controversy. Opponents of conservation recognize, however, that the radium agitation is not a very good basis for them to work on, inasmuch as so much sentimentalism has been developed with regard to it as a cure for a great variety of ailments. In order to get a clearer statement of the situation, hearings on the radium question will shortly be begun by the House Committee on Mines.

✽

### A. S. & R. Co., and the Attorney-General

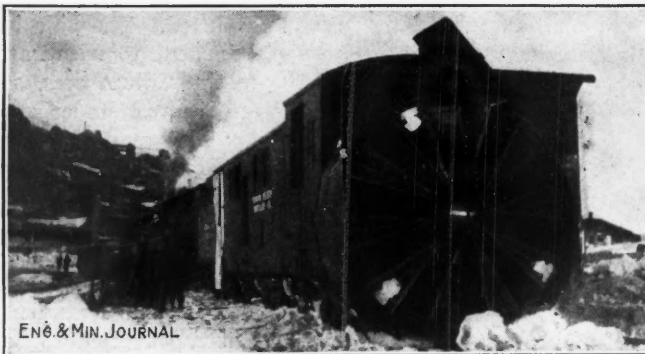
WASHINGTON CORRESPONDENCE

The report that Attorney-General McReynolds will succeed in obtaining from the American Smelting & Refining Co., a definite adjustment of its business relationships, such as will permit him to apply the same policy of dissolution that he has adopted with other combinations thought to be operating in violation of the Sherman anti-trust law, has lately been confirmed. Mr. McReynolds has made no definite announcements on the subject, and it is not expected that anything further will be accomplished until reassembling of Congress, when there seems to be a possibility that a reply will be made by the Department of Justice whether an adjustment of the situation without resort to litigation is likely.

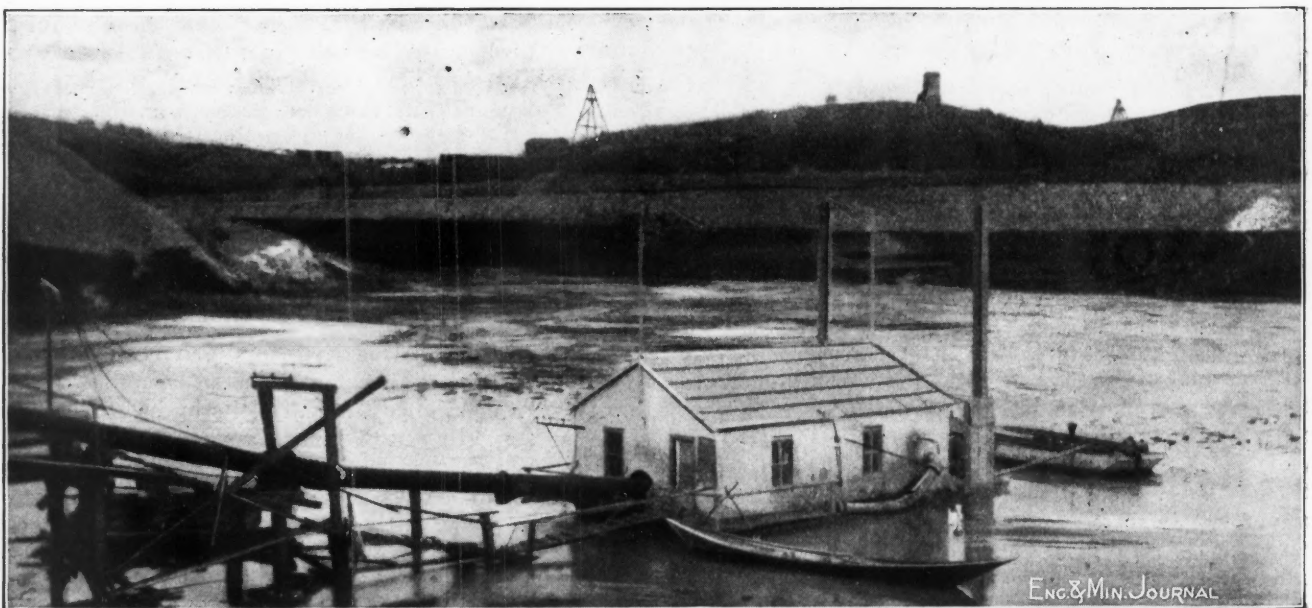
## Photographs from the Field



**MOUNTED FEDERAL TROOPS IN THE CITY OF CHIHUAHUA, MEXICO**  
The city was later evacuated by the Federals and is now held by Carranza forces.



**SNOW PLOW AT CLOSE QUARTERS AND IN ACTION IN THE CRIPPLE CREEK DISTRICT**  
Unusually heavy snowfall in Colorado interfered with or stopped business early in December. Operations were at a standstill for a week at Cripple Creek



**KERR LAKE, AT COBALT, WHICH WAS DRAINED BY CROWN RESERVE AND KERR LAKE COMPANIES**  
silver veins were found in the bed of the lake. The dark band around the shore of the lake shows the previous height of water



CARTING GRAVEL TO WASHING PLANT AT LEBEDINI

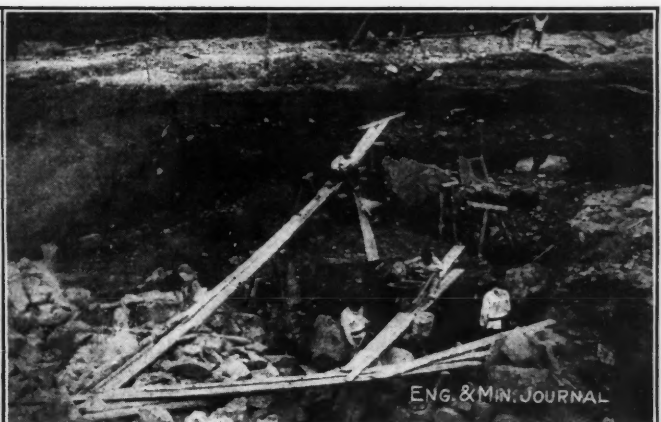
DREDGES ON THE BRIANTA RIVER

All the views on this page are of placer operations in Siberia



PADDLE-WHEEL STEAMER ON THE ZEYA

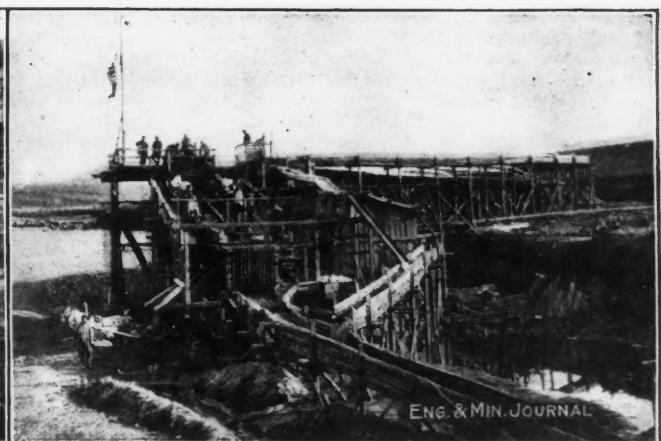
ARMED ESCORT TAKING OUT A GOLD SHIPMENT



DJEGDAGLI MINE WORKED BY KOREAN TRIBUTERS

ONE OF THE TIMPTON GROUP OF PROPERTIES

The Long Tom is used as gravel contains too many boulders to allow carting as at Lebedini



DITCH DRAINING OPEN CUT, SHOWING BEDROCK

SIMPLE SLUICE WASHER FOR PLACER GRAVEL

## NEW PUBLICATIONS

**ALGUNAS FAUNAS DEL CRETACICO SUPERIOR DE COAHUILA Y REGIONES LIMITROFES.** By Emilio Bóse. 9x13, pp. 73, illus. Bull. 30, Instituto Geologico de Mexico, Mexico City.

**ECONOMICS OF BUSINESS.** By Norris A. Brisco. 5x7½, pp. 383; \$1.50. Macmillan Co., New York.

This is a convenient little book describing practices in business, covering a wide range of subjects. It is elementary but will no doubt be useful to many persons.

**MINERAL DEPOSITS.** By Waldemar Lindgren, 6x9, pp. 883, illus; \$5. McGraw-Hill Book Co., New York.

Since the science of ore deposits became sufficiently differentiated from mining on the one hand and geology on the other to be regarded in the light of a separate science, many books have appeared dealing with the subject in greater or less detail. Although some of these have proved extremely valuable, nearly all have consisted in the main of a series of detailed descriptions of the occurrence of individual deposits. Perhaps this is most thoroughly exemplified in the immense, three-volume work of De Launay, which with economically valuable substances alphabetically arranged constitutes an encyclopædia of occurrences in which one may almost certainly find a description of nearly every known deposit in the world, but where none of the principles of ore deposition is separately presented. It is also, though in lesser degree, true of the valuable and elaborate work by Beyschlag, Krusch, and Vogt which has just appeared.

In nearly all of these books some discussion of the principles of ore deposition has preceded the detailed descriptions or has been interspersed with them.

For some years students of ore deposits, whether they be practical men to whom a knowledge of ore deposits is a sine qua non for successful work, or scientists who seek for an explanation of the origin of ores, have been conscious of the need of a book which would present the principles of ore deposition, and where discussion of the origin of ores was not buried in such a mass of descriptive detail as to be well nigh worthless to the busy man.

The present volume by Mr. Lindgren is the first attempt of which the writer has knowledge—certainly the first in the English language—to present the principles which govern the details of ore deposition in any complete manner with only sufficient description of occurrences to illustrate the principles involved.

The book has required several years of arduous labor for its preparation and by all who have known Mr. Lindgren its appearance has been eagerly awaited. This is the more true because it is well recognized that there are few geologists who could have brought to such a task so wide an experience in nearly all of the world's mining districts and so profound a knowledge of the principles of ore deposition and the literature of many languages.

Too much cannot be said in commendation of the work. It offers to the reader not only all of the newest points of view on the genesis of the metalliferous ores, but a thorough exposition of the evidence on which they are based and a critical discussion of them. The book will be indispensable to all interested in ore deposits.

The volume comprises thirty chapters. Of these the first thirteen, or slightly less than one quarter of the volume, are devoted to the discussion of general geological and chemical questions upon which the origin of mineral deposits is in large measure to be based. These embody: definitions; the usual preliminary tables for conversion, etc.; an excellent discussion of solution and precipitation; the flow, composition, chemical work, and origin of underground waters with a theoretical discussion of their connection with mineral deposits; folding and faulting; openings in rocks; the form, structure, and texture of mineral deposits; ore shoots; and a chapter on classification.

The classification adopted contains many new features, and, since it serves as a basis for the arrangement of the main body of the book, is worthy of presentation entire:

### A CLASSIFICATION OF MINERAL DEPOSITS

- I. Deposits produced by mechanical processes of concentration. (Temperature and pressure moderate.)
- II. Deposits produced by chemical processes of concentration. (Temperature and pressure vary between wide limits.)
  - A. In bodies of surface waters.
    1. By interaction of solutions.
      - a. Anorganic reactions.
      - b. Organic reactions.
    2. By evaporation of solvents. (Temperature, 0° to 70° ±. Pressure, moderate.)

### B. In bodies of rocks.

1. By concentration of substances contained in the geological body itself.
  - a. Concentration by rock decay and residual weathering near surface. (Temperature, 0° to 100° ±. Pressure moderate.)
  - b. Concentration by ground water of deeper circulation. (Temperature, 0° to 100° ±. Pressure, moderate.)
  - c. Concentration by dynamic and regional metamorphism. (Temperature up to 400°. Pressure, high.)
  - d. Zeolitization of surface lavas. (Temperature, 50° to 300°. Pressure, moderate.)
2. Concentration effected by introduction of substances foreign to the rock.
  - a. Origin independent of igneous activity. By circulating atmospheric waters at moderate or slight depth. (Temperature, to 100°. Pressure, moderate.)
  - b. Origin dependent upon the eruption of igneous rocks.
    - a. By hot ascending waters of uncertain origin, but charged with igneous emanations.
      1. Deposition and concentration at slight depth. (Temperature, 50° ± to 150° ±. Pressure, moderate.)
      2. Deposition and concentration at intermediate depths. (Temperature, 150° ± to 300° ±. Pressure, high.)
      3. Deposition and concentration at great depth or at high temperature and pressure. (Temperature, 300° ± to 500° ±. Pressure very high.)
    - b. By direct igneous emanations.
      1. From intrusive bodies. Contact metamorphic deposits and allied veins. (Temperature, probably 300° ± to 800° Pressure, very high.)
      2. From effusive bodies. Sublimates, fumaroles. (Temperature, 400° ±. Pressure atmospheric to moderate.)
- C. In magmas, by processes of differentiation.
  - a. Magmatic deposits proper. (Temperature, 700° to 1500°. Pressure, very high.)
  - b. Pegmatites. (Temperature, about 575°. Pressure, very high.)

This classification is based on origin, but the main feature emphasized is the geological process involved in the concentration of the ores belonging to the several groups. It includes the so called non-metallic as well as the metallic deposits and is in this respect quite different from the usual classification of ore deposits and an important advance. Throughout the entire grouping the stress is laid on the temperature and pressure of formation, thereby making the entire grouping hang almost entirely on the principles of physical chemistry. The old distinction between "epigenetic" and "syngenetic" does not appear, although the terms are defined and discussed on pp. 140 and 141, and are used constantly throughout the volume. This grouping of deposits is immensely suggestive and will without question do much to advance our real knowledge of the origin of mineral deposits. There may be some question as to whether such a classification is entirely satisfactory and the author's constant and inevitable use of the terms epigenetic and syngenetic suggests that their importance more than warrants their recognition in the new classification.

Following the classification, the remainder of the book consists of a presentation of the deposits belonging to the several groups given. These chapters consist of a general discussion of the principles of deposition, followed by some of the more important examples. The amount of new material in these theoretical discussions and the accompanying descriptive examples is so great that it is difficult for one who has not read the book to appreciate the immense amount of valuable information which has been condensed into a small space. So great indeed is the amount and importance of the material presented that the book cannot be lightly read; it must be closely studied. The style is clear, no ambiguities appear, and the accuracy of the data is remarkable. One cannot fail to be impressed with the immensely wide field of personal observation of the author, and a familiarity with the literature of ore deposits that is seldom equaled.

Although the book leaves little if any opportunity for adverse criticism, the reviewer on closing it, after a careful study, cannot escape a tinge of regret that so much has been included in a single volume. Because of the very qualities which make the work so valuable, the long deferred hope of all students of ore deposits for a volume which shall set forth the principles of ore deposition with little or no discussion of examples is not quite realized. Those to whom this volume will be indispensable may continue to hope that the same author may some day write a shorter book which will fulfill this hope.

In the reviewer's opinion, this volume marks an epoch in the science of ore deposits and it cannot fail to receive a most enthusiastic welcome.

J. D. IRVING.

## Mining and Metallurgical Society

The annual meeting of the Mining and Metallurgical Society of America was held at the Engineers' Club, in New York, on Jan. 13. The first session, in the afternoon, was devoted to business and the hearing of the presidential address. Dr. H. M. Chance, president, occupied the chair. The secretary and treasurer presented the annual reports, which showed the society to be in excellent condition in all respects. The treasurer reported a surplus of about \$3000 in liquid assets.

The election of officers for 1914 was reported as follows: President, Prof. James F. Kemp; Vice-President, James R. Finlay; Secretary and Treasurer, W. R. Ingalls; Councillors to take the place of those retiring, J. Parke Channing, Philip N. Moore, Hennen Jennings, and H. Foster Bain. At a subsequent meeting of the council, George C. Stone was elected to fill a vacancy.

The evening session was preceded by a dinner. About 40 members were present. In opening the meeting, Dr. Chance reviewed the work of the society. He then made formal announcement of the award of the annual medal of the society to Herbert C. Hoover and Lou Henry Hoover. In the absence of Mr. and Mrs. Hoover, J. Parke Channing replied in their behalf. Presentation of the medal will be made at a later meeting.

Sydney J. Jennings was the first speaker on the program. He told about the "gold mines back of Juneau, Alaska." He gave a very clear and instructive account of these important mines, which are now being developed. Allen H. Rogers described mining conditions in South America in an entertaining and illuminating way. Professor Kemp told of some new methods of extracting metals from ore in place, which he had lately invented. The consensus of opinion was that his proposals deserve careful consideration. Mr. Riordan told some stories of early experiences in Nevada and Arizona. The meeting was pronounced one of the most successful in the history of the society.

## Oroville Buys Another Dredging Area in Colombia

According to a circular recently issued by the secretary of Oroville Dredging Co., Ltd., the company has completed arrangements for acquiring another rich dredging property in Colombia, on the other side of the Nechi River from the Pato mine. The negotiations were to have been closed on Jan. 2, 1914. The new property is known as the San Francisco and comprises about 400 acres. The option price was \$51,000 and T. J. Hoover estimates that if the drilling average is confirmed by dredging results, the profit from that portion of the San Francisco property now drilled should be £700,000, or an amount equal to the entire capital of the Oroville company.

Drilling has been in progress for some time on the San Francisco property with Empire drills, and in December, W. A. Prichard cabled that 90 acres of pay gravel had been proved, the drilling showing an average of 70c. per cu.yd. for a depth of 48 ft. According to Mr. Hoover's calculation, this area should contain approximately 6,900,000 cu.yd. and, assuming the drilling results to be substantiated in dredging, would yield a profit

of £700,000, or £1 per share, after allowing 10c. per cu.yd. for operating cost and £100,000 for equipment. With reference to power for another dredge, Mr. Prichard estimates that the present plant will supply ample power, and that there is sufficient water impounded by the present dam to generate power for a number of additional dredges during nine months of the year.

In a preliminary report, Mr. Prichard, who was employed by the directors to make a full investigation of the company's Colombian properties, stated that the California Hill hydraulic deposit was of but small area; five drill holes gave an average of 12c. per cu.yd. He added that other placer deposits on the Pato property were "worthy of investigation" and that preliminary drilling had indicated additional dredging ground of most favorable character. The holdings of Pato Mines, Ltd., in Colombia, are now estimated to comprise over 60 square miles or nearly 40,000 acres, about double the area originally estimated from engineers' preliminary reports. The secretary's circular gives the Pato operating costs from February to August as 11.82c. per cu.yd.; for the month of August, alone, 8.76c. per cubic yard.

## Canadian Klondyke Mining Co.

At the second ordinary general meeting of the Granville Mining Co., Ltd., in London, recently, the chairman gave the following information regarding the Canadian Klondyke Mining Co., which is one of the two principal subsidiaries of the Granville Mining Co. According to the *London Financial Times*, the Granville company, on conversion of the debentures it holds, will be represented by approximately 49% of the \$8,000,000 capital of the Canadian Klondyke Mining Co. The latter property comprises about 40 square miles in the Klondyke River basin, which the company estimates to contain 122,000,000 cu.yd. of gravel, indicated by 800 to 900 drill holes to contain a gross value of approximately \$27,500,000; the total recoverable value is estimated at \$20,000,000 on a basis of a 6c. cost per cu.yd. The company now has three 16-cu.ft. dredges and one 7½-cu.ft. dredge; these operated practically to the end of 1913, before weather conditions compelled a cessation of operations. Manager Boyle estimates that in a normal season of 240 days, these dredges will handle 7½ million yards of gravel, giving the property a life of approximately 17 to 18 years. While complete returns were not available, the weekly advices from Mr. Boyle indicates a recovery of 85,899 oz. having a gross value of \$1,331,000, from 6,363,000 cu.yd. washed in the 1913 season. The cost of recovery was estimated at \$480,000, leaving working profits of approximately \$851,000. The final figures will not be in hand until about the end of February. Satisfactory as results were in 1913, Mr. Boyle anticipates a larger return in 1914, as the difficulty of obtaining repair parts will be reduced, and an earlier start is anticipated during the coming season.

The Corocoro Branch of the Arica-La Paz railway, was opened to traffic on Oct. 26. Although the branch is only 8 km. long, says the "Board of Trade Journal," it is important in that it links up the great copper mining center of Corocoro with the main line, thus giving a direct rail connection with the coast of 346 km. as against the former indirect route to Mollendo of 897 km. Of the 4707 metric tons of copper mined in Bolivia in 1912, the Corocoro district accounted for 4131 metric tons, and it is anticipated that the opening of this new railway line will lead to a further development of the copper resources of the district.

## Correspondence and Discussion

### Natomas Consolidated

In regard to criticisms that have followed the failure of the returns of Natomas Consolidated of California to equal the estimate of the yield originally made, I should like my brother engineers to know the facts relating to these estimates, as the criticisms have been given wide circulation both by the technical and the financial press.

At the recent annual meeting, President Griffin summarized for the bondholders the causes which led to the present financial embarrassment, namely, that the gold-dredging fleet was not completed until two years after it was due under the original schedule, and that the burning of one dredge and sinking of three others in addition, curtailed the gold earnings. He further stated that the gold recovery was about 15% less on the gross gold, or about 27% on the net, than the boreholes indicated; that the cost of the dredges exceeded the estimates by about \$800,000, and that more lands were acquired than was originally contemplated, and that, in consequence of all, the present shortage of money resulted.

At the time of the flotation of the bonds in London, my report on Natomas was published and accompanied the prospectus.

(1) As I never made any estimate of cost of dredges or plant, the excess of cost cannot be laid at my door. It is a matter between the company engineers and the Bucyrus Co., or the Yuba Construction Co.

(2) The loss of money through completion of the dredging fleet two years behind the original scheduled time, if blame is to be attached for it, falls on California, London having repeatedly pointed out by correspondence the inevitable consequence which would follow the delay.

(3) Regarding the 15% shortage in gross gold recoveries from what the boreholes indicated, I point out that I checked the report made by the general manager of the company, and that I stated in my published report that I based my valuation on the average results of the individual values of 1274 drillholes and test pits, as inscribed on the company's map.

I stated in the computation of the average values, that I found the company estimate \$418,000 too large, which I considered a permissible error in so large a gross value as \$28,814,000, which was the company's estimate, in round numbers, for Natomas Development Co. and Folsom ground. Immediately after this, I added the following sentence, which I copy literally from my report.

The writer wishes to emphasize that, according to the statement of the general manager, Mr. Newton Cleaveland, the values of the different bore tests, which are marked on the company's map, are the original values calculated, reduced by 15%. In order to make them representative of actual extraction. The different test bores are marked on the larger map in the places where drilling or shaft sinking took place.

My valuation of the Folsom and Natomas ground is conditioned distinctly by this qualification. As dredging proceeded over a longer period, I was enabled to collect

data to check this statement. I then wrote President Griffin that extraction results did not bear out above quoted statement, and I added the extraction results up till then.

Mr. Griffin took immediate steps to satisfy himself as to the correctness of my assertion, and from his statement quoted to begin with, it is seen that he admits what I pointed out to him.

CHARLES M. ROLKER.

London, Dec. 23, 1913.

✻

### Record in Building All-Steel Dredges

In the JOURNAL for Dec. 27, p. 1235, an account is given of the erection of an all-steel dredge in California, in four months and four days. It is stated that this is a record time for dredge building.

In the summer of 1911, I was engineer in charge of construction of a 7½-ft. dredge that was being built for the Orsk Goldfields, Ltd., of London, in East Siberia, under contract, by the New York Engineering Co., and the record made in building by the contractors and assembling in the field, excels the one mentioned, Yuba No. 14 in California.

The Siberian dredge had an all-steel hull, including a steel deck, also steel gold-saving tables, in fact, it was the first all-steel dredge built in the United States. The article I am criticizing is again in error when it states that the Yuba No. 14 is the only dredge provided with a steel deck and steel gold-saving tables.

The entire dredge complete, with steel hull, a 450-hp. electric generating plant, together with machine shop and all other accessories, was designed, built and shipped in 130 days. This also was a record that I am quite sure has never been equaled. The hull complete with all gantries weighed 325 tons, and the machinery, 350 tons, this dredge being electrically driven. All the construction work was done by Russians and Chinese, and including the foreman there were only seven men who could speak English, two of these being Chinese, while two of the Russians could speak German.

The first bottom plates for the hull were laid July 26, and on Sept. 10, the hull was floated. Riveting and calking were completed in 20 days, 55,000 three-quarter-inch rivets being driven. For this we had seven gangs using air hammers and three gangs hand-riveting, only two of the Chinese having ever seen an air hammer before riveting was started. Installation of machinery was commenced Sept. 10, and completed Oct. 25. Simultaneously with the dredge construction, the construction work in power house and machine shop was carried on, the whole plant being put in operation Oct. 25, 93 days after construction work was started. This, I believe, is the record for construction of an all-steel dredge.

RUDOLPH E. SCHULTZ.

New York, Dec. 31, 1913.



## Editorials

### The Copper Statistics for December

The copper statistics for December were surprising to the public, but they simply confirmed what the producers supposed and expected. Until the very end of December there had been no important buying from domestic copper manufacturers in nearly three months and the contracts made in the last big buying movement ran only into early December. Contraction in their business put the manufacturers in the position of being overbought and consequently they did not need to contract for any more supply. Thus, when the producers' deliveries caught up with the blank pages of their order books in December, the deliveries of about 22,000,000 lb. completing their old contracts, stocks began to pile up at the refineries. The foreign delivery was probably maintained by sending copper to Europe on consignment.

If there was anything surprising in the December statistics it was the large production. It should be borne in mind, however, that although the Michigan and Mexican productions have been greatly reduced, American refiners have lately been obtaining largely increased supplies of crude copper from foreign countries, taking what previously went to foreign refiners. The copper business has become so very complicated through the complex international movements that no deductions may safely be drawn from the American refinery statistics taken alone except the fluctuations in the stock of refined metal here carried and the amount of the deliveries. The world's production of copper in 1913 decreased about 43,000,000 lb., as compared with 1912, while from the beginning to the end of 1913 the visible stocks decreased about 82,000,000 lb. Consumption was therefore in excess of production, considering the whole year. Consumption fell off in the last half of the year, especially in the last quarter, but to what extent no one knows.

The domestic buying movement that occurred during the last 10 days of December happened too late to affect the December statistics. The occurrence of large buying then, coupled with the history of the previous three months and the look of the statistics indicates that manufacturers must have been low in supplies at the end of the year; in other words, while the visible supply was increasing, the invisible was decreasing and probably had become small.

### The State of the Mining Industry

Anyone who examines carefully the statistical and review number which we published last week can scarcely fail to obtain any idea but that prosperity prevailed in the mining industry in 1913 and will perhaps wonder respecting the pessimism that existed. There were increased outputs of iron, lead, zinc, silver and coal. There was a smaller output of copper than in the previous year, but the reduction was not so much as the

Michigan strike accounted for. Only in the case of gold was there a large decrease among the more important mineral substances.

The American mining companies that publicly announce their dividends paid over \$76,000,000 in 1913, compared with a little less than \$69,000,000 in 1912. The metallurgical and holding companies increased their dividends by about \$8,000,000. These figures are properly comparable inasmuch as they represent the same companies in each year. They are not complete, there being many close corporations which do not inform the public respecting their payments. Nevertheless, they afford us an idea of how profitable the mining industry really is, and they furnish a pretty reliable index that the profits in 1913 were greater than in 1912.

Nor did our mining operators figure apparently that the end of good times was coming with the end of 1913, and that there was consequently no use in providing for the future. That such was not their opinion is evidenced by the fact that our report of new mining and metallurgical construction in 1913 enumerated 163 concerns that completed or began new milling and smelting plants during the year, at costs ranging from \$10,000 to \$6,000,000 per plant. Nor, probably, is our list complete.

We showed that the copper-smelting works of America at the end of 1913, had capacity for smelting about 29,000,000 tons of ore per annum; the silver-lead smelting works of 7,000,000 tons; the zinc smelting works of about 900,000 tons of concentrate; and the electrolytic copper refineries of about 1,750,000,000 lb. of copper. These are big figures, and they reflect the immensity of the American mining and metallurgical industry.

### The Engineering School at Cambridge

The announcement this week of the union of the Mass. Institute of Technology and the engineering schools of Harvard University was of great interest. Such a union was all but consummated some years ago, but was defeated by the opposition of the alumni of the Institute. The present plan accomplishes the same object, broadly viewed, but the Institute fully preserves its independence. In fact Harvard surrenders its engineering courses, faculty, and part of its income to the Institute, while the latter unites a part of its faculty with Harvard's. In other words, portions of the respective faculties are consolidated and will lay out and conduct courses of instruction, to be carried out in the new buildings and laboratories of the M. I. T. on the Charles, the same courses leading to degrees in both institutions.

The purpose of this merger is to do just what formerly was in view, i. e., avoid the unnecessary duplication of educational plant and the weakening division of interest. Harvard, with its great McKay endowment, is in a position to give superb financial assistance. Heretofore, this

has been used for the Graduate School of Applied Science, founded in 1906, but President Lowell, recognizing that it had not grown satisfactorily, grandly decided to relinquish it to the Institute which has been highly successful in similar work. Nothing in these negotiations commands more credit than the broadness of President Lowell.

At present the union will be only partial, being limited to the great fields of engineering, viz., mechanical, electrical, civil, sanitary and mining, all of which involve large expense in the maintenance of extensive and costly laboratories. There can be little doubt, however, that the amalgamation so started, will run further. Presidents Lowell and McLaurin, by a stroke, create not merely one of the great engineering schools of the world, the M. I. T. being that already, but one that will be well nigh of unrivaled facilities and resources.

✱

### Withdrawal of Carnotite Deposits

It is the desire of the Secretary of the Interior to attempt to withdraw carnotite deposits, and others of similar character, from private entry, and to establish a radium monopoly for the government. The justice of this step, taken, of course, to conserve the interests of "the people," is by no means evident. Except for a certain glamor about radium, due to its curious properties and high price, appealing particularly to the unscientific mind and government officials, there is no more reason for government exploitation of radium, than there is for government exploitation of iron ore.

The radium deposits must not be exploited at the expense of suffering humanity, seems to be the argument. No, neither should those of iron, copper or lead. In fact, if it came to a pinch, suffering humanity could probably worry along as well without radium as without steel. That certain individuals have been enriched by steel-making seems true. That they have built up an industry supporting several million people, is also apparent.

It can be stated confidently that if the government goes into the radium business without fear of outside competition, the output of radium will cost incomparably more than under competitive private enterprise. Of course, this will not appear in any cost sheets, nor will the radium probably cost the consumer any more. The difference will be made up in a constant stream of appropriations for special radio-research by the Bureau of Mines, the Bureau of Standards, the Bureau of Public Health, the Bureau of Soils, for radium laboratories, etc. Nevertheless, the ultimate consumer will also be the ultimate payer, a fact sometimes lost sight of in taxation.

It has also been pointed out by Mr. Flannery, of Pittsburgh, that the byproducts of radium, viz., uranium, vanadium, etc., are of great importance, and in weight and bulk vastly exceed the radium. These would be disposed by a host of government uranium and vanadium weighmasters, clerks, auditors, inspectors and salesmen. Here we will be on a competitive ground, and the government factory will have to sell at competitive prices. But what difference? Any deficit between cost of production and sale price can be made up by Congressional grant—and, anyway, the income-tax payer must stand this, and the common people will be protected in their inalienable right to life, liberty and the pursuit of radium.

### The Lake Superior Strike

As the struggle in the Lake Superior region progresses, it seems more and more evident that it is impossible to control the contending forces. The thing must wear itself out. There are today about 9000 men working under conditions entirely satisfactory to them, and there are many others ready to go to work if they can feel free to do so. It is reported reliably that the strikers cannot muster 3000 *bona fide* mine workers. It is difficult to realize how few may be the number of men, when supplied with means and leadership, that can upset all processes of civil government and create and maintain a reign of terror. A very disturbing feature has been the manifestation on the part of the Secretary of Labor of a tendency to use the authority of his high office in a way that can but bring discredit on it. Mr. Wilson's recent Seattle speech was nothing short of indecent. The way in which it and similar talk is taken by the ignorant was indicated by one of our Lake Superior correspondents in a recent communication, as follows:

A friend of the writer met a Mohawk miner on the road the other day, "Still on strike, John?" asked my friend. "Sure. Next week the Government is going to take the mines. I am going to be superintendent of the Ahmeek and Dunnigan will boss the Mohawk." Dunnigan is strike agitator at Ahmeek. "What makes you think that?" "That's what Wilson said in his Seattle speech, and he's going to make the President do it." And no amount of argument could convince this simple man that he did not know what he was talking about. This socialistic doctrine of the Secretary of Labor has kept alive the spirit of hope in many of the strikers remaining out. It has been fed to the strikers in their newspapers regularly, in all languages, and preached to them in all the strike meetings.

There is no doubt that the meddling of Washington officials has prolonged this disastrous strike, the consequences of which have been extremely serious to both employers and employees. The partisans of the strikers would have the world believe that peonage, or something akin to that, has prevailed in the Lake Superior region. Persons who knew Calumet in the pre-strike days appreciate the absurdity of that sort of talk.

✱

### Threatened Strike in the Michigan Iron Mines

Some of the officials of the Western Federation of Miners have been quoted of late as favoring a strike of the iron miners in the Michigan field, but those who are acquainted with the conditions believe that there is no likelihood of the Michigan iron miners leaving their places. President Moyer has no hold on the iron miners, as there are only one or two branches of the federation outside of the copper country, and he could not muster up a corporal's guard to obey his wishes if he ordered a strike. The only place where the federation has any sort of a foothold is at Negaunee, some of the Finns employed underground there being members of the Negaunee branch. There are probably not over 200 miners in the city affiliated with the organization. For a number of years there was a branch of the Western Federation of Miners at Ishpeming, but the membership dwindled down until there were only a few left, and they grew tired of paying the numerous assessments which were called and gave up their charter. The majority of the miners on the Marquette range do not sympathize with the men out on strike in the copper district, as they have no use for the organization which brought about the trouble and believe

that the men were being fairly treated by the mine managers.

There was a strike on the Marquette range in 1895 and those who are residing there now and participated in that trouble do not favor strikes. Great hardships were endured by many of the men at that time and nothing was gained. The miners of the Marquette range would pay little heed to an order of Moyer or anyone else calling upon them to walk out, as they are not union men and are satisfied with present conditions. They are well treated by their employers and when they have a grievance they are always given consideration. The same conditions exist on the other iron ranges in the state, and President Moyer knew when he stated that he could call out the iron miners of Michigan that he would have a difficult task on his hands.

### BY THE WAY

A zinc company operating in east Tennessee in its prospectus announced that the ore yielded an assay: Zinc, \$42.40; dolomite spar, \$49.50; silica, \$6.50; pyrite, \$1.50. Inasmuch as the company is now in the hands of a receiver, it would seem that there must have been some carelessness in the efforts to recover the "values" particularly the "spar" and "silica."

"That the Calumet & Hecla Mining Co. has been a highly profitable concern is one of the conclusions arrived at by the Federal investigators who have examined its record," says the *Sun*; "it scarcely seems worth while to add that its prosperity is in these days a source of reproach to it. Its officers, moreover, are disinclined to turn the management of their properties over to the gentle administration of the Western Federation of Miners, now under the leadership of that notable apostle of peace, Mr. Moyer, a dovelike creature of more than parochial reputation. Prosperous and determined to mind its own business: is there no depth to which this corporation will not gladly sink?"

Two men interested in metals were discussing the recent editorial in the *JOURNAL*, which mentioned the purchase of a large quantity of sheet zinc instead of sheet lead for the manufacture of coffins. "That is a final consumption," said one. "That metal never comes back into the market." "There are others," remarked his friend. "Shot and bullets, for example." "You are only partially correct," replied the first. "Some of the bullets come back. They are so economical and so well organized in Germany that after military target practice the soldiers have to pick up and account for all the lead they have fired. They are no theorists about conservation over there. They are practitioners."

The building trades in New York started the new year with a new wage scale. About 12,000 bricklayers received an advance from \$5.60 to \$6 a day. About 5500 stone setters advanced to the same figures; 3000 composition roofers received an advance from \$3.25 to \$3.50 a day; about 3000 electrical workers got an advance from \$4.50 to \$4.80 a day. This scale was put into effect al-

though a large number of building mechanics are reported idle in consequence of slack times. The principles of economics do not rule in these trades in New York. But \$6 per day for a bricklayer! The idea will occur to many engineers that they might well become bricklayers, but they can't, because they haven't got union cards.

The annual statistical and review number of the *JOURNAL* this year, as last year, was a book of 112 pages, or  $3\frac{1}{2}$  times the size of the every-week issue of the *JOURNAL*. Besides being of this great size, it involved a large amount of original investigation and work, far more than does any weekly issue. In former years, we were always a little late in publication. In getting out our weekly issue the last page proof goes to the printery at about 5:45 p.m. of Wednesday. We recollect former years when the last page proof of the annual number did not leave the editorial rooms until Thursday afternoon. Then it became Thursday morning. Last year the time was about 10:30 p.m., Wednesday. This year it was 5:28 p.m., or about a quarter of an hour earlier than the time of an ordinary weekly issue.

Arthur D. Little, in his presidential address before the American Chemical Society, quoted with reference to industrial research some words of Dr. W. R. Whitney, of the General Chemical Society, who is distinguished in such work. Dr. Whitney said: "We see a field where it seems as though experimental work ought to put us ahead. We believe that we need to get into the water to learn to swim, so we go in. We start back at the academic end as far as possible, and count on knowing what to do with what we find when we find it. Suppose that we surmise that, in general, combustible insulation material could be improved upon. We try to get some work started on an artificial mica. Maybe we try to synthesize it, and soon come to a purely theoretical question, for example: Is it possible to crystallize such stuff under pressure in equilibrium with water vapor corresponding to the composition of real mica? This may lead a long way and call in a lot of pure chemistry and physical chemistry. Usually we just keep at it, so that, if you haven't seen it on the market, we're probably at it yet."

They have queer ways in London. The last meeting of the stockholders of Great Cobar, Ltd., appears to have been an interesting occasion, if we may read between the lines. Among other things a curious incident was reported. In October, 1912, one of the directors asked permission for a gentleman to visit Cobar and report on the property in the interests of a number of persons who were interested. The object, as the board understood it, was that these gentlemen had made an investment in Cobar shares and desired to send out an expert to examine the property. The request was granted. The expert furnished a very long and able report. This report was lent to the board, and while they were studying it part of it appeared in the circular of an outside broker's firm. The board, therefore, felt it necessary to obtain a copy, and they had to pay 250 guineas for it. They published the report, and it provoked an action at law for libel by a man on the adjoining property, so that so far as the board was concerned they had paid over 250 guineas for an action for libel, which was rather a dear thing, remarked the chairman.

## PERSONALS

Marion L. Thomas, formerly of Mexico City, is now located at 71 Broadway, New York City.

Eli T. Conner, of Philadelphia, who has been sick for several months, is now about well again.

Arthur J. Hoskin, of Denver, Colo., has removed his office to 308 Commonwealth Building in that city.

L. D. Moore has returned to New York from Chile, where he has been examining some silver and gold properties.

R. C. Canby and Donald M. Liddell have been elected to membership in the Mining and Metallurgical Society.

F. G. Lasier will be at Crescent City, Fla., during January and February, returning to Detroit early in March.

B. P. Miller, of Portland, is investigating mining properties in Josephine County, Oregon, for interested parties.

J. R. Finlay expects to complete his work in connection with the reorganization of the St. Joseph Lead Co., Bonne, Terre, Mo., and to return to New York by March.

Harold C. E. Spence recently returned to Montreal from New Mexico and Arizona and sailed for London by way of Halifax.

Prof. Frank Adams, of McGill University, Montreal, has been appointed a member of the Canadian Conservation Commission.

George J. Bancroft has accepted the editorship of a newly established mining and industrial page in the "Rocky Mountain News," Denver.

L. G. Huntley, of the Associated Geological Engineers, is returning to the Tampico oilfields in Mexico, having spent the holidays in Pittsburgh.

Edward Manion has been appointed general manager of Wasp No. 2 at Flatiron, S. D., succeeding John Gray, who resigned on account of ill health.

Siegfried Hirsch, of Aaron Hirsch & Sohn, Halberstadt, Germany, who has been visiting in this country for several weeks, has returned to Europe.

Arnold Becker, of New York, is in Josephine County, Oregon, near Grant's Pass, looking after mining interests in the Holland district and also in hopes of improving his health.

Walter Segsworth, engineer of the Seneca-Superior, of Cobalt, Ont., has sailed for England. His visit is believed to be in connection with a project to dispose of the mine to British capitalists.

H. A. Guess has been transferred to the New York office of the American Smelting & Refining Co., as consulting engineer. Mr. Guess will retain the general management of the Federal Lead Company.

Richard A. Parker, of Denver, Colo., has been elected president of the Colorado Scientific Society for this year. Mr. Parker has just undertaken the management of the Argo Mill at Idaho Springs.

Lloyd B. Smith, of the Associated Geological Engineers, has returned from the West Indies, where he was engaged in examining prospective oil properties, and is now making examinations in Oklahoma.

Edgar S. Cook, of the Warwick Iron & Steel Co., Pottstown, Penn., and B. F. Fackenthal, Jr., former president of the Thomas Iron Co., Easton, Penn., sailed for Europe, Jan. 10, for a tour covering several months.

Edgar H. L. Steinthal and Fritz Schütte, who heretofore held power of attorney, were, on Jan. 1, admitted as general partners in the New York firm of Schütte, Büemann & Co. Hans Thiermann, while remaining a general partner in the New York firm, has transferred his residence to Bremen, Germany.

Heinrich J. Freyn, formerly consulting engineer of the gas engineering department of the Allis-Chalmers Manufacturing Co., Milwaukee, Wis., has accepted the position of third vice-president of the H. Koppers Co., of Chicago, builders of by-product coke ovens, gas plants, benzol recovery plants, and by-product recovery gas producer plants, and consulting engineers in matters concerning fuel economy.

Clarence Hall, after having acted in the capacity of expert in charge of the Explosives Section of the U. S. Bureau of Mines during the past seven years, has tendered his resignation in order to establish an industrial laboratory in Pittsburgh. The analyses and tests of explosives will be a specialty. Investigations will be undertaken in the laboratory

and field to determine the suitability of explosives with respect to their safety and adaptability to any particular work.

Reginald W. Brock, director of the Canadian Geological Survey, has been appointed to the position of Deputy-Minister of Mines in succession to Dr. A. P. Low, who has retired. Professor Brock was born in Perth, Ont., in 1874, and before joining the staff of the Geological Survey was a professor at the Queen's School of Mines, Kingston, Ont. He was appointed director of the Survey in 1901 and has been concerned in many investigations, the results of which have added materially to the information concerning the mineral wealth of Canada.

Samuel S. Arentz, chief engineer of the Salt Lake & Utah R.R., who has been in charge of construction since the beginning of work on this line in September, 1912, has resigned his position, to take effect Feb. 1. Mr. Arentz has been with the firm of A. J. Orem & Co. for 8½ years, during which time he has acted as engineer and superintendent in the Silver City, Bingham and Yerington districts. He went to Salt Lake from the position of general superintendent of the Nevada Douglas Copper Co. and the Nevada Copper Belt R.R., to accept position as chief engineer of the Salt Lake & Utah inter-urban road. He will remain in Salt Lake City to engage in private business.

## OBITUARY

Hector G. Williamson, one of the owners of the Red Ledge mine at Washington mountain, east of Grass Valley, Calif., was killed by an snow and earth slide near the mine on Dec. 31. Williamson was warned of the approaching slide by one of his companions, but, being deaf, did not hear the warning. He was 42 years of age.

Edward L. Adreon, vice-president American Air Brake Co., and former city comptroller of St. Louis, died at his home in St. Louis, Dec. 29, aged 66 years. He was vice-president and general manager of the company from 1887 to 1910, when he retired from the last named office, continuing only as vice-president. He was a native of St. Louis and was prominent in civic movements.

Andrew Noce died at Sacramento, Calif., on Dec. 19, of consumption. Mr. Noce was employed for a number of years in the deep mines of the Mother Lode region, chiefly in Amador County, in California, as foreman and superintendent. He was 49 years old and a native of California. For several months he had been ill and incapacitated for work. Four children survive him.

W. S. Copeland, one of the best known mining men in Colorado, was accidentally killed, Dec. 19, by falling down a stope in the Jo Dandy mine while on a trip of inspection. Mr. Copeland, besides being manager of the Jo Dandy mine, was in charge of the Copeland sampler of Victor. He was a brother-in-law of D. W. Brunton of Denver.

Earl D. Blowers died at Oakland, Calif., Dec. 31, aged 50 years. Mr. Blowers was a mechanical engineer and machinist and had for about 10 or 12 years been employed as dredge-master in various fields where gold dredges are operated in California and Oregon. He was one of the first master dredge-men to operate the California type of bucket-elevator dredge. He had also prospected with Keystone drills a great deal of dredging ground and in December, 1912, was sent to Siberia in charge of men and drills to do prospecting. He returned about the middle of the year very much broken in health.

Herman Charles Meinholtz died in St. Louis, Dec. 24, aged 45 years. He graduated from the Manual Training School in 1886. After a few months as assistant in the Washington University laboratory under Professor J. B. Johnson, and a few more months with Shickle, Harrison & Howard, he entered the employ of the Heine Safety Boiler Co. at the age of 19 as draftsman, and was continuously connected with that company up to the time of his death. At the beginning of his connection with the Heine company, it was in its infancy, and he literally grew up with it, coming in contact with every phase of the business, although his work was mainly in connection with the practical side. He was made superintendent in 1895 and vice-president in 1907. He had entire charge of the company's shop when it was established in 1899, and under his general direction the new factory was designed and built in 1909, and had since been under his direct supervision. Although of a modest and unassuming disposition, he made many friends and was a keen observer and judge of men. He was by nature honest and courageous, and while slow to form decided opinions, after having once arrived at a conclusion he very persistently maintained it, and his judgment was usually justified by the results. He was a mem-

ber of the Engineers' Club of St. Louis, and of the American Society of Mechanical Engineers. In the latter he was serving on a Committee to Formulate Standard Specifications for the Construction of Steam Boilers and Other Pressure Vessels and for the Care of Same in Service. In 1891 Mr. Meinholtz married Miss Minnie Eller, and is survived by her and five children.

## SOCIETIES

**American Chemical Society**—Dr. Irving C. Allen, petroleum chemist of the U. S. Bureau of Mines, stationed at Pittsburgh, addressed a meeting of the California Section at San Francisco on Dec. 29. His address referred chiefly to the organization of the American Petroleum Society, of which he is secretary, and the purpose of the society regarding the petroleum exhibit to be made at the Panama-Pacific International Exposition. Doctor Allen will also visit Los Angeles, New Orleans, Houston and Beaumont, Texas.

**Colorado Scientific Society**—At the 31st annual meeting in Denver, Dec. 20, the following officers for the ensuing year were chosen: President, Richard A. Parker; first vice-president, E. N. Hawkins; second vice-president, Thomas B. Stearns; treasurer, J. W. Richards; secretary, H. C. Parmelee. For members of the executive committee: Charles A. Chase, J. D. Skinner, to serve three years; Victor G. Hills to serve two years to fill vacancy.

**American Institute of Mining Engineers**—The 107th meeting of the institute will be held at the headquarters of the institute, 29 West 39th St., New York City, on Feb. 17 to 20. All indications point to a very active and important meeting. The iron and steel committee has asked for the assignment of two sessions for the reading and discussion of papers; the committee on petroleum and gas has asked for two sessions; the committee on mining law has asked for two sessions; the committee on mining geology has asked for one session. In addition to these special sessions, there is a goodly number of manuscripts already in the hands of the secretary, which will be printed and distributed in advance. This is also the annual meeting. Members are urged to vote promptly for officers and directors. In order to be counted, all ballots must be received at the headquarters of the institute on or before Feb. 10 next.

## INDUSTRIAL NEWS

The London office of the Hardinge Conical Mill Co. has now been opened just one year and during this, its 12th month, orders are on its books calling for the shipment of nine Hardinge Conical Mills into Russia alone.

The Electric Steel Co., Indianapolis, Ind., has been formally organized. Hugh McK. Landon has been elected president. James M. Ryan, formerly in charge of the Canadian Pacific Foundries, Ltd., Montreal, and previous to that with the Mesta Machine Co., will be general manager. The company will build a plant in Indianapolis, and will make electric steel castings.

The Taylor-Wharton Iron & Steel Co., of High Bridge, N. J., announces the opening of its Western sales office, at 509 Insurance Exchange Building, 433 California St., San Francisco, with Richard D. Chapman in charge as western sales manager. Mr. Chapman will also be in charge of the company's offices at Salt Lake City, Seattle and Los Angeles. The sale of all the company's products will be handled through these offices, including miscellaneous "Tisco" manganese-steel castings, special manganese-steel track work for steam and electric railways, forgings of all kinds and manganese-steel repair parts for steam shovels and gold dredges.

## TRADE CATALOGS

The Gardner Governor Co., Quincy, Ill. Circular A-C6. Horizontal duplex air compressors. 8 pp., illus., 6x9 inches.

Hoskins Mfg. Co., 354-471 Lawton Ave., Detroit, Mich. Bulletin No. 8. Electric furnaces, type FB. 20 pp., illus., 6x9 inches.

Lehigh Car, Wheel & Axle Works, Fullerton, Penn. Catalog. Fuller-Lehigh pulverizer mill and pulverized coal equipment. 24 pp., illus., 8x10½ inches.

## NEW PATENTS

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

**BLASTING CAP AND CARRIER THEREFOR.** John R. Powell, Plymouth, Penn. (U. S. No. 1,081,772; Dec. 16, 1913.)

**CHLORIDIZING**—Process of Chloridizing Ores. Augustus D. Ledoux, Summit, N. J. (U. S. No. 1,082,599; Dec. 30, 1913.)

**CONCENTRATOR**—Dry Concentrator. Elisha A. Stephens, Portland, Ore., assignor to International Manufacturing & Mining Co. (U. S. No. 1,083,152; Dec. 30, 1913.)

**CONCENTRATOR**—Ore-Concentrator Belt. Peter H. Craven, Spokane, Wash., assignor to P. H. Craven Machinery Co., Spokane, Wash. (U. S. No. 1,083,058; Dec. 30, 1913.)

**CRUCIBLE.** George N. Jeppson, Worcester, Mass., assignor to Norton Co., Worcester, Mass. (U. S. No. 1,081,535; Dec. 16, 1913.)

**CRUCIBLE**—Glazed Refractory Article. Arthur T. Malm, Worcester, Mass., assignor to Norton Co., Worcester, Mass. (U. S. No. 1,081,542; Dec. 16, 1913.)

**CRUSHING**—Operating Means for Stamp Mills. Edward Dollar, Pietersburg, Transvaal, South Africa. (U. S. No. 1,082,015; Dec. 23, 1913.)

**CRUSHING**—Slow-Speed Chilian Mill. Charles C. Lane, Los Angeles, Calif., assignor to Lane Mill & Machinery Co., Los Angeles, Calif. (U. S. No. 1,082,960; Dec. 30, 1913.)

**CYANIDING**—Method of Aerating Solutions. Wilton E. Darrow, Amador City, Calif. (U. S. No. 1,081,436; Dec. 16, 1913.)

**DESULPHURIZING**—Process for Desulphurizing Ores. William A. Hall, New York, N. Y. (U. S. No. 1,083,246; Dec. 30, 1913.)

**DRILL**—Percussive Tool. Lewis C. Bayles, Easton, Penn., assignor to Ingersoll-Rand Co., New York, N. Y. (U. S. No. 1,081,653; Dec. 16, 1913.)

**DRILL**—Rock-drilling Stopping Drill. John George Leyner, Denver, Colo., assignor to The J. Geo. Leyner Engineering Works Co., Littleton, Colo. (U. S. No. 1,082,162; Dec. 23, 1913.)

**DRILL**—Self-Cleaning Drill. Robert Binnie, Bolivar, Penn. (U. S. No. 1,081,655; Dec. 16, 1913.)

**ELECTRIC FURNACE.** Alois Helfenstein, Vienna, Austria-Hungary. (U. S. Nos. 1,082,195 and 1,082,196; Dec. 23, 1913.)

**ELECTRIC FURNACE** with Electrodes Passing through Charging Receptacles. Alois Helfenstein, Vienna, Austria. (Brit. No. 2577 of 1913.)

**ELECTRIC SMELTING**—Method of Electrically Smelting Volatile Metals. Woolsey McA. Johnson, Hartford, Conn. (U. S. No. 1,080,912; Dec. 9, 1913.)

**ELECTRIC SMELTING FURNACE** (for Zinc and Lead Ores). Karl Oskar Ernfrid Olausson, Trollhättan, Sweden, assignor to Trollhättans Elektrothermiska Aktiebolag, Stockholm, Sweden. (U. S. No. 1,081,912; Dec. 16, 1913.)

**ELECTRIC ZINC FURNACE** with Integral Condenser. John Thomson, New York, N. Y. (U. S. Nos. 1,080,862; -863; -864; -865 and -866; Dec. 9, 1913.)

**FERRO-TUNGSTEN**—Method of Dephosphorizing Ferro-Tungsten. Frederick M. Becket, Niagara Falls, N. Y., assignor to Electro Metallurgical Co., New York, N. Y. (U. S. No. 1,081,569; Dec. 16, 1913.)

**FILTER**—Porous Article. Percy Albert Böeck, Worcester, Mass., assignor to Norton Co., Worcester, Mass. (U. S. No. 1,081,573; Dec. 16, 1913.)

**LAMPS**—Hanger for Miners' Lamps. Louis K. Terry, Cooks, N. M. (U. S. No. 1,082,779; Dec. 30, 1913.)

**NICKEL**—Improvements in or Relating to the Recovery of Nickel from Its Ores. H. L. Sulman and H. F. K. Picard, London, Eng. (Brit. No. 27,626 of 1912.)

**REFRACTORY COMPOSITION.** George N. Jeppson, Worcester, Mass., assignor to Norton Co., Worcester, Mass. (U. S. No. 1,081,536; Dec. 16, 1913.)

**ROASTING**—Improvements in or Relating to Furnaces for Roasting Ores. X. de Spirlet, Brussels, Belgium. (Brit. No. 1849 of 1913.)

**SANDS AND SLIMES**—Improvements in or Relating to the Treatment of Metalliferous Sands or Slimes. R. H. Kendall, Maulkuppam, India. (Brit. No. 27,320 of 1912.)

**SEPARATOR (Dry).** Newton C. Westerfield, Oregon City, Ore. U. S. No. 1,081,282; Dec. 9, 1913.)

**STEEL**—Purifying Steel. Ernest Humbert, South Chicago, Ill. (U. S. No. 1,081,532; Dec. 16, 1913.)

**SULPHIDE ORE TREATMENT**—Process for the Production of Sulphureted Hydrogen. William A. Hall, New York, N. Y. (U. S. No. 1,083,247; Dec. 30, 1913.)

**SULPHUR**—Process for the Extraction of Sulphur from Metallic Sulphides. William A. Hall, New York, N. Y. (U. S. No. 1,083,248; Dec. 30, 1913.)

**SULPHUR**—Process for the Production of Sulphur. William A. Hall, New York, N. Y. (U. S. No. 1,083,249; Dec. 30, 1913.)

**SULPHUR**—Process of Obtaining Sulphur from Sulphides. William A. Hall, New York, N. Y. (U. S. No. 1,083,251; Dec. 30, 1913.)

**SULPHUR**—Process of Recovering Sulphur. William A. Hall, New York, N. Y. (U. S. No. 1,083,250; Dec. 30, 1913.)

**ZINC**—Condensation of Zinc. Augustin L. J. Queneau, Philadelphia, Penn. (U. S. No. 1,082,765; Dec. 30, 1913.)

**ZINC**—Process of Reducing Zinc Compounds. Elisha B. Cutten, Erie, Penn. (U. S. No. 1,080,102; Dec. 2, 1913.)

## Editorial Correspondence

### SAN FRANCISCO—Jan. 9

**A Mine Safety Bureau** to be established by U. S. Bureau of Mines and California Industrial Commission has been announced by Secretary of Interior Lane. It is reported that H. M. Wolfen of the Bureau of Mines has been appointed to be chief of the mine safety bureau with headquarters to be established with the California Industrial Commission. The bureau will be maintained jointly by the Government and State of California.

**The Compensation Law** which provides for employees of all industries by making employers responsible for injuries or death seems to have failed to take care of employees of the state, but the State Board of Control has generously declared that it will approve the salary claims of employees who are incapacitated and will provide medical aid at state institutions. The board also will urge the next legislature to appropriate money for the payment of claims for injury or death.

**A Heavy Rain Storm** swept the coast and extended into the foothills and the Sierra Nevada in the closing days of December, continuing through most of the first week in January. Much damage was done to shipping; many towns in the valleys were flooded; the railroad tracks in several places in the northern and southern part of the state were washed out. Wherever the rain extended into the higher elevations large amounts of snow were thawed; snow 6 ft. deep was reduced to a depth of only 6 in. The early expectation of a large supply of water for mining purposes stored in the form of snow will not be realized unless it becomes colder. It is not too late for a snowfall heavy enough to supply sufficient water for mining purposes provided rains do not extend into the mountains the rest of the winter.

### DENVER—Jan. 10

**No Sale of Sutton, Steele & Steele Testing Plant** to U. S. Bureau of Mines has been made as was reported in the daily papers of Colorado, which stated that Bureau would remodel and equip the testing plant for investigations in the treatment of the rare metal ores, such as those of uranium, vanadium, tungsten, etc. This statement caused the mining fraternity much amazement, for it is locally understood that the company has been doing such a splendid business that it would have little cause for selling out. However, the officials of the Denver branch of the Bureau of Mines have been visited by the "Journal's" correspondent who found that the newspapers wove their stories almost "out of whole cloth." The facts are: The Bureau of Mines has been doing a great amount of research work in the Denver branch offices, in the Foster Building, and it has been in need of more working space. The field experts of the Bureau have spent much of their time in the western carnotite fields this autumn and winter. They have found enough of the rare minerals to warrant the Government to advance from a simple laboratory to testing ores on a commercial scale. The Bureau has therefore carefully investigated the sites in Denver that would be appropriate for the sort of plant or mill desired, and this inquiry finally resulted in the selection of a one-acre vacant tract of land now owned by the Sutton, Steele & Steele Co. As the owners have made the Bureau a favorable contract offer for the use of this land, the Bureau has proceeded with plans for the immediate erection of the mill. This area is adjacent to the land occupied by the company's present plant, but the two plants will be absolutely distinct. There are excellent railroad trackage facilities, the site being along the lines of both the Denver & Rio Grande and the Colorado & Southern. Workmen are already clearing the land.

**Withdrawal of Rare-Metal Lands** from location and entry as recently proposed by the Department of the Interior has aroused a storm of protest in Colorado. The Denver branch of the Bureau of Mines has been doing research work on the metallurgy of vanadium, uranium and radium. Without inviting any publicity in this work, the experts have for months labored earnestly and hard both in the field and in the laboratory. It is understood that this work has resulted in the development of processes for the commercial recovery of radium. The investigations into the radium situation by the officials of the Bureau led Secretary Lane, of the Depart-

ment of the Interior, to believe that all radium-bearing lands should be withdrawn from location. This move, which was generally assumed to have been suggested by the Denver branch, really originated in Washington, and it was fostered for the purpose of retaining to American citizens and industry the development and exploitation of these deposits. It appears that thus far these things have been largely controlled by foreigners, or that foreigners were securing the greatest benefits from the marketing of the radium ores and products. To invite a general discussion of this topic, State Commissioner of Mines, Thomas R. Henahan met with the Denver chamber of commerce committee on mines and mining. The gist of Mr. Henahan's arguments was to the effect that the Federal officials seriously err in stating that the bulk of the radium ore produced in Colorado is shipped abroad. He claims that most of the Colorado ore is shipped to Pittsburgh and that the reduced products never leave the United States before entering the regular trade channels. He further raised the question as to why the Government could not as justifiably withdraw the mineral lands other than the radium-bearing tracts. Calling the whole affair a bugaboo, he wrote to Secretary Lane: "The withdrawal of the carnotite fields would mean the loss of an annual pay roll of millions of dollars to Colorado miners. When the metallurgical processes have been worked out, these fields should give employment to not less than 2000 miners at an average wage of \$3 per day." Apparently practically no one in Colorado who seems interested in this matter has read the statement made by Secretary Lane in his letter to Chairman Foster of the Mining Committee of Congress. The authority that Secretary Lane desires is as follows: "The Secretary of the Interior should be authorized to conduct explorations and researches with a view to determining the practicability of developing from such ores a supply of radium, and also authorized, by leases or otherwise, to provide for the mining and treatment of radium-bearing ores in such manner as would best secure a supply of radium for the use of the Government of the United States and the hospitals of the country." A careful perusal of this request will make it evident that this is not intended to be a land withdrawal in the ordinary sense. Secretary Lane seeks only to reserve to our own country a sufficient supply of radium for uses in hospitals generally. At the present time, it is impossible for physicians or hospitals in this country to purchase radium here or abroad at any price, while the market quotation on radium, established in Europe, is about double what it was a year ago. Secretary Lane's request to Congress does not involve the stopping of the development of radium-bearing ore deposits on public lands; instead it would seem to encourage a more vigorous development of these deposits and a more energetic treatment of the ores in America. Further, it aims to eliminate speculation in connection with at least a portion of the deposits. Meanwhile the agitation connected with the proposed withdrawal has enhanced the value of the mining properties already patented or located, and the prices on crude ore have gone up materially and have resulted in immediate benefit to the miner. Mr. Henahan has called a state mining convention for Feb. 19 at which the subject will be discussed.

### SALT LAKE CITY—Jan. 8

**Some Bingham & Garfield R.R. 6% Bonds** have recently been sold, the principal and interest of which are guaranteed by the Utah Copper Co. The bonds are convertible into Utah Copper stock at \$50 per share.

**Fire Destroyed Daly West Mill** and hoisting works at Park City the morning of Dec. 28. The fire was discovered in the boiler room, and spread rapidly to the roof of the hoist house, engine room, carpenter shop, No. 1 mill, etc., all of which were destroyed. The mine and mill were closed down for the Christmas holidays. Only three men were at the mill when the fire was discovered, and little could be done to check the flames. Help from the Daly-Judge mine and from Park City arrived, and the flames were kept from adjacent buildings. The loss is placed at \$200,000, of which approximately \$120,000 is covered by insurance. The Thompson-Quincy mine, which is worked through the Daly West, and also the Ontario, both of which are dependent on the Daly West for air power have been closed down.

**BUTTE—Jan. 9**

A \$75,000,000 Mortgage was filed Jan. 5 by the Montana Power Co., in the office of clerk and recorder of Cascade County. The mortgage is payable in 40 years, and the Guarantee Trust Co. of New York is acting as trustee. All of the property of the company, situated in 18 counties of Montana, is covered by the mortgage. About \$17,000,000, in outstanding bonds, is owed by the several power companies of the Montana Power Co. Under the new mortgage these bonds will be refunded, and bonds issued under the mortgage bearing interest at the rate of 5% per annum. John G. Maroney, vice-president of the company, states that they expect to spend many millions of dollars in the state in the development of its resources, and knowing what difficulties industrial corporations have to overcome in order to obtain money the company has made the mortgage for so large an amount in order that at any time money may be raised for development purposes. It is not considered probable that the company will find it necessary within the next 40 years to borrow to the full extent of the mortgage, but it was thought advisable to make such a course possible, in view of the fact that Montana's material development is in its infancy.

**CALUMET—Jan. 10**

Governor Ferris Visited the Copper Country during the early part of the week to ascertain the true state of affairs. The governor conferred with union officials, mine managers, county officials, including the grand jury, and non-union men, securing much information. He did not come as a mediator to settle the strike, and did not want it considered that he had taken any action. He said, upon leaving, "I think that if the matter be left with the miners themselves and the employers themselves, it would end very quickly. The advice of outsiders, and this is a venturesome thing to say, is likely to do more than anything else to prolong the strike." The investigation brought out the fact that the only issue at stake was recognition of the Western Federation of Miners. The mine managers maintain that they were not opposed to Union labor, but were opposed to the Western Federation of Miners, owing to its history, and would not in any way recognize that organization. C. H. Moyer, president of the Western Federation of Miners, has returned to Hancock to appear before the grand jury on his deportation charges. He maintains that he will remain in the district in charge of the strike. The companies gave out the following list of men employed at their properties underground before the strike and on Jan. 6, 1914.

Company	Men employed before strike	Employed now.
Isle Royale	709	295
Centennial	117	135
Superior	162	146
Laurium	25	0
Champion	1118	594
Quincy	1580	1242
Trilmountain	570	349
Baltic	960	328
Osceola	1143	548
Tamarack	591	112
Wolverine	333	106
Calumet & Hecla	4107	4203
Hancock Consolidated	161	94
Mohawk	686	103
Ahmeek	582	246
La Salle	43	29
Allouez	305	171
Franklin	322	23
Totals	13,514	8724

**ISHPEMING—Jan. 10**

A Machine New to the Lake Superior Region is the Star drill with which the Plymouth Exploration Co. is testing lands on the Cuyuna range. The drill is of a type extensively used in the oil fields and in the present instance is operated by experienced men from Pennsylvania. The drill is claimed to have bored a hole of 140 ft. in hard ground in 48 hr.

No Danger of a Labor Strike is imminent, sympathetic or otherwise, in the Lake Superior iron region. Resolutions declaring for a general walkout if the Federal government does not force the mining companies in the Michigan copper district to accede to the demands of their former employees have been adopted by the socialistic element on the Marquette and Gogebic ranges, but this is not taken seriously. The Western Federation has little hold in the iron districts of Michigan, Wisconsin and Minnesota. Conditions in the iron and copper fields differ materially. The problems in each region are distinctive. There is no evidence of any marked discontent on the iron ranges. Many of the conditions put forth as grievances by the copper-mine workers have no counterpart in the iron mines. The ruling wages are the best ever paid in the region. The 8-hr. shift is general. The tramming issue is not acute. It is no exaggeration to say that there is a fair measure of contentment. The

strength of the federation is not large. All members could walk out without seriously interfering with operations. With the intention of first controlling the copper country and then establishing itself in the iron fields, the federation concentrated its propaganda work in the red metal district. Thus to date the iron region has received only incidental attention and now, with the experience of the copper country prominent in mind, there is no doubt that propaganda work will encounter vigorous opposition. The mining companies have no objection to their employees banding themselves into unions of their own, but they are as vigorously opposed to having any dealings with the Western Federation of Miners as are the operators in the copper country. Not only does the membership of the Western Federation constitute a small part of the miners in the iron districts, but it is not particularly strong in leadership. On the Marquette range it is involved in internal dissension. The last term of circuit court in Marquette County, for instance, witnessed the start of a trial to determine the equities between two factions in the Negaunee organization which are fighting for possession of the Labor temple in that city. In addition, the term saw the issue of an injunction to the Ishpeming miners' union forbidding the Western Federation from seeking to take its property. The Ishpeming union recently seceded from the federation for the reason that its members no longer cared to pay excessive strike assessments. The membership of the Western Federation in the iron fields is largely socialistic and is mainly made up of Finns. It is the consensus of opinion that the federation is in no position to "start anything" and the resolutions adopted are regarded as a bluff.

**RENO—Jan. 2**

A New Labor Statute went into effect Jan. 1. It relates to the non-employment of men underground who cannot speak or understand the English language. It is required that they be able to read the rules posted in and around the mines for themselves and that bosses may be sure the men understand instructions that are delivered in English.

**SOUTH PORCUPINE—Jan. 5**

Operations at the Dome Mill during the last few months have shown a steadily increasing production and the tonnage treated has increased from 9863 tons in April, 1913, to 13,320 in November. It has been stated that the tonnage for December will be approximately the same as for the preceding month, which constituted a record monthly production for the Porcupine district. This increase in tonnage treated is not due to any mechanical changes in the mill, but is the result of overcoming the initial difficulties that are incident to the commencement of operations in any new property and to the gradual building up of an organization capable of the most efficient results. The mill is being enlarged by the addition of 40 stamps and other necessary machinery and the treatment in the enlarged mill will be somewhat different from that at present followed. The present mill is an all-sliming plant; the slimes being treated in pachuca tanks. The enlarged mill will use the sand-leaching treatment and slimes will be treated with the present equipment. The original plant was designed and erected by the Merrill Metallurgical Co., which is also responsible for the addition. This company has also had the technical supervision of the milling operations.

**PACHUCA—Dec. 30**

Everything is Running Full Blast at Pachuca and perfect order prevails. The political situation looks like a sort of draw. The rebels are not strong enough to get south of the border states, and the government is not strong enough to recover that section. In Mexico City people are pretty "triste"; little business and not many Americans to be seen. There is no doubt that the government is being hard pressed for money; but still with the customs, taxes, bullion tax, etc., it is undoubtedly able to pay its troops and hold the army together. The impression here is that Villa is doing more to help Huerta by his actions creating sentiment in the United States in favor of a strong government, regardless of where it comes from, than anything that could happen. Silver is scarce, but we are now getting a few one- and two-dollar bills. The high cost of living is no mere phrase here now, but the supply of native comestibles is still good. All mines in the district are running, and two small new ones have been started at El Chico. The Pachuca tonnage is now greater than ever, but the grade of ore is lower. It is said that the output of silver from Pachuca is now 60,000 to 70,000 kg. per month. The Real del Monte company is increasing capacity at its two mills to treat better than 2000 tons metric per day. Santa Gertrudis is milling about 900 tons. At La Blanca 500 tons is being treated daily, the plant changing over to a continuous system of treatment. San Rafael and San Francisco, are operating normally, as well as the smaller mills.

# The Mining News

## ALABAMA

### Jefferson County

U. S. CAST-IRON PIPE CO. (Boyles)—New plant is about ready to start, employing 500 men.

TENNESSEE COAL & IRON CO. (Ensley)—Plant which for past few months has been working only four days per week, was to go on full time week of Jan. 5-10.

WOODWARD IRON CO. (Birmingham)—A horizontal, cross-compound blowing engine, 48x84-in. steam and 84-in. air cylinders by 60-in. stroke was delivered Dec. 27, by Mesta Machine Co., of Pittsburgh. Weight is 90,000 lb. and engine was built in 37 days. A duplicate will be delivered soon.

### Talladega County

MARBLE QUARRY CO. (Sylacauga)—Company owns 90 acres of marble lands, which have been drilled by Ricketts & Banks, who report a large body of high-grade white marble close to surface.

## ALASKA

AUK BAY PROPERTY has been optioned to H. R. Plate acting for W. B. Thompson and associates of New York. Two prospecting shafts will be sunk in early spring and two prospecting tunnels will be driven. Ore zone is a large dike cutting slate. Zone has been exposed at surface by numerous trenches which show dike seamed with stringers of quartz.

ALASKA MEXICAN (Douglas)—November production, 18,438 tons yielded \$33,976 or \$1.86 per ton; profit \$5533.

ALASKA TREADWELL (Douglas)—November production, 74,508 tons yielded \$192,683 or \$2.61 per ton; profit \$102,510.

ALASKA UNITED (Douglas)—November production, Ready Bullion; 18,914 tons yielded \$35,153 or \$1.88 per ton; 700 Claim 18,879 tons yielded \$32,680 or \$1.75 per ton. Profit \$12,900.

VALDEZ CREEK PLACER MINES (Valdez)—Last payment of \$56,750 has been made for option on Smith-Monahan property on Valdez Creek. This makes total of \$146,000 paid and completes title. Some new equipment and supplies have been ordered and will leave Seattle this month. When completed new pipe line will have capacity for moving 4000 cu.yd. of gravel per 24 hr.; some gravel is paying better than \$1.50 per cu.yd. Bank is 110 ft. high and 200 ft. wide on bedrock.

## ARIZONA

### Gila County

INSPIRATION CONSOLIDATED (Globe)—The 600-ton test mill is in operation, although nothing but waste has been put through so far, to get machinery properly regulated. It is probable mill will be operated by three shifts daily, at least for a while a total force of 25 men. Rudolph Gahl will be metallurgist, C. E. Singer, of Los Angeles, chemist, G. E. Hunt will be in direct charge. J. L. Greninger will represent Minerals Separation Co. locally. A few finishing touches are being put on ore storage bins and sampling mill by American Bridge Co. and structures will soon be ready for corrugated iron sheathing. Jan. 6 American Bridge Co. erected another section of incline conveyor housing between ore bins and the coarse-crushing plant, but in order to finish erection of this conveyor they will have to place a large boom, 125 ft. long, in middle of Webster Gulch and operate from that point. Greater portion of steel to be used in coarse-crushing plant building is now in place, but on account of a break down of locomotive being employed by company at this work building was suspended for a time about Jan. 1. Construction company is now preparing a runway on one of the benches at concentrator site, as it now has two carloads of steel on the road. Concrete pouring is still in progress for air-compressor foundations near main east and west shafts. As form work at this place is practically completed construction department laid off about 50 carpenters and helpers. Concrete pouring for retaining walls at concentrator site is still in progress, but is rapidly nearing completion.

### Mohave County

LUCKNOW (Music Mountain)—In drift on 300-ft. level a strong flow of water has been encountered. It is expected that additional water developed from this drift will be enough to enable mill to run 12 hr. Samples from drift show good milling ore.

LEXINGTON-ARIZONA MINING CO. (Oatman)—York mines, locally known as Kemple property have been purchased. York is west extension of main Lexington vein. Shaft is about 600-ft. west of No. 2 Lexington shaft and is being retimbered and put in shape for resumption of sinking. It is to be equipped with modern hoisting equipment and a large compressor.

### Pinal County

TROY-ARIZONA COPPER CO. (Troy)—Property, which has been idle for several years, will be developed according to a new scheme.

COPPER CREEK MINING CO. (Winkelman)—After several months idleness work has been resumed. Mill is in operation and concentrates are shipped to Hayden smelter instead of to El Paso as formerly.

OVERLAND (Hayden)—Work has been suspended temporarily until a larger pumping plant can be installed. Shaft struck a strong flow of water a little below 200-ft. level which has proved a serious handicap.

REYMERT (Superior)—Work has been resumed. Three months ago work was suspended on account of strong flow of water encountered below 100-ft. level. Two 40-hp. boilers

and a pumping plant have been installed. A new hoisting plant has also been installed. Crude oil is used for fuel and is hauled in from Florence by teams. Shaft is down about 175-ft.

RAY CONSOLIDATED (Kelvin)—Fifty tons of dynamite were exploded in mine Dec. 25. Over an area 400 ft. in diameter ore left above stopes had not settled. In order to avoid an accident, explosion was arranged so that all ore might settle at once. Four winzes were sunk from drift and four raises were made. These were filled with dynamite, and exploded simultaneously.

## CALIFORNIA

### Amador County

ARGONAUT (Jackson)—Repairs at hoist were completed several weeks ago.

ONEIDA (Sutter Creek)—Electric power will be used for underground ore cars.

### Butte County

SOUTH BANNER MINING CO. (Oroville)—It is reported that Richard Phillips has interested London men in proposed exploration of this and other mining properties in Morris Ravine, Oroville district.

### Calaveras County

CALAVERAS COPPER CO. (Copperopolis)—Mine is reported to have been examined in interests of American Smelting & Refining Co. G. McM. Ross, of Stockton, former superintendent of property assisted in examination. Property is controlled by Ames interests, of Boston.

### Nevada County

NORTH STAR (Grass Valley)—Usual Christmas custom in form of refreshments and cash presents for employees was observed Dec. 25. Men earning \$5 per day received each \$10, and those who earn \$2.50 per day received \$5. Christmas was a holiday at these and other mines in Grass Valley district.

### Inyo County

KEANE WONDER (Bishop)—It is reported that mill will be increased to 40 stamps.

WILSHIRE BISHOP CREEK (Bishop)—It is reported that a 50-ton cyanide plant has been ordered from Colorado Iron Works Co. to be operated in conjunction with 10-stamp mill built last year.

### Plumas County

WALKER COPPER MINE (Portola)—Sinking and hoisting machinery has been installed. Ore will be hauled with caterpillar engines or auto trucks 18 miles to Portola for shipment to Salt Lake.

### San Bernardino County

AMERICAN TRONA CO. (Searles)—A pipe line will be laid to carry water from springs in Slate range to company's plant being built at Borax Lake. It is reported that a recurrence of dispute of a year ago as to possession of Searles Lake deposits resulted in arrest of an employee of company, a deputy sheriff and a detective, who are charged with taking possession of an automobile carrying supplies to representatives of Eastern men claiming possession of land. It is also reported that owner of automobile, and two of his employees were driven from machine and ordered by representatives of American Trona Co. to walk back to Randsburg, a distance of 43 miles. It is said lease on property expired at end of year and that it will not be renewed.

### Shasta County

MOUNTAIN COPPER CO. (Keswick)—Early reports of contemplated concentration plant were exaggerated. A single unit of 250 tons capacity is contemplated, using a flotation process. Work of construction has not begun.

### Sierra County

MEXICAN (Downieville)—A new 5-stamp mill is to be erected to treat large body of free milling \$3 ore.

MONARCH (Sierra City)—A 10-stamp mill and an electric-power plant have been built, two miles of flume completed, and several new buildings erected.

### Siskiyou County

OSGOOD (Yreka)—New 5-stamp mill is in operation. A Johnson concentrator has been installed.

SISKIYOU MINES CO. (Happy Camp)—Twenty men are employed putting in new sluices, cleaning ditches and generally overhauling and preparing for an early run next season.

### Trinity County

GLOBE (Dedrick)—New stamp mill is in operation crushing 100 tons per day.

LA GRANGE (Weaverville)—The 36-in. steel pipe carrying water across cañon is reported to have blown out in December, causing temporary closing of mine. New material is on ground for installation of new pipe at this and other points, but weather has delayed work.

### Yuba County

TWO KEYSTONE DRILLS WERE LOST, it is reported, in river in recent storm, by Guggenheim interests, who are drilling dredging ground in vicinity of Smartsville. Yuba River becomes a torrent in high-water seasons.

### Tuolumne County

EAGLE-SHAWMUT (Shawmut)—Two miners died from suffocation, below 1300-ft. level Dec. 27. They had been warned against going below 1300-ft. as air was known to be bad.



### COLORADO

#### Boulder County

EVERY MINE IN THE SUGAR LOAF REGION has been obliged to close down because of the snow blockade.

WOLF TONGUE (Nederland)—Company's lessees all quit work before holidays, and will not resume until new leases are made out for 1914. This will mean only a few days of idleness.

#### Gilpin County

GOWER MINES SYNDICATE (Central City)—Dr. John H. Gower states that his British associates have authorized him to proceed with building of a small mill to treat large tonnage of low-grade silver ore that was left in Running Lode mine during former profitable operations. This property was unique in Gilpin County region in fact that it was a rich silver producer although surrounded by gold mines.

SARATOGA—Work on new mill has been delayed by recent severe snowstorms. Building is partly completed and most of machinery is on ground. Plant will be equipped to treat ore from old stopes of mine and from mine dumps by amalgamation and cyanidation. It is estimated that 175,000 tons of material having a gross value of \$3 to \$4 per ton is available for treatment. Treatment charges are estimated at \$1.25 per ton. Mill is being erected by William Crossley and S. S. Rowe, who have secured a 10-years lease on dumps.

#### Lake County

PROF. J. D. IRVING, who is completing the Survey monograph on Leadville district, started years ago by late S. F. Emmons, has been here recently securing what is expected will be last data required before publication of work.

DIVIDEND MINING CO. (Leadville)—New development work is being done on property of Big Four Mining Co. under lease. This ground is on north slope of Breece Hill and work is being directed along strike of a vein that was formerly followed for some distance in an old drift. However, real pay streak failed to be recognized. Several large shipments of rich ore have been stripped down along one side of this old passage and returns have been at rate of 19 oz. gold per ton. As soon as electrical installation can be provided, it is intention to sink 300 ft. deeper in an old shaft and to then drive out this same vein at lowest horizon worked in that part of district.

#### San Juan Region

GREEN MOUNTAIN CONSOLIDATED (Silverton)—Property in Cunningham Gulch is being examined for New York men.

SUNNYSIDE (Silverton)—Reconstruction work is progressing. An excellent road has been kept open through 3 ft. of snow, over which materials have been hauled.

LA JUNTA CONSOLIDATED GOLD MINING CO. (Telluride)—Mill is almost finished. Machinery is set with exception of one motor that has not arrived. Each mechanical unit has independent motor drive.

LIBERTY BELL GOLD MINING CO. (Telluride)—Claims in East Mill Creek basin known as Free Mill, Elgiva and Jonah have been purchased. It is proposed to develop by adit driven along vein from company's old property adjoining on the southeast.

SOUTHERN EXPLORATION & MINING CO. (Silverton)—Mine which has been operated by company for last three years was closed down Dec. 21. It is reported that total indebtedness is \$7000 and that failure to liquidate was due to drop in price of copper and muddy roads over which product had to be hauled to railroad. Mine, which is said to be owned by Congress Gold & Copper Co., was being worked under lease. Shut down comes as a surprise inasmuch as shipments have averaged one car of ore per day during last four months. Indebtedness is chiefly for labor and supplies.

#### Summit County

WELLINGTON (Breckenridge)—Wet mill has been shut down pending settlement of railroad freight rates. Colorado & Southern R.R., that controls freight affairs pretty largely in this district, raised rates to Denver recently on account of heavy expense of keeping line open over Boreas Pass during winter. In anticipating a resumption of former rates repairs are being made as it is expected to start up again.

TONOPAH MINING CO. (Breckenridge)—Extensive holdings of placer ground along gulches of French Creek, Swan River and Blue River have been purchased. Altogether these form one tract of nearly 3000 acres. Company will henceforth own and operate dredges known as "Colorado" and "Reliance." There are two large Bucyrus boats included in purchase from Colorado Gold Dredging Co. Revett boat is considerably smaller, but is equipped with special steam-heating arrangements that permit its operation continuously throughout severe winter seasons that prevail here. Dredging at elevations of 10,000 ft. or more is naturally a hard matter, and the warm season is ordinarily short. Ben Stanley Revett, original holder of part of this tract, has been appointed manager, and he intends to have operations in full swing this coming summer. Gold Pan holdings within town of Breckenridge are included in property giving company a finely equipped set of shops and power house.

#### Teller County

ROOSEVELT DRAINAGE TUNNEL is draining at rate of 6536 gal. per min., according to recent measurements, maintaining about same average flow as for last few months.

DANTE (Cripple Creek)—Owing to snow blockade, mine has been unable to send ore from shaft-house to mill with result that mill has been idle while mine bins are full.

DEXTER (Cripple Creek)—Mine on Bull Hill has completed sinking of its main shaft so that a station has been made at 1200-ft. level. During November, 450 tons of ore was derived exclusively from this shaft-sinking.

COLBURN-AJAX (Victor)—It is announced that mill will begin to take custom ore Feb. 1. An aerial tramway is projected to supply mill with custom ore, and pending its completion shipments will be received by rail.

### IDAHO

#### Cœur d'Alene District

STEWART (Kellogg)—Rumors are circulating that company is preparing to reopen litigation with Ontario company for possession of Ontario orebodies, and that it is anticipated suit will be instituted soon in Federal courts.

MARSH (Burke)—Output for October was 100 tons daily, which yielded a total of 493 tons of picked ore and concentrates and net earnings were approximately \$21,000. In November same rate of production was maintained, but though value of ore was higher, 540 tons of ore and concentrates being shipped, net earnings were only \$19,500, decrease in profit due to decline in price of lead in latter month. About Dec. 1 output of mine was increased to 150 tons daily and it is believed December shipments will reach 650 to 700 tons of ore and concentrates, yielding about \$25,000 net, deducting for several days mill was idle because of freezing weather, basing settlement for product on prevailing lead prices. Company now is installing a sorting plant at mine, which was to be ready to operate Jan. 5. This will admit shipping high-grade product direct to smelter, instead of milling it as at present. It is anticipated that raise to connect main working tunnel with new three-compartment shaft will be started in a few days. When raise is completed incline shaft now in use will be abandoned and three-compartment shaft put in service, permitting increased operations and correspondingly reducing operating costs. Development is now in progress on No. 5 level, 700 ft. vertically below main working tunnel, and recently 7 ft. of good ore was opened in west drift. It will require not less than 30 days to open No. 5 level to same extent that No. 4, in which there is now 375 ft. of stoping ground, has been opened.

### MICHIGAN

#### Iron

NEWPORT (Ironwood)—General Manager L. C. Brewer, Superintendent B. W. Vallat and Master Mechanic Frank Vallat severed their connection with company last week. Mr. Brewer had been in charge of the properties of company for several years and had been connected with company for 16 years.

MILLIE (Iron Mountain)—Francis H. Clergue and associates, who recently purchased this property at auction, have decided to reopen it. Sinking and drifting will be started within a few days. In addition to underground mine there is an open pit, and most of the ore will come from it. Forty men will be employed now, but force will be increased to 200 when navigation opens. Mine has been idle for several years, but new manager has made examination of workings and is of opinion that chances of locating new ore are excellent.

E. N. BREITUNG CO. (Negaunee)—This company placed an order last week for about \$60,000 worth of new machinery for Breitung No. 3 and Lucky Star mines, which are now being opened up. Order includes two hoists and a 2500-cu-ft. compressor for new Breitung shaft and a hoist for Lucky Star. An order was also placed for a large motor and several boilers. These mines will be well equipped with best of machinery and substantial mine buildings. Ore from new mines will be needed soon as company has closed Barron and Washington-Davis properties.

### MINNESOTA

#### Cuyuna Range

THE SOO RY. has ordered 500 additional all-steel ore cars to take care of the anticipated increase in tonnage from the Cuyuna Range in 1914.

CUYUNA-DULUTH (Ironton)—Contract was recently closed for sale of entire 1914 production.

BARROWS (Barrows)—Some labor trouble has been experienced, but men have now returned to work. Trouble was due to an unpopular mine boss.

ROGERS-BROWN ORE CO. (Crosby)—Armour No. 2 and Kennedy mines resumed operations in full Jan. 5, but Armour No. 1 will remain idle indefinitely. Iroquois Iron Co. takes the entire output from Armour No. 2.

BRAINERD-CUYUNA (Brainerd)—New shaft now down 70 ft. At 68 ft. shaft cut water zone, stopping all artesian wells in vicinity and lowering level in wells a mile or more distant. As a result, Brainerd was without a drinking water supply other than Mississippi River water. Later flow amounted to only 250 gal. per min. and was being handled by two Cameron sinkers.

CUYUNA IRON & MANGANESE ORE CO. (Crosby)—Officials of company report that they are encountering a good grade of nonbessemer ore in recent drilling, and that surface is shallow enough to permit of open-pit mining. Elsewhere on property there exists a considerable tonnage of manganese-iron ore, also at shallow depth, so that it is quite possible, if reports are true, that nonbessemer-iron ore and manganese-iron ore may be mined from same pit. Property adjoins Pennington pit on north.

#### Mesabi Range

VIRGINIA (Eveleth)—A premature blast killed one man and seriously injured three, Dec. 29.

DULUTH & IRON RANGE RY. (Two Harbors)—For first time in its history railway will operate its ore docks during winter season. Pickands-Mather Co. has docked several boats for winter, and these will be loaded with ore from Virginia mine, Eveleth, so as to be ready for immediate shipment when navigation opens.

ALBERTA (Virginia)—For first time in history of state, a state mineral lease has been seized for non-payment of royalties. Dec. 29, state took possession of Alberta mine, heretofore operated by Minnesota Mining & Development Co. Mine is located on 150 acres of state land, and is said to contain a considerable tonnage of merchantable ore. Litigation has been pending to restrain company from removing buildings and machinery from property, as it was about to relinquish its lease to Lily Mining Co., lessor, which objected to removal until certain liens had been satisfied.

## MISSOURI-KANSAS-OKLAHOMA

## Joplin District

**PAIN LAND** (Joplin, Mo.)—Development shows two runs of ore, one at 85-ft. level, other from 170 to 185 feet.

**GERONIMO** (Joplin, Mo.)—Twenty-year lease has been sold by B. P. Ellis to Underwriters Land Co. Mine has produced \$150,000 worth of zinc ore. New operators own Priscilla, rich producer on adjoining lease.

**LONGACRE-CHAPMAN** (Neck City, Mo.)—Fifty tons of zinc ore daily are being produced at this mine. Ore of high grade, most of it assaying 62% metallic zinc. Century mine, on same lease, also producing heavily.

## St. Francois County

**COUNTY ROCK QUARRY FORTY**, 1½ miles southeast of Elvins, one-quarter mile east of the Federal Lead Co.'s Derby shaft and immediately adjoining the old Central Lead Co.'s tract on south was sold by J. F. Jones to A. O. Nichols, of Farmington, for \$100,000. Nichols bought property for Eastern men, who are forming a company for immediate development. Shaft will be located as soon as two or three more holes are put down, and lowest point of orebody located.

**ST. FRANCOIS LEAD CO.**—Hearing of application of William J. Elledge and others for appointment of a receiver for company was begun Dec. 8. Suit is an attempt to have sale of Jake Day property to St. Francois Lead Co. set aside and ownership of property reverted to Potosi Lead, Baryta & Mercantile Co. on ground that development of property shows that price paid by St. Francois Lead Co. to Potosi company was comparatively insignificant. St. Francois company claims that before organization of its company Potosi Lead, Baryta & Mercantile Co., and later Potosi Mines Co., the holding company, were totally unable to finance development of Day property, and that when new company was formed to take it over all stockholders in the two old companies were invited to come into new company and put up their proportionate part of cash necessary to pay for and develop Day property, but that plaintiffs in pending suit declined to do so. They, however, went ahead and organized St. Francois Lead Co. with a capital stock of \$500,000, paid the Potosi company \$50,000 in cash and notes and \$175,000, or more than one-third of capital stock of St. Francois company for Day tract, assumed \$240,000 due Day, also other obligations, finished shaft and placed property in operation. Operation of mine has unquestionably been profitable to St. Francois company, yielding a net profit averaging about \$5000 per month for 15 months it has been in operation. Defendants also claim they put up their money and took hold of property after St. Louis Smelting & Refining Co. had let an option on property at \$750,000 expire after having extensively drilled land.

## MONTANA

## Dawson County

**OIL WELLS NEAR GLENDIVE** are being sunk by a party of operators from Casper, Wyo. One of their wells has reached a depth of 2300 ft., and while no oil has been struck so far, increasing presence of gas points toward probability of soon encountering oil. Machinery in place is capable of sinking to a depth of 4000 ft.

## Madison County

**GRAND-VIEW DEVELOPMENT CO.**—Much development work is being done in Tobacco mountains. On Red Bell claim a 4-ft. vein, carrying lead, silver and gold was struck while driving main tunnel. Company contemplates installation of a tramway and erection of a mill next spring. Many prospectors are in district and a revival of mining activity is expected.

## Silverbow County

**BUTTE & LONDON MINING CO.** (Butte)—With new electric hoist in place mine will be in shape to resume operations as soon as compressor plant can be completed. All preparations for setting up compressor have been made. Machinery has not yet been received, but is expected soon.

**PILOT-BUTTE** (Butte)—At recent meeting with Anaconda officers status of litigation pending between two companies was discussed. Pilot-Butte reporting that development work on 1600-ft. level uncovered a vein, which appears to prove its right to orebodies in contention. No settlement was reached at conference, Anaconda officers claiming that further development would be necessary to prove ownership.

**WEST STEWART** (Butte)—For several months this property of Anaconda company has been undergoing great improvements, consisting in changing hoist from steam to air, in installation of a new compressor plant, and construction of large ore bins. Concrete supports for bins are completed and work has been started on upper parts. It will probably be Mar. 1 before operations will be resumed at this mine.

**BOSTON & MONTANA DEVELOPMENT CO.** (Butte)—Machinery and an air compressor have been purchased and delivered at Butte. As soon as snow is heavy enough outfit will be hauled to Elkhorn mines up Wise River. Contracts have been let for sufficient timber to timber a tunnel 2000 ft. long, which is being driven from Wise River into Elkhorn group of claims. It is expected that first large vein will be encountered June 1. Surveyors of Butte, Wisdom & Pacific Ry., to be built by this company, have completed their work and gone into winter quarters at Dewey.

**ANACONDA** (Butte)—Beginning Feb. 1, company will gradually suspend shipment of concentrating ore to Great Falls smelter and divert all to Washoe plant at Anaconda; 1600 tons daily will be diverted Feb. 1, closing half of Great Falls smelter. By May 1 remainder of concentrating ore now going to Great Falls will be delivered at Washoe. Reason for change is difference in haul, and as a matter of economy. Capacity of Washoe concentrator has already been increased from 9600 tons daily to 11,000 tons, and it will eventually have a capacity of 12,500 tons daily. Thereafter only concentrates and first-class ore will be shipped to Great Falls. In 1913 \$20,000,000 was paid out for labor alone; 16,000 employees were on the pay rolls, averaging \$1258 each for year. According to census this average amount is more than twice the general average paid by all corporations and employers of labor in U. S.

## NEVADA

## Elko County

**ELKO MINING CO.** (Jarbridge)—Shaft sinking on Alpha claim is in progress. Ore is being stoped above tunnel level and is transported to mill by 1600-ft. aerial tramway. Mill is of 30 tons capacity, and at present process is amalgamation only. Tailings is being impounded for future treatment.

## Eureka County

**EUREKA & PALISADE R.R.**—This road, it is stated, will be put in shape for ore haulage from Eureka.

**CORTEZ MINING & REDUCTION CO.** (Mill Cañon)—Development is progressing with satisfactory results, a large tonnage of milling grade ore being blocked out. The 50-ton concentrating plant is operating steadily; concentrates are hauled to Beowawe for shipment. Main tunnel is being driven to cut Elrin oreshoot.

## Humboldt County

**HIGH-GRADE ORE IN ROCHESTER** has been discovered recently in Cole lease, Boreland lease on Raven lode, and H. P. Aldredge sublease on Big Four. Record shipment from camp for one day recently was 10 cars assaying \$10,500.

**SIGNAL PEAK** (Seven Troughs)—A mill will be built, first unit to be of 10 tons capacity.

**ROCHESTER WEAVER** (Rochester)—It is reported that indebtedness will be assumed by Mexican Gold & Silver Mining Co., of Virginia City, and that mill to treat custom ores will be built; mill to be completed by July.

**RECOVERY GOLD MINES CO.** (Golconda)—Company has just been formed to develop south end, or extension, of old Keystone gold mine, on Kramer Hill, which was sold recently for \$350,000. Shaft is 100 ft. deep, and drift on 50-ft. level has cut oreshoot 12 ft. wide, assaying \$8 in gold. Further development will be done.

## Lander County

**PLACER MINING ACTIVITIES** in Copper Cañon continue in spite of cold weather and lawsuits. Elder Cañon was scene of latest discovery.

**NEWPASS**—It is reported that this mine, 20 miles west of Austin, will build a stamp mill and cyanide plant. Large tonnage of ore is now developed.

**BUCKHORN MINING CO.** (Buckhorn)—New 400-ton milling plant was started recently and is giving satisfactory results. Process is crushing by rolls followed by cyanidation. Company owns 200 acres, which have been under development for three years. Ore is low grade and vein is 50 ft. wide. Mining will be done by glory hole to 100-ft. level, followed by caving or slicing on lower levels. It is stated that mining and milling can be done for \$2.50 per ton. Principal owners are George Wingfield, of Goldfield, Henry C. Frick, of Pittsburgh and J. H. Carstairs, of Philadelphia.

## Mineral County

**CONDITIONS IN RAWHIDE** are improving. Two milling plants are now in operation and a third is under construction. Ore from three producing mines averages \$15 per ton. Cheap electric power is now being supplied by Pacific Power Co.

**THORNDYKE-BLEY** (Sunland)—Mill is completed and will be put in commission in near future, recent cold weather having caused some delay. Large tonnage of ore is blocked out in mine.

**PITTSBURGH-DOLORES** (Rockland)—Milling plant with process similar to that of Mexican mill at Virginia City is being built. Work in mine has been discontinued for winter months; 50,000 tons of milling grade ore are developed.

**AURORA CONSOLIDATED** (Aurora)—Mill will be finished in April on schedule time, and within estimate of cost. Capacity of mill is 500 tons. Many details have been adapted from South African mills. Ore reserves estimated at 100,000 tons, average value, \$5. Living conditions of employees will be made as pleasant as possible. Company houses front on park where tennis courts and space for other sports are provided. Club house and amusement hall have also been built.

## Ormsby County

**NEVADA INDUSTRIAL COMMISSION** (Carson City)—Surplus in treasury is now \$75,000. Commission has done its work without net cost to state, as appropriation of \$2000, which was used, has been repaid. Average monthly revenue from insurance premiums is now between \$25,000 and \$30,000, with an assured increase in future.

## Storey County

**C. & C.** (Virginia City)—Starrett sinking pumps are again in operation and water has been lowered to 60-ft. point in Consolidated Virginia and Mexican-Ophir winzes.

**HALE & NORCROSS MINING CO.** (Virginia City)—At annual meeting of stockholders old board of directors and officers of company were reelected. It was unanimously carried to rejoin Comstock Pumping Association; pro rata contribution will be 2%.

## NEW MEXICO

## Bernillo County

**NOWALD MILLING CO.** (Golden)—A concentrator has been put into operation by this company with a capacity of 20 tons per shift. It will treat \$10 ore.

## Grant County

**PETERSON & ESPLANE** (Pinos Altos)—New mill is nearly completed.

**COLORADO FUEL & IRON CO.** (Fierro)—On account of coal strike in Colorado it is reported that this company has reduced its daily shipment tonnage of iron ore to Pueblo furnaces.

**BURRO MOUNTAIN COPPER CO.** (Tyrone)—Large shipments of machinery for concentrator, are being made over newly constructed branch railroad. Grading is under way for a testing plant to be constructed at once a short distance from precipitation flume near Tyrone and it is stated that ore removed from 7000-ft. tunnel will be treated in this plant.

**Socorro County**

**OILING DRILLING NORTH OF MAGDALENA** is still in progress.

**NEW JERSEY ZINC CO.** (Magdalena)—Tri-Bullion property is being opened up again.

**OZARK** (Magdalena)—It is reported that this company is erecting storage houses for its concentrates awaiting better prices before shipment.

**ERNESTINE MINING CO.** (Mogollon)—Electric hoist is being replaced by a large air-driven lift and former will be installed at Maud S. Mine, which is being operated by this company.

**PRECIOUS METALS MINING CO.** (Mogollon)—For last year company has been driving a crosscut tunnel, which recently encountered vein at a distance of 1100 ft. from portal. Good milling ore has been found and is improving as drift on vein advances. Arrangements are being made to start shipping to custom works.

**SOUTH DAKOTA  
Lawrence County**

**WASP NO. 2** (Flatiron)—Operations are again at full capacity in 500-ton mill, which was shut down Oct. 20 on account of shortage of water.

**BLACK HILLS SMELTING CO.** (Galena)—C. H. Greve, of Chicago, has secured control of corporation, purchasing interests of Dunlap & Dankwardt. Reported he is arranging for blowing-in plant at an early date.

**RATTLESNAKE JACK** (Galena)—Open weather is permitting rapid work on construction of 10-stamp mill. Plant will be ready earlier than was anticipated. Regular shipments of high-grade ore are being made to smelters.

**NEW RELIANCE** (Trojan)—Steam-heating plant has just been completed. New piping will be installed to carry tailing sluiced from sand tanks. Plant is operating steadily, and besides company ore is handling small tonnage for P. H. Bertschy, who is leasing on Dakota property, adjoining.

**HOMESTAKE** (Lead)—Employees are receiving with their pay checks this month bonus of 7% of their earnings for last year. Plate house at Amicus mill is being rebuilt. Good progress is being made on construction of addition to assay office. Superintendent Grier announces company has no intention of increasing milling capacity. All regrinding is now done by tube mills, pans having been discarded.

**UTAH  
Juab County**

**DRAGON** (Silver City)—Lead-silver ore is being mined through Iron Blossom. Electrical pumping equipment has been installed on the 800 level, and three drifts are being driven here.

**LEHI-TINTIC** (Eureka)—Development is being done in upper workings, where small bunches of galena have been opened. At a lower level a tunnel is being driven to cut old Empire vein. Five men are employed.

**CHIEF CONSOLIDATED** (Eureka)—Semiannual dividend has been declared, payable Feb. 2, and amounting to 5c. per share or \$43,822. Dividend payments were begun in 1913, when two dividends of 10c. per share each were paid.

**IRON BLOSSOM** (Silver City)—New vein encountered a short time ago is producing shipping ore on 500 level and above it; on 600 there is milling ore too low grade for shipment, with indications of better ore in a raise 20 ft. above the 600. Copper ore is being mined in south workings on 600- and 700-ft. level. Four cars of ore of this character were shipped in December. New Knight mill is being tried out on low-grade ore from this property.

**Salt Lake County**

**UTAH APEX** (Bingham)—Parts of mine are still bulkheaded in effort to capture Mexican murderer Lopez. This has thrown a number of miners out of work and hindered the company's operations.

**UTAH COPPER** (Bingham)—During recent snow and winter weather an additional force of about 100 men was added. With this addition it was hoped to be able to maintain daily output, though production for December probably showed a decrease from month preceding.

**WASATCH-UTAH** (Brighton)—A trial was made of new cyanide plant at this property at mouth of Little Cottonwood, Dec. 27. There are two 90-ton tanks, a Blake crusher, and a 7-ft. Chilean mill. Electric power is used. Company mines low-grade gold ore assaying about \$2 in gold and 25c. in silver.

**Tooele County**

**BULLION COALITION** (Stockton)—Old Honorine mill at mouth of drain tunnel is treating 50 tons of ore daily, and making a concentrate carrying around 30% lead, 16 oz. silver and \$1.20 in gold. The ore is coming from between the 1300 or drain tunnel, and 600-ft. level.

**Utah County**

**WYOMING** (American Fork)—Strike was recently made by lessees about 600 ft. east of Tyng stope. Ore is silver-lead carbonate, and there is a car sacked and ready for shipment.

**WASHINGTON  
Pierce County**

**AT TACOMA SMELTER** a strike broke out Jan. 3. Two men were seriously injured in a riot early in the morning. On Jan. 6, 20 deputies and the town marshal at Ruston, the smelter town, fought a long distance rifle duel with the strikers a little before midnight. The situation became so acute that the marshal declared that he would call on Governor Lister for aid in event any more private property was destroyed. Several houses were burned and smelter water supply was cut off. Two steamers from Alaska were tied up at docks unable to unload their ore. Strike resulted from announcement that a 10-hr. day would be restored for men who had been working nine hours at present wages. About 250 unskilled workers were affected. When strike was declared President Rust closed down plant throwing 750 men out of work. Work was resumed and strike ended Jan. 7.

**CANADA****British Columbia**

**IRON DEPOSITS IN NEW HAZELTON DISTRICT** are not generally known to exist, although mining men realize that district has great mineral resources. Deposits of iron have been uncovered on Copper River about 40 miles south of Hubert. Government trail and a Canadian Pacific R.R. survey pass through property. Extent of ore is unknown but cuttings show it to be at least 45 ft. deep. It may run much deeper but this will not be known until spring when diamond drills will be put on. Property is controlled by North Pacific Mines Co., of Prince Rupert. This company has engaged John V. Rittenhouse, of New York to examine property.

**GRANBY** (Anyox)—Advices received at Spokane state that entire mechanical equipment, including smelter, hydro-electric power plant, machine shops and railway system, is completed and will be ready for operations Jan. 15. It will require not less than two weeks to get machinery adjusted, and Superintendent Williams predicts that permanent operations will not be begun before Feb. 1. Christmas was celebrated by a general holiday. No construction work was carried on, and for one day the mines were idle. An entertainment and Christmas tree for children was given in Recreation hall on Christmas Eve, and a number of children in fancy costume sang suitable songs and otherwise entertained. Santa Claus was there, too, with a Christmas gift for every child in Granby. Steamship "Leelanaw," arrived Dec. 23, with 1500 tons of coke from Tacoma. She is a first-class freighter, carrying wireless apparatus, and is an oil-burner. Although her first trip to Anyox it is expected that she will go there regularly with coke in future. Two more feet of snow fell about Jan. 1, but prior to that fine clear weather had been experienced for some time. A week prior the tug "Tatoosh" towed in the "Gerrard C. Tobey," a large schooner, which will be used for conveyance of lime and ore to smelter. Company has given up its option on Mamie property on Prince of Wales Island, Alaska, and has acquired Mount Andrew mine on same island. Mount Andrew is on Kasaan Bay and was formerly owned by Mount Andrew Mining Co., of New York. It was operated at different times under lease by Britannia Mining & Smelting Co., and S. Lichenstader, of Seattle, who shipped ore to Tyeve Copper Co.'s smelter at Ladysmith. Ore is magnetite with chalcopyrite disseminated through it and averages 3.75% copper, with \$1 to \$1.60 in gold per ton. Ore has been stripped over an area of two acres and developed by two tunnels and open cuts. Mine is equipped with tramway, steam plant, air compressor and drills.

**Ontario**

**WORK OF DRAINING COBALT LAKE** has commenced, preliminary operations being confined to deepening the natural outlet. Specifications for the different styles of pumps are now out and tenders are being asked.

**NORTH COBALT** (Cobalt)—Property having liabilities of \$70,000 will be sold at public auction by liquidator.

**HURONIAN** (South Porcupine)—First shipment of bullion from this mine consisted of three bars valued at \$3375. Mill will be closed down while water power in immediate vicinity of property is being developed.

**Yukon**

**CANADIAN KLONDYKE** (Granville)—All dredges are now shut down; 6,363,515 cu.yd. having been dredged during year for a total cleanup amounting to \$5,899 oz., of an approximate value of \$1,331,000. Working costs are estimated at \$480,000.

**MEXICO  
Sonora**

**SHIPMENTS FOR DECEMBER** through port of Agua Prieta totaled 13,630 tons. El Tigre shipped 77 bars of bullion weighing 12,518 lb. Estimated value of shipments in Mexican currency are: Copper, 1,676,800; silver, 434,000; gold, 197,500; total, 2,308,300 pesos.

**GENERAL CONDITIONS IN SONORA** are as good as they ever were and mining is being carried on the same as it was before the present political trouble. Most of the mining men in northern portion are operating their properties and building mills and houses and one would not know from a trip through the country that there was a revolution in progress.

**AGUA BUENA** (Nacozari)—F. A. Montgomery has secured a bond and lease on property from present owners, Silver Seal Mining Co.

**HOHMAN** (Nacozari)—A large body of low-grade ore has been encountered and tests are being made at Douglas, Ariz., to ascertain if it can be milled to advantage.

**GERMANY**

**GERMAN POTASH SYNDICATE** is to bring suit against von Bethmann-Hollweg, demanding return of \$2,000,000 forming the so called "propaganda fund" for advertising merits of German fertilizer at home and abroad which was raised by imposing a tax on potash mined in Germany under law of 1910. Fund in question remains partly unused for specific purpose and it is stated in some quarters that Government is allowing it to accumulate with idea of diverting it to general purposes under provisions of a new law now being formulated. Law of 1910 was designed to conserve natural supplies of potash in Germany, to insure prosperity of German industry and to prevent Americans from getting a cheap supply, but has been a partial failure.

**CHOSEN**

**ORIENTAL CONSOLIDATED**—December cleanup \$143,000.

**TRANSVAAL**

**A GENERAL STRIKE OF RAILWAY EMPLOYEES** broke out Jan. 9, and late reports are to effect that a general sympathetic strike of all laborers, including miners, is impending. It is feared that native outbreaks will result, putting county in state of revolution. Labor leaders have been arrested and 60,000 men have been called to arms. The entire defensive force of the Union of South Africa, including regulars, and the citizens' reserve are being mobilized.

# The Market Report

## METAL MARKETS

NEW YORK—Jan. 14

The metal markets have been rather quiet, with no special changes, but perhaps a weaker feeling.

### MONTHLY INDEX NUMBERS

Month	1912	1913	Month	1912	1913	Month	1912	1913
Jan.	111	126	May	118	126	Sept.	127	118
Feb.	109	125	June	117	117	Oct.	133	114
March	111	125	July	114	110	Nov.	129	110
April	115	124	Aug.	120	116	Dec.	129	110

Average for year 1913, 118; year 1912, 119; year 1911, 112; year 1910, 115.

Numbers for each month and year calculated on approximate sales of pig iron, copper, tin, lead, zinc and aluminum.

### Copper, Tin, Lead and Zinc

**Copper**—It would seem that on mature reflection the last statistics of the Producers' Association got on the nerves of several of the large producers, perhaps in a degree which in time will prove to be excessive. Meanwhile, however, the market is feeling the effect of competitive selling by practically all the producers and important dealers to such an extent that prices are being demoralized, without much business taking place, and so far a scaring-off of buyers has been the only effect of the material concessions which have been made. A leading agency first cut the price to 14¼c., delivered, usual terms. Domestic manufacturers bought at that price on Jan. 8, but the day closed with sellers over. In the subsequent days of the week prices were cut sharply. By Jan. 13, copper was freely offered at 14c., delivered, usual terms, and sales were reported both for home account and for export at that price, netting about 13.80@13.90c., cash, New York. At the close the market is weak.

The market for Lake copper is wholly nominal. We have heard of no sales except of arsenical brands. The principal producer is silent respecting its attitude.

The average of our quotations for electrolytic copper during the last week is 13.975 cents.

The standard market, which was inclined to rally somewhat, largely due to bear covering, is at the close reflecting the extreme weakness of refined sorts, and quotations are cabled at £62 11s. 3d. for spot and £62 17s. 6d. for three months.

Base price of copper sheets is 20¼ c. per lb. for hot rolled and 21¼c. for cold rolled. The usual extras are charged and higher prices for small quantities. Copper wire is 15¼@16c., carload lots at mill.

Exports from New York for the week included 10,583 long tons of copper. Our special correspondent reports the exports from altimore for the week at 551 tons copper.

**Tin**—During the latter part of last week, the selling pressure in the London market abated, in consequence of which a steadier tone developed. Considerable orders were placed by consumers in this market and sellers who were willing to book business at below the importation basis withdrew. When, however, at the beginning of this week the London market did not respond to the large business which was placed from this side, buying here ceased, and the market became very dull. The close is easy at £167 5s. for spot and £169 for three months, and about 36¾c. in this market.

Exports of tin from the Straits in December were 5110 long tons. For the year ended Dec. 31, the total exports were 55,479 tons in 1912, and 62,550 in 1913; an increase of 7071 tons.

**Lead**—The A. S. & R. Co. reduced its price to 4.10c., New York, on Jan. 9, and the other producers followed. In St. Louis the independent producers appeared again in the market and offered liberally at 4c. Sales were reported at 3.95@4c. The market continues quiet. The reduced prices have so far failed to stimulate business, and at the close the market is but barely steady.

The London market reflects more and more the scarcity of available lead as a result of the entire interruption of shipments from Mexico, the full force of which is really only

beginning to be felt now. The close is firm at £19 10s. for Spanish lead and 12s. 6d. higher for English.

**Spelter**—Some tonnage was placed during the last week at 5.05@5.10c., St. Louis. Some round lots were sold at 5.05c., but the bulk of the business appears to have been done at 5.07½c. Very little interest is being shown in this metal. Consumers are buying only from hand-to-mouth and business is of scarcely more than retail character. On the other hand, producers are not inclined to press their metal for sale, even though part of their current production is being left on their hands. The close is steady.

The London market is unchanged, the close being cabled at £21 11s. 3d. for good ordinaries and 7s. 6d. higher for specials.

### DAILY PRICES OF METALS

#### NEW YORK

January	Sterling Exchange	Silver	Copper		Tin Cts. per lb.	Lead		Zinc	
			Lake, Cts. per lb.	Electrolytic, Cts. per lb.		New York, Cts. per lb.	St. Louis, Cts. per lb.	New York, Cts. per lb.	St. Louis, Cts. per lb.
8	4.8640	57½	*14½ @15	14.10 @14.20	36½	4.10 @4.15	4.00 @4.05	5.20 @5.25	5.05 @5.10
9	4.8655	57½	*14½ @15	14.00 @14.10	36½	4.10 @4.05	4.00 @4.05	5.20 @5.25	5.05 @5.10
10	4.8685	57½	*14½ @15	13.95 @14.05	37	4.10 @4.00	3.95 @3.95	5.20 @5.25	5.05 @5.10
12	4.8685	57½	*14 @15	13.90 @14.00	37	4.10 @4.00	3.95 @3.95	5.20 @5.25	5.05 @5.10
13	4.8665	57½	*14 @15	13.80 @13.90	36½	4.10 @4.00	3.95 @3.95	5.20 @5.25	5.05 @5.10
14	4.8660	57½	*14 @15	13.80 @13.90	36½	4.10 @4.00	3.95 @4.00	5.20 @5.25	5.05 @5.10

\*Nominal.

The quotations herein given are our appraisal of the markets for copper, lead, spelter and tin based on wholesale contracts; and represent, to the best of our judgment, the prevailing values of the metals specified as indicated by sales by producers and agencies, reduced to basis of New York, cash, except where St. Louis is given as the basing point. St. Louis and New York are normally quoted 0.15c. apart. The quotations for electrolytic copper are for cakes, ingots and wirebars. The price of electrolytic cathodes is usually 0.05 to 0.10c. below that of electrolytic; of casting copper 0.15 to 0.25c. below. The quotations for lead represent wholesale transactions in the open market for good ordinary brands, 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.

Some current freight rates on metals; per 100 lb., are: St. Louis-New York, 15½c.; St. Louis-Chicago, 6c.; St. Louis-Pittsburgh, 12½c.; New York-Bremen or Rotterdam, 15c.; New York-Havre, 16@17½c.; New York-London, 16c.; New York-Hamburg, 18c.; New York-Trieste, 22c.

#### LONDON

January	Silver	Copper				Tin		Lead		Zinc	
		Spot		3 Mos.	Best Sel'td	Spot	3 Mos.	£ per Ton	Cts. per lb.	£ per Ton	Cts. per lb.
		£ per Ton	Cts. per lb.								
8	26½	63½	13.82	64½	68½	166½	168½	19	4.13	21½	4.68
9	26½	62½	13.66	63½	68½	168½	169½	19½	4.18	21½	4.67
10	26½	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
12	26½	62½	13.66	63½	67½	168	169½	19½	4.24	21½	4.67
13	26½	62½	13.66	63½	67½	167½	169½	19½	4.21	21½	4.67
14	26½	62½	13.59	62½	67½	167½	169	19½	4.24	21½	4.68

The above table gives the closing quotations on London Metal Exchange. All prices are in pounds sterling per ton of 2240 lb., except silver which is in pence per troy ounce of sterling silver, 0.925 fine. Copper quotations are for standard copper, spot and three months, and for best selected, price for the latter being subject to 3 per cent. discount. For convenience in comparison of London prices, in pounds sterling per 2240 lb., with American prices in cents per pound the following approximate ratios are given: £10 = 2.17½c.; £15 = 3.26c. = £25 = 5.44c.; £70 = 15.22c. Variations, £1 = 0.21½c.

Base price of zinc sheets is \$7.50 per 100 lb. in carload lots, f.o.b. Peru, Ill., less 8% discount.

Exports of Metals and Minerals from Spain, 10 months ended Oct. 31, as reported by the "Revista Minera," in metric tons:

Exports	Metals		Ores	
	1912	1913	1912	1913
Iron.....	29,006	8,901	6,970,556	7,575,796
Copper.....	19,484	22,302	127,100	134,450
Copper precipitate.....	11,046	4,226	.....	.....
Lead.....	161,061	175,648	2,966	1,808
Zinc.....	2,563	1,025	93,516	94,598
Quicksilver.....	1,489	1,477	.....	.....
Manganese.....	.....	.....	25,285	22,353
Pyrites.....	.....	.....	2,491,151	2,468,511

Exports of salt were 494,440 tons in 1912, and 471,870 in 1913; a decrease of 22,570 tons.

Other Metals

**Aluminum**—A slight improvement in business is reported, but no great activity. Prices are about the same as last week, quotations being 18½@19c. per lb. for No. 1 ingots, New York. The foreign market is reported rather unsettled.

**Antimony**—The market is rather quiet. There is a good jobbing demand, but no buying of futures and no speculation at all. Quotations are slightly easier. Cookson's is 7.30 @7.40c. per lb.; Hallett's, 7@7¼c.; while for Hungarian, Chinese and other outside brands, 6@6¼c. per lb. is named.

**Quicksilver**—Business is rather quiet, but steady, with prices a little easier. New York quotation is \$38@39 per flask of 75 lb. for large lots. Jobbing price is 54@55c. per lb. San Francisco, \$38.50 per flask for domestic orders. London price is £7 10s. per flask, with £7 quoted from second hands.

**Bismuth**—Quotations at New York are \$1.80 per lb. for imported metal and \$1.72 per lb. for metal from domestic ores. The London price is 7s. 6d. per lb. The price is still controlled by the European Syndicate.

**Cadmium**—German quotation is 750 marks per 100 kg.—equal to about 81c. per lb.—f.o.b. works in Silesia.

**Magnesium**—The current quotation for pure metal is \$1.50 per lb. for lots of 100 lb. or over, at New York.

**Nickel**—Quotations for ordinary forms—shot, blocks, or plaquettes—are 40@45c. per lb., according to size or order and quality. Electrolytic nickel is 5c. per lb. higher.

**Selenium**—For large lots, 100 lb. or over, \$3@3.25 per lb. is quoted; while \$5 per lb. is paid for retail orders.

Gold, Silver and Platinum

**Gold**—The price of gold on the open market in London continued at the bank level 77s. 9d. per oz. for bars and 76s. 4½d. per oz. for American coin. There was no special demand and most of the supplies arriving went to the Bank of England. There has been a sharp advance in New York in sterling exchange and the rate is now at a point which would ordinarily warrant imports of gold. There is no doubt, however, that all possible steps will be taken on the other side to prevent any such movement and it is quite doubtful whether any gold will come this way, for the present at least. In New York, there is no urgent need of gold at present and a little is coming this way from Canada now, \$400,000 having been received this week.

Sales of gold bars from the New York Assay Office in December were \$2,574,580, being \$278,238 less than in November. For the year ended Dec. 31, the total sales were \$31,037,051 in 1912, and \$31,240,952 in 1913; an increase of \$203,901 last year.

Imports of gold into France 11 months ended Nov. 30, were 620,977,000 fr.; exports, 69,851,000 fr.; excess of imports, 551,126,000 fr., an increase of 357,201,000 fr. over the previous year.

Gold in the United States, Jan. 1, is estimated by the Treasury Department as follows: Held in Treasury against gold certificates outstanding, \$1,115,755,969; in Treasury current balance, \$174,664,381; in banks and circulation, \$633,940,156; total, \$1,924,360,506. This includes bullion held in Treasury.

**Iridium**—Supplies are good and demand moderate. Prices are off a little from recent quotations and the metal can be had at \$75@77 per oz. New York.

**Platinum**—The market continues quiet with demand only fair. A better demand is expected when the season is a little further advanced. Quotations are about the same as last reported at \$42.75@43.75 per oz., New York, for refined platinum. Hard metal is quoted at \$46@49 per oz., according to

quality. The foreign market continues strong and seems to be maintained at rather a speculative point by two or three of the large companies.

**Silver**—The market remains steady. The demand for silver so far has been satisfied with the offerings, at the diminution of supplies from Mexico—owing to the serious internal discords in that country—must eventually count for higher prices for silver, if all other conditions incident to good business are maintained this coming year.

Shipments of silver from London to the East for the year ended Dec. 31, as reported by Messrs. Pixley & Abell:

	1912	1913	Changes
India.....	£11,955,500	£9,821,000	D. £2,134,500
China.....	1,917,000	755,000	D. 1,162,000
Total.....	£13,872,500	£10,576,000	D. £3,296,500

The decrease in values was 31.2%. The approximate quantities of silver were 118,729,000 oz. in 1912, and 92,045,000 oz. in 1913; a decrease of 26,184,000 oz., or 22.1%, last year.

Imports of silver into France, 11 months ended Nov. 30, were valued at 351,370,000 fr.; exports, 324,034,000 fr.; excess of imports, 27,336,000 fr., or 27,274,000 fr. more than in 1912, when imports and exports very nearly balanced.

Coined silver in the United States, Jan. 1, 1914, is estimated by the Treasury Department as follows: Dollars, \$565,718,263; subsidiary coins, \$178,306,350; total, \$744,024,613. Of the dollars, \$489,461,000 are held in the Treasury against silver certificates outstanding.

Zinc and Lead Ore Markets

JOPLIN, MO.—Jan. 10

The high price of zinc blende is \$45, the base ranging from \$39 to \$42 per ton of 60% zinc. Calamine is quoted strong on a base of \$20@23 per ton of 40% zinc. The average of all grades is \$38.06 per ton. Lead was advanced \$2 to a base of \$50 per ton of 80% metal content, with the highest price reported at \$51. The average of all grades is \$49.42 per ton. Outputting conditions were excellent, yet the production was light.

SHIPMENTS WEEK ENDED JAN. 10

	Blende	Calamine	Lead	Value
Total the week.....	12,297,740	698,190	1,911,230	\$294,475
Total this year.....	20,091,710	962,610	3,577,180	496,505

Blende value, the week, \$241,460; two weeks, \$399,920. Calamine value, the week, \$5790; two weeks, \$8815. Lead value, the week, \$47,225; two weeks, \$87,770.

PLATTEVILLE, WIS.—Jan. 10

The base price paid this week for 60% zinc ore was \$41.50@42 per ton. The base price paid for 80% lead ore was \$53@54 per ton.

SHIPMENTS WEEK ENDED JAN. 10

	Zinc ore, lb.	Lead ore, lb.	Sulphur ore, lb.
Week.....	2,693,400	66,000	1,288,870
From Jan. 1.....	5,011,770	66,000	1,929,470

Shipped during week to separating plants, 2,633,030 lb. zinc ore.

MONTANA ZINC ORES

The production of the Butte & Superior mill in December amounted to 11,400 tons concentrates, running 51% zinc.

NEW CALEDONIA, ORE.

Exports of ores from New Caledonia for the 10 months ended Oct. 31, as reported by the "Bulletin du Commerce," of Noumea, were 80,570 metric tons nickel ore and 45,908 tons chrome ore. Exports of metals were 6039 tons nickel matte.

IRON TRADE REVIEW

NEW YORK—Jan. 14

The iron markets have shown an improvement in sentiment since the turn of the year. Orders and inquiries for finished material seem to be coming in much better than they have done for two or three months. Buyers seem disposed to take hold and there is quite an encouraging outlook for better business.

Mills are starting up after the holidays and those which were already running are increasing their working force. While there is no rush yet by any means, there is an appearance of activity which most people think will continue. Structural steel is in demand and for small building material there is a much better outlook. Jobbers report an improvement in their trade.

Pig iron continues rather quiet and there is not much rush to buy, notwithstanding the curtailment in output. It is believed that the furnaces now in blast will keep up a sufficient supply. There has been no improvement in prices, but also there seems to be very little lowering of quotations.

**Pig-Iron Production**—There was a heavy reduction in December. The returns of the blast furnaces, as collected and published by the "Iron Age," show that on Jan. 1 there were 212 coke and anthracite stacks in blast, having a total daily capacity of 66,200 tons, a decrease of 5500 tons from the previous month. The January capacity includes 18 furnaces, which were banked over the holidays.

**Alabama Pig Iron Production** for the year 1913 was 2,025,378 long tons, an increase of 190,608 tons, or 10.4% over 1912, and the largest make ever reported. Of the total make 724,364 tons, or 35.7% were basic iron, and 1,301,016 tons, or 64.3% merchant iron, chiefly foundry. The largest monthly production was 186,945 tons, in March; the smallest, 160,057 tons, in November.

**The United States Steel Corporation** reports the filled orders for material of all kinds on Dec. 31 at 4,282,102 tons, a decrease of 114,245 tons during December, and of 3,650,062 tons as compared with Dec. 31, 1912.

**The American Pig Iron Association** was organized at a meeting held in New York last week. The meeting was a private one, but it is claimed that there were 207 plants represented with an aggregate annual capacity of between 13,000,000 and 14,000,000 tons of iron a year. It is proposed to bring into the Association all the merchant furnaces and nearly all of them were represented at the meeting. The new association disclaims all intention of regulating prices or production, or of interfering in any way with the legitimate course of business. The purposes announced by the by-laws include discussion of all problems entering into manufacture and sale of pig iron and the standardization as far as practicable of all grades, securing of equitable freight rates, cultivation of closer relationship with customers, discussion of methods for improving quality of service to users of the product, and as a result of research and investigation of new methods, reducing of cost and improvement of quality of iron produced, as well as adoption of a uniform form of contract between producer and consumer.

#### PITTSBURGH—Jan. 13

While new orders in most lines are scarce, mills generally are now pretty well filled for several weeks on bars, plates and shapes. Prices on those products are firm at the 1.20c. rate recently quoted. Wire is quite active, with good orders for plain and barbed wire and nails. Jobbers are buying freely.

While there are no special developments, sentiment is improving. Even the inveterate croakers are willing to admit that any change must be for the better. The critics have little to say and the more hopeful observers are now taking their turn. Nothing more is heard about the tariff, and the changes have been generally accepted as making very little difference to the steel trade. There is a greater disposition to settle down and go to work.

While there has been no advance in prices they are generally firmer than they were, and no concessions are heard of, except in one or two lines, chiefly in tinplate.

The November-December settlements under the Amalgamated Association scale were made at just a shade over 1.20c. for bars, which means a puddling rate of \$5.85, or 65c. below October.

**Pig Iron**—Not much new business is reported in bessemer and basic pig, and foundry iron is also quiet, though there is more inquiry about. Merchant furnace production is down to a low point, and does not seem likely to go much lower. Some furnaces may go out, but their places will be taken by others starting in. We quote bessemer pig, \$14; basic, \$12.50; No. 2 foundry, \$13; all at Valley furnaces, 90c. higher delivered Pittsburgh.

**Ferromanganese**—The market has been unsettled and the price is lower, at \$45 per ton, Baltimore. The Carnegie Steel Co. is understood to have booked several orders since it came into the market.

**Steel**—Markets are still adhering pretty firmly to their prices, \$20 for billets and \$21 for sheet bars at maker's mill,

Pittsburgh or Youngstown. Rods can be done about \$26, Pittsburgh.

**One Charcoal Iron Plant** is being operated by the Cleveland-Cliffs company, which with the Lake Superior Iron & Chemical Co. produces the bulk of the charcoal iron manufactured in the United States. This plant is the Pioneer furnace at Marquette. The plant at Gladstone, Mich., is undergoing repairs, after a long run without stoppage, and will not be in readiness to be restored to activity for several months. The Carp River plant of the company has not been in blast for several years. The Stephenson Iron Co. is operating its stack at Wells, Mich., to full capacity. Much of its product is taken by the Chicago, Milwaukee & St. Paul R.R. A severe "kick" at the Newberry furnace of the Lake Superior Iron & Chemical Co. recently scattered burning charcoal over a wide area and set fire to buildings three blocks distant. It dislodged the hopper on the tophouse and caused a shut down for repairs.

**The Mines and Oil Exhibit of the Sierra Madre Club**, of Los Angeles, will probably be displayed at the Panama-Pacific Exposition. There is no state appropriation to provide for such an exhibit as this, so the club has endeavored to raise \$150,000 to pay the cost. The movement was started at a recent banquet of the club and the plan is said to have been endorsed by Dr. Charles E. Van Barneveldt, director of the department of mines and metallurgy of the exposition and Irving E. Allen, petroleum chemist of the U. S. Bureau of Mines. A movement was recently inaugurated by the Sacramento Valley Development Association and the San Joaquin Valley Development Association, endorsed and assisted by Charles P. Dunton, vice-president of the California Miners' Association, to gather an exhibit of minerals from the mining counties of the northern half of the state to be exhibited at the exposition. An exhibit may be displayed by the State Mining Bureau. There appears to be no unity of action, no definite state organization for the exhibition of minerals by California at the Panama-Pacific Exposition. What this state needs is a getting together of the men who are interested in the mining industry and making a positive, determined and concerted effort to represent California mines and mining in a manner that would be a benefit to the state and a credit to mining men. The California Miners' Association made an effort in the last legislature, but the legislature would do nothing to assist the association, which is a proper representative of the mining industry. The legislature also declined to make an appropriation to enable the State Mining Bureau to take charge of such an exhibit. All that the state mineralogist can do is to make a display which will in some way represent the State Mining Bureau. Unless there is some concert of action, and that soon, California will be improperly and inadequately represented in the departments of mines and metallurgy of the Panama-Pacific Exposition.

#### IRON ORE

The division of Lake Superior shipments by ranges in 1913 was approximately as below; the full statement cannot be made until the rail shipments are reported:

	Tons	Per Cent.		Tons	Per Cent.
Marquette.....	4,200,000	8.4	Vermillion.....	1,662,918	3.3
Menominee.....	4,000,000	8.0	Mesabi.....	33,788,617	67.5
Gogebic.....	5,500,000	11.0	Cuyuna.....	743,648	1.5
Barabow.....	161,064	0.3			
			Total.....	50,056,247	100.0

The largest shipper this year was the Hull-Rust, with 2,232,112 tons. The next in succession were the Leonard, the Canisteo and the Mahoning, all on the Mesabi.

**Much Development Work is in Progress** on the Marquette range. New mines being opened are the Mackinac and Gardiner, of the Cleveland-Cliffs Iron Co., in the Gwinn district; the Isabella, of the Cascade Mining Co., in the Cascade field; the Lucky Star, of the Cleveland-Cliffs company and the Breitung interests, at Negaunee, the Athens, of the Cleveland-Cliffs and Pickands, Mather & Co., at Negaunee, and the Iron Mountain Lake, of the Jones & Laughlin company, at Ishpeming. Several properties already on the list of producers are being prepared for larger production, among these the Volunteer, Rolling Mill, Breitung Hematite and the Cleveland-Cliffs properties at North Lake. At the last, 400 men are now at work. A recent shipment to the Rolling Mill mine, a Jones & Laughlin property, was a consignment of fir timber from Washington, to be used in shaft work. Steel headframes are to be erected this winter at the Isabella, Lucky Star and Breitung Hematite No. 3. Much steel work is also to be done at the Mackinac and Gardiner. The Jones & Laughlin company, which is seeking for ore at Greenwood, west of Ishpeming, has three diamond drills in steady operation there. Holes are being put down to depths of 1700 ft. The rock is hard and progress is slow.

Receipts of Lake Superior ore at Lake Michigan ports in the season of 1913 were: Gary, 2,365,557 tons; Indiana Harbor, 455,252; South Chicago, 5,572,866; Milwaukee, 234,551; Boyne City, Mich., 45,028; East Jordan, Mich., 28,444; total, 8,701,732 long tons, which is 17.7% of the total shipments. Lake Michigan receipts in previous years were: 1912, 8,357,070 tons; 1911, 5,558,458 tons; 1910, 7,452,084 tons.

In a decision in the case of the Thomas Iron Co., versus the Pennsylvania R.R. Co., just handed down, the Interstate Commerce Commission has decided that a rate of 60c. per gross ton on imported iron ore in carloads from Philadelphia to Island Park, Penn., is justified. The complainant is engaged in the manufacture of pig iron at Island Park. Prior to April 1, 1910, the Pennsylvania's rate on imported iron ore from Philadelphia to Island Park and South Bethlehem was 50c. per gross ton. On that date the rate to Island Park was increased to 60c. and this rate is still in force. The distance over the Pennsylvania from Philadelphia to Island Park is 88.6 miles and to South Bethlehem 96.2, while the short line distance is by the Philadelphia & Reading, South Bethlehem (57 miles), and then over the Lehigh Valley. Since Aug. 22, 1906, the rate via this short-line route has been 60c. to Island Park and 50c. to South Bethlehem. The Pennsylvania claimed that it was obliged to meet the rate to South Bethlehem established by the short-line railroads in order to share in the traffic. In deciding the case the Commission says: "From the facts before us it appears that the rate of 50 cents per gross ton on imported iron ore in carloads from Philadelphia to South Bethlehem is forced by short-line competition and that the rate of 60 cents to Island Park does not bear an unreasonable relation to the South Bethlehem rate. Under the circumstances an order will be entered relieving the defendants from the operation of the fourth section of the act in so far as the traffic herein involved is concerned and the complaint in this proceeding will be dismissed."

**COKE**

Coke production has been kept down in the Connellsville and other regions by severe weather. Very little has been done in the way of new contracting, and makers are still holding for a price of \$2 per ton at ovens for 1914 furnace coke.

**Connellsville Coke**—There are no new developments in the contract situation, though some large interests have not yet covered their needs for the first quarter of the year. The makers are reported generally firm in their demand for \$2 per ton for contract furnace coke. Nothing further has been heard of the report that some makers would give way and break off from the agreement to hold for that price. Prompt coke has been in light demand, with small sales, and prices are \$1.90 @ 2 for prompt furnace. Sales have been small. Production has been curtailed by severe weather.

**Anthracite Shipments** in December were 5,662,618 long tons. For the full year ended Dec. 31 the shipments were 63,610,578 tons in 1912, and 69,069,628 in 1913; an increase of 5,459,050 tons, or 8.6%. Making the usual allowance for coal used and sold at mines, the total production of anthracite in 1913 was 76,667,000 long tons, or 85,867,040 short tons.

Imports of coal into Spain 10 months ended Oct. 31 were 2,254,918 metric tons, an increase of 394,291 tons. Imports of coke were 286,057 tons, a decrease of 1643 tons.

Visible stocks include nitrate afloat from the West Coast of South America, but do not include stocks at United States ports. Some advance in prices is expected from the restriction agreement of the producers; to offset which there has been a reduction of about one-third in ocean freights.

**PETROLEUM**

The monthly report of the "Oil City Derrick" reports new wells completed in December as follows: Pennsylvania grade, 639; Lima-Indiana, 144; Kentucky, 25; Illinois, 164; Kansas-Oklahoma, 1225; Texas-Louisiana, 174. A total of 2421 wells was completed, with an initial production of 31,157 bbl. There were 428 dry holes and 179 gas wells. Lima-Indiana and Kansas-Oklahoma were the only divisions to show an increase in wells completed. At the close of December the new work consisted of 722 rigs and 2278 drilling wells.

**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.

	August	September	October	November	December
Alaska shipments	1,847,785	2,261,216	1,951,883	3,391,300	3,104,155
Anaconda	22,500,000	22,600,000	18,400,000	25,250,000	25,100,000
Arizona, Ltd.	1,800,000	1,800,000	3,550,000	2,800,000	1,920,000
Copper Queen	8,252,401	8,434,803	8,292,929	7,115,991	9,033,459
Calumet & Ariz.	4,500,000	4,000,000	4,000,000	4,600,000	.....
Chino	5,788,572	4,196,296	4,767,466	4,270,821	.....
Detroit	2,187,223	2,102,818	1,861,878	1,922,352	2,021,034
East Butte	1,162,007	1,233,018	1,040,997	1,002,190	.....
Giroux	524,953	198,178	156,084	.....	.....
Mason Valley	867,060	918,000	1,052,000	1,174,000	.....
Mammoth	1,750,000	1,750,000	1,700,000	1,700,000	1,400,000
Nevada Con.	5,989,973	4,441,671	5,898,046	5,443,647	.....
Ohio	689,000	685,900	698,691	772,120	.....
Old Dominion	2,524,000	2,679,000	2,037,000	2,450,000	2,613,000
Ray	4,269,519	4,336,434	4,725,419	4,753,964	.....
Shannon	1,248,000	1,232,000	1,216,000	1,110,000	1,078,000
South Utah	223,498	241,843	232,269	225,072	.....
Tennessee	1,101,019	1,309,985	1,392,162	1,666,753	1,700,000
United Verde*	3,000,000	3,000,000	3,000,000	3,000,000	.....
Utah Copper Co.	10,302,251	11,463,905	9,929,478	10,787,426	10,088,000
Lake Superior*	9,700,000	6,950,008	5,500,000	6,600,000	.....
Non-rep. mines*	6,200,000	6,000,000	6,200,000	6,000,000	.....
Total prod.	96,427,264	91,835,075	88,102,302	.....	.....
Imp., bars, etc.	22,474,471	35,703,660	21,935,023	.....	.....
Total blister	118,901,735	127,538,735	110,037,325	.....	.....
Imp. ore & matte	9,171,351	10,800,162	5,062,015	.....	.....
Total Amer.	128,073,086	138,338,897	115,099,340	.....	.....
Miami†	3,097,500	2,688,000	2,862,050	3,230,000	.....
Shattuck-Arizona	1,001,634	1,163,237	993,224	995,429	.....
Brit. Col. Cos.	647,905	621,120	688,581	.....	.....
Granby	1,847,344	1,824,659	1,718,258	1,944,145	.....
Mexican Cos.:	.....	.....	.....	.....	.....
Boleof	2,264,640	2,369,920	2,424,800	2,315,040	.....
Cananea	3,186,000	3,148,000	3,682,000	3,800,000	3,646,000
Moctezuma	3,542,047	3,024,121	3,178,136	3,517,800	3,139,613
Other Foreign:	.....	.....	.....	.....	.....
Braden, Chile	1,572,000	1,332,000	2,006,000	1,592,000	2,122,000
Cape Cop., S. Af.	.....	607,040	712,320	649,600	.....
Kyshtim, Russia	1,585,000	1,187,000	.....	.....	.....
Spassky, Russia	1,048,320	1,025,920	983,360	904,960	.....
Exports from	.....	.....	.....	.....	.....
Chile	8,736,000	5,600,000	6,160,000	7,616,000	.....
Australia	7,720,000	6,944,000	7,728,000	11,200,000	.....
Arrivals-Europe‡	14,624,960	9,661,120	18,040,960	9,107,840	.....

† Boleo copper does not come to American refiners. Miami copper goes to Cananea for treatment, and reappears in imports of blister.  
‡ Does not include the arrivals from the United States, Australia or Chile.

**CHEMICALS**

**NEW YORK—Jan. 14**

**Potash Salts**—A report comes from Germany that the government has decided to extend the potash syndicate on the present lines for 10 years from the expiration of the present agreement. Nothing is said in the dispatches received of what changes have been made to meet the objections to the existing syndicate.

**Nitrate of Soda**—The consumption, shipments from South America and stocks of nitrate in the world for three years past are estimated by W. Montgomery & Co., as follows, in long tons:

	1911	1912	1913
Great Britain	132,000	130,000	124,000
Other Europe	1,564,000	1,778,000	1,700,000
United States	556,000	485,000	608,000
Other Countries	103,000	115,000	88,000
Total consumption	2,355,000	2,508,000	2,520,000
Shipments from S. Am.	2,412,000	2,452,000	2,660,000
Visible stocks, Dec. 31	1,058,000	977,000	1,075,000

**STATISTICS OF COPPER**

Month	United States			Visible Stocks.		
	U.S. Refin'y Production	Deliveries, Domestic	Deliveries, for Export	United States	Europe	Total
Year, 1912	1,581,920,287	819,665,948	746,396,452	.....	.....	.....
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	68,362,571	68,067,901	67,474,225	77,235,200	144,709,425
VII. ....	138,074,602	58,904,192	78,480,071	52,814,606	77,904,000	124,808,606
VIII. ....	131,632,362	73,649,801	73,263,469	53,594,945	66,420,480	120,015,385
IX. ....	131,401,229	66,836,897	73,085,275	38,314,037	63,716,800	102,030,837
X. ....	139,070,481	68,173,720	68,123,473	29,793,094	53,625,600	83,418,692
XI. ....	134,087,708	48,656,858	70,067,803	32,566,382	48,787,200	81,353,582
XII. ....	138,990,421	21,938,570	73,542,413	47,929,429	46,592,000	94,521,429
Yr., '13	1,622,450,829	767,261,760	869,062,784	.....	.....	.....
I, 1914	.....	.....	.....	91,438,867	53,916,800	145,355,667

Note—Visible supplies in Europe do not include copper afloat.

Assessments

Company	Defn.	Sale	Amt.
Bullion Beck & Champion, Utah	Dec. 1	Jan. 26	\$0.20
C. & R. Ida.	Dec. 20	Jan. 24	0.005
Central Eureka, Calif.	Jan. 16	Feb. 17	0.05
Century, Utah.	Jan. 2	Feb. 2	0.01
Clear Grit, Ida., postponed.	Jan. 23	0.0025	
Comet Placer, Nev.	Jan. 6	Jan. 24	0.03
Confidence, Nev.	Jan. 5	Jan. 23	0.10
Cons. Imperial, Nev.	Jan. 7	Jan. 29	0.01
Empire, Ida., postponed.	Feb. 2	0.005	
Giant, Nev.	Jan. 3	Jan. 20	0.0015
Greenhorn, Utah.	Dec. 24	Jan. 31	0.005
Happy Day, Ida.	Dec. 18	Jan. 20	0.0025
Highland National, Nev.	Jan. 9	Jan. 24	0.0175
Imlay, Nev.	Dec. 31	Jan. 20	0.01
Legal Tender, Ida.	Dec. 23	Jan. 20	0.001
Montello, Utah.	Jan. 11	Jan. 30	0.005
Mullan, Ida.	Dec. 20	Jan. 20	0.002
North Franklin, Ida., postponed.	Jan. 29	0.005	
North Scranton, Utah.	Dec. 26	Jan. 26	0.002
Noche, Nev.	Jan. 9	Feb. 2	0.01
Raymond-Illinois, Utah.	Jan. 15	Jan. 31	0.005
Ruby Mountain, Nev.	Jan. 17	Feb. 2	0.0017
Silver Eagle, Ida.	Jan. 14	Jan. 26	0.0015
St. Marys, Utah.	Jan. 20	0.02	
Sunset, Ida.	Jan. 3	Jan. 24	0.0015
Tarbox, Ida.	Dec. 29	Jan. 27	0.002

Monthly Average Prices of Metals

SILVER

Month	New York			London		
	1911	1912	1913	1911	1912	1913
January	53.795	56.260	62.938	24.865	25.887	28.983
February	52.222	59.043	61.642	24.081	27.190	28.357
March	52.745	58.375	57.870	24.324	26.875	26.669
April	53.325	59.207	59.490	24.595	27.284	27.416
May	53.308	60.880	60.361	24.583	28.038	27.825
June	53.043	61.290	58.990	24.486	28.215	27.199
July	52.630	60.654	58.721	24.286	27.919	27.074
August	52.171	61.606	59.293	24.082	28.375	27.335
September	52.440	63.078	60.640	24.209	29.088	27.986
October	53.340	63.471	60.793	24.594	29.299	28.083
November	55.719	62.792	58.995	25.649	29.012	27.263
December	54.905	63.365	57.760	25.349	29.320	26.720
Year	53.304	60.835	59.791	24.592	28.042	27.576

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

COPPER

Month	New York				London Standard	
	Electrolytic		Lake		1912	1913
	1912	1913	1912	1913		
January	14.004	16.488	14.337	16.767	62.760	71.741
February	14.084	14.971	14.329	15.253	62.893	65.519
March	14.698	14.713	14.868	14.930	65.884	65.329
April	15.741	15.291	15.930	15.565	70.294	68.111
May	16.031	15.436	16.245	15.738	72.352	68.807
June	17.234	14.672	17.443	14.871	78.259	67.140
July	17.190	14.190	17.353	14.563	76.636	64.166
August	17.498	15.400	17.644	15.904	78.670	69.200
September	17.508	16.328	17.698	16.799	78.762	73.125
October	17.314	16.337	17.661	16.913	76.389	73.383
November	17.326	15.182	17.617	16.022	76.890	68.275
December	17.376	14.224	17.600	14.904	75.516	65.223
Year	16.341	15.269	16.560	15.686	72.942	68.335

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

TIN

Month	New York		London	
	1912	1913	1912	1913
January	42.529	50.298	191.519	238.273
February	42.962	48.766	195.036	220.140
March	42.577	46.832	192.619	213.615
April	43.923	49.115	200.513	224.159
May	46.063	49.038	208.830	224.143
June	45.815	44.820	205.863	207.208
July	44.519	40.260	202.446	183.511
August	45.857	41.582	208.351	188.731
September	49.135	42.410	223.762	193.074
October	50.077	40.462	228.353	184.837
November	49.891	39.810	227.619	180.869
December	49.815	37.635	226.875	171.786
Av. year	46.096	44.252	209.322	206.279

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

LEAD

Month	New York		St. Louis		London	
	1912	1913	1912	1913	1912	1913
January	4.435	4.321	4.327	4.171	15.597	17.114
February	4.026	4.325	3.946	4.175	15.738	16.550
March	4.073	4.327	4.046	4.177	15.997	15.977
April	4.200	4.381	4.118	4.242	16.331	17.597
May	4.194	4.342	4.072	4.226	16.509	18.923
June	4.392	4.325	4.321	4.190	17.588	20.226
July	4.720	4.353	4.603	4.223	18.544	20.038
August	4.569	4.624	4.452	4.550	19.655	20.406
September	5.048	4.698	4.924	4.579	22.292	20.648
October	5.071	4.402	4.894	4.253	20.630	20.302
November	4.615	4.293	4.463	4.146	18.193	19.334
December	4.303	4.047	4.152	3.929	18.069	17.798
Year	4.471	4.370	4.360	4.238	17.929	18.743

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

SPELTER

Month	New York		St. Louis		London	
	1912	1913	1912	1913	1912	1913
January	6.442	6.931	6.292	6.854	26.642	26.114
February	6.499	6.239	6.349	6.089	26.661	25.338
March	6.626	6.078	6.476	5.926	26.048	24.605
April	6.633	5.641	6.483	5.491	25.644	25.313
May	6.679	5.406	6.529	5.256	25.790	24.583
June	6.877	5.124	6.727	4.974	25.763	22.143
July	7.116	5.278	6.966	5.128	26.174	20.592
August	7.028	5.658	6.878	5.508	26.443	20.706
September	7.454	5.694	7.313	5.544	27.048	21.148
October	7.426	5.340	7.276	5.188	27.543	20.614
November	7.371	5.229	7.221	5.083	26.804	20.581
December	7.162	5.156	7.081	5.004	26.494	21.214
Year	6.943	5.648	6.799	5.504	26.421	22.746

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

PIG IRON IN PITTSBURGH

Month	Bessemer		Basic		No. 2 Foundry	
	1912	1913	1912	1913	1912	1913
January	\$15.12	\$18.15	\$13.32	\$17.35	\$14.00	\$18.59
February	15.03	18.15	13.28	17.22	14.01	18.13
March	14.95	18.15	13.66	16.96	14.10	17.53
April	15.13	17.90	13.90	16.71	14.15	16.40
May	15.14	17.68	13.90	15.80	14.12	15.40
June	15.15	17.14	14.11	15.40	14.22	15.10
July	15.15	16.31	14.38	15.13	14.38	14.74
August	15.43	16.63	14.90	15.00	14.85	14.88
September	16.86	16.65	16.03	15.04	15.63	14.93
October	17.90	16.60	17.18	14.61	17.22	14.80
November	18.07	16.03	17.09	13.91	18.00	14.40
December	18.15	15.71	17.45	13.71	18.73	14.28
Year	\$16.01	\$17.09	\$14.93	\$15.57	\$15.28	\$15.77

STOCK QUOTATIONS

COLO. SPRINGS Jan. 13		SALT LAKE Jan. 13	
Name of Comp.	Bid.	Name of Comp.	Bid.
Acacia	02½	Beck Tunnel	05
Cripple Cr'k Con.	\$0.09	Black Jack	06½
C. K. & N.	06½	Cedar Fallsman	00½
Doctor Jack Pot.	06½	Colorado Mining	11½
Elkton Con.	59½	Crown Point	01
El Paso	2.40	Daly-Judge	4.50
Flinday	02	Gold Chain	16
Gold Dollar	05½	Grand Central	52
Gold Sovereign	01½	Iron Blossom	1.20
Golden Cycle	1.00	Little Bell	10
Isabella	10	Lower Mammoth	01½
Jack Pot.	05½	Mason Valley	3.50
Jennie Sample	05	May Day	05
Jerry Johnson	\$0.03	Nevada Hills	38
Lexington	003	New York	000
Old Gold	01	Prince Con.	17½
Mary McKinney	59½	Silver King Coal'n.	3.40
Pharmacist	01½	Slou Con.	02
Portland	99½	Uncle Sam	05
Vindicator	84½	Yankee	01½

TORONTO

Name of Comp.	Bid.	Name of Comp.	Bid.
Balley	05	Foley O'Brien	15
Conlagas	7.37½	Hollinger	17.35
T. & Hudson Bay	70.00	Imperial	\$0.01
Timskaming	13	Jupiter	07
Wettlaufer-Lor.	07	Pearl Lake	10
Apex	\$0.01	Porcu. Gold	10½
Big Dome	14.87½	Preston E. D.	01½
Crown Chartered	00½	Rea	10
Doble	\$1.10	Swastika	04
Dome Exten.	07	West Dome	06

SAN FRANCISCO

Jan. 13

Name of Comp.	Bid.	Name of Comp.	Bid.
Comstock Stocks	07	Misc. Nev. & Cal.	7.65
Alta	62	Belmont	76
Beicher	05	Jim Butler	09
Best & Beicher	1.25	MacNamara	36
Caledonia	14	Midway	1.12½
Challenge Con.	02	Mont-Tonopah	38
Chollar	35	North Star	1.22½
Confidence	18	West End Con.	15
Con. Virginia	36	Atlanta	03
Crown Point	02	C.O.D. Con.	04
Gould & Curry	1.15	Comb. Frac.	06
Hale & Norcross	07	Jumbo Extension	13
Mexican	70	Pitts-Silver Peak	35
Occidental	11	Round Mountain	44
Ophir	39	Sandstorm Kendall	10
Overman	02	Silver Pick	04
Potosi	10	Argonaut	2.50
Savage	07	Bunker Hill	1.50
Sierra Nevada	09	Central Eureka	32
Union Con.	33	So. Eureka	2.00
Yellow Jacket	33		

N. Y. EXCH. Jan. 13		BOSTON EXCH. Jan. 13	
Name of Comp.	Clg.	Name of Comp.	Clg.
Amalgamated	72½	Adventure	1½
Am. Agri. Chem.	53½	Ahmeek	289
Am.Sm.&Ref.,com.	64½	Alaska Gold M.	21½
Am. Sm. & Ref., pf.	99½	Algomah	1½
Am. Sm. Sec., pf. B	81½	Allouez	34
Anaconda	34½	Am. Zinc	20
Batopilas Min.	1	Ariz. Con., cts	4½
Bethlehem Steel, pf.	71	Bonanza	80
Chino	38½	Butte & Corbin	1.50
Federal M. & S., pf.	33	Butte & Balak	4
GreatNor.,ore,ctf.	36½	Calumet & Ariz.	64
Guggen. Exp.	44½	Calumet & Hecla	415
Homestake	114	Centennial	14
Inspiration Con.	15½	Cliff	2
Miami Copper	22½	Copper Range	36½
Nat'l Lead, com.	46	East West	2½
National Lead, pf.	105	Daly Butte	11
Nev. Consol.	14½	Franklin	3½
Phelps Dodge	183	Granby	73½
Pittsburg Coal, pf.	87½	Hancock	16
Quicksilver, pf.	21	Hedley Gold	29
Ray Con.	181	Helveta	35
Republic I&S,com.	83	Indiana	42½
Republic I&S, pf.	82	Island Cr'k, com.	47
Sloss-Sheff'd,com.	29½	Island Cr'k, pf.	85
Sloss-Sheff'd, pf.	87	Isle Royale	19
Tennessee Copper	33½	Keeweenaw	2½
Utah Copper	50½	Lake	9
U. S. Steel, com.	108	La Salle	4½
U. S. Steel, pf.	108½	Mass.	2½
Va.Car.Chem.,pf.	100	Michigan	75
		Mohawk	43½
		New Aradain	41
		New Idria Quick	31
		North Butte	27½
		North Lake	1½
		Oldway	75
		Old Dominion	50