

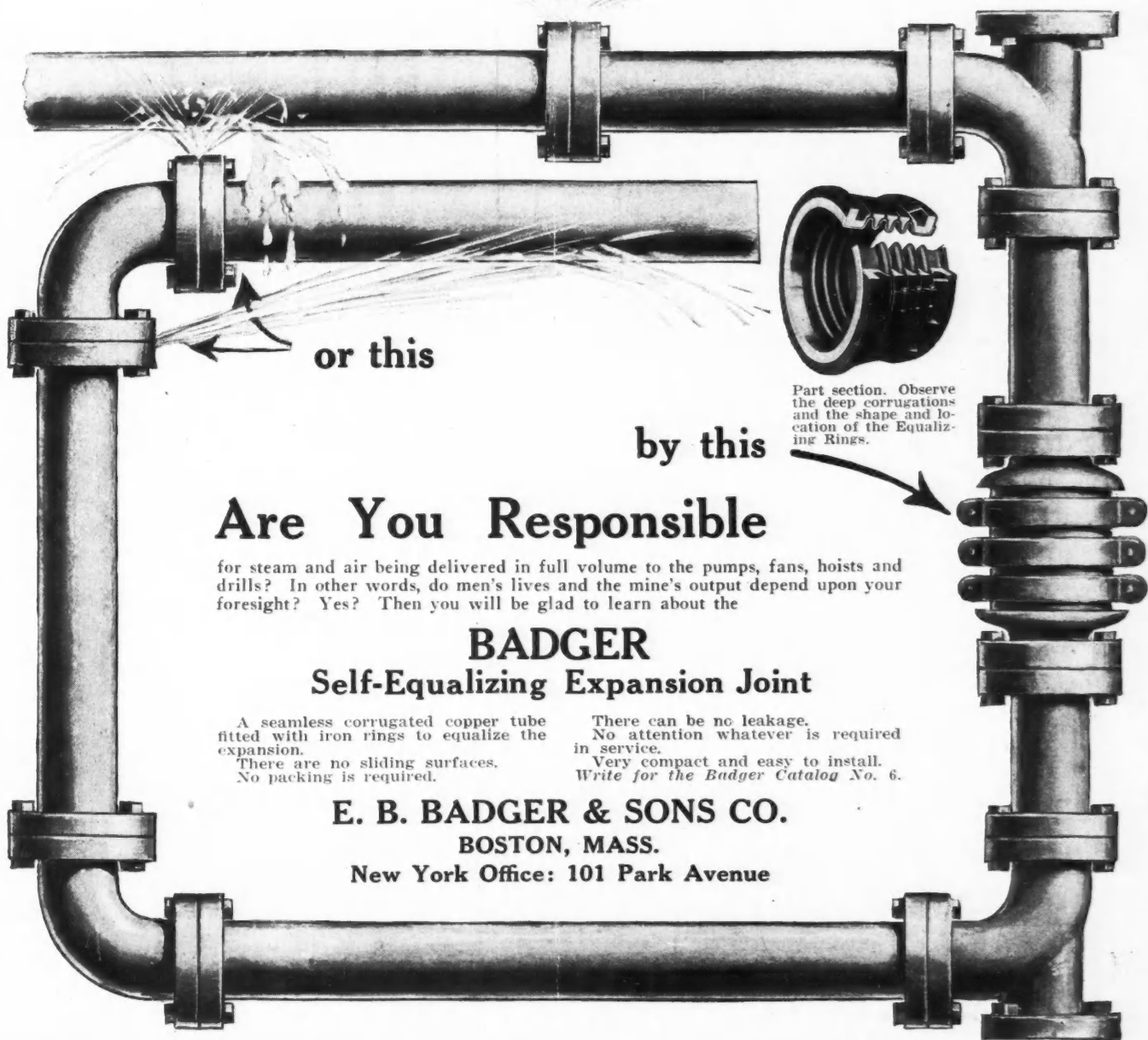
# Engineering and Mining Journal

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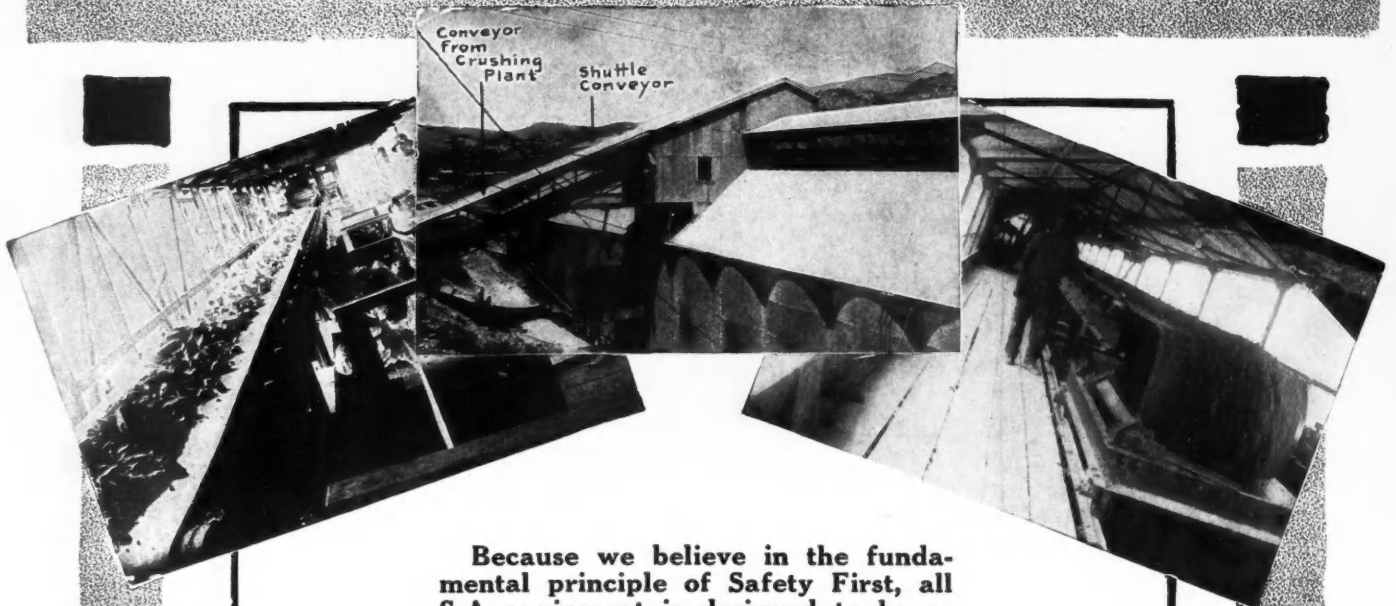
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# Engineering and Mining Journal

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MAIN POWER PLANT OF ARIZONA POWER CO. ON VERDE RIVER, ARIZONA

## Electric Power for Mining in Yavapai County, Arizona\*

*Fossil Creek, having a fall of 1600 ft., is the source of power for the Irving and Childs hydro-electric plants of the Arizona Power Co., which operates 250 miles of transmission lines in Yavapai County. From the Irving or upper plant water is flumed to an artificial lake, and*

*thence, by means of pressure tunnel, surge tank and pressure pipe, is carried to the turbines at the Childs or lower plant, situated on the Verde River. An auxiliary steam-generating plant at Tapco, on the Verde River, is operated by a subsidiary company, which uses oil as fuel.*

**F**OLLOWING the eastern slope of the hills 20 miles south from Jerome, Ariz., on the western foothills of the Verde River, cutting through the hill at Cherry Creek and proceeding 40 miles further south along the western slope to the Crown King mine, is a territory rich in mineral deposits. In these 60 miles are situated the mines of the United Verde Copper Co., United Verde Extension Mining Co., Copper Chief, Yaeger Canyon, Arizona Binghamton Copper Co., Blue Bell, De Soto, Crown King and Wildflower. The combined output of these properties exceeded 150,000,000

lb. of copper in 1917, in addition to their gold, silver and zinc production.

In 1907, when United Verde was the only producer, steam power for operation of mines and prospects was provided from wood, gasoline, coal or oil burned under poor boilers, and procured at high cost. Water was scarce, and, when available, contained impurities injurious to boilers, so that the difficulties in operating power plants of the various properties were discouraging, on account of the expense entailed, the delays due to boiler repairs and the difficulty of procuring fuel at points remote from the railroad. With such serious obstacles to mining, the question of power at any price,

\*Compiled by P. R. Milnes, of Yavapai County Chamber of Commerce.

and particularly cheap power, was necessarily of paramount importance.

The power situation in Yavapai County has been satisfactorily solved by the Arizona Power Co., which furnishes electric power from two hydroelectric plants aggregating 12,000 hp. and a modern 10,000 hp. steam plant. The northern part of the county is provided with 250 miles of transmission lines covering the territory shown on the accompanying map, which also indicates the situation of the mines now served by the company. Practically every mine and prospect is supplied with electricity furnished by the power company at a reasonable cost. Lines are extended as required, and generating capacity is increased as the market expands.

In March, 1918, the following customers procured power:

POWER USED BY CUSTOMERS OF ARIZONA POWER COMPANY

Customers	Horsepower Used
Atchison, Topeka & Santa Fe Ry.....	100
Prescott City pumping plant, Del Rio.....	100
Consolidated Arizona Smelting Co.....	1,500
United Verde Copper Co., Jerome and Clarkdale	5,000
United Verde Extension Copper Co.....	1,500
Hayden Development Co.....	300
Prescott Gas and Electric Co.....	400
Big Pine Mining Co.....	300
Bradshaw Reduction Co., Crown King.....	300
Arizona Binghamton Copper Co.....	450
Copper Queen Mining Co.....	100
Big Ledge Development Co.....	350
Jerome Verde Mining Co.....	350
Pittsburgh-Jerome Mining Co.....	100
Arkansas & Arizona Copper Co.....	100
Jerome Portland Copper Co.....	75
West United Verde Copper Co.....	200
Gadsden Copper Co.....	300
Green Monster Mining Co.....	250
Jerome Del Monte.....	150
Locey Pabst Gold Mining Co.....	100
Verde Combination Copper Co.....	250
Dundee Arizona Co.....	200
Shannon Copper Co.....	200
Cottonwood Township.....	100
Mayer Township.....	50
Total .....	12,825

The Arizona Power Co. was incorporated under the laws of the State of Maine in 1908, and took over the interests of an Arizona corporation which was using water from Fossil Creek and had done some preliminary work.

WATER POWER DEVELOPED FROM FOSSIL CREEK

The source of Fossil Creek is at the junction of Coconino, Gila and Yavapai counties, and the stream takes a southeasterly direction and forms the dividing line between Gila and Yavapai counties for 14 miles, where it empties into the Verde River. From its source to the Verde River, Fossil Creek has a total fall of 1600 ft., and this fall serves two hydroelectric developments, the upper plant using 500 feet and the lower, 1080 feet.

Two hundred yards below the lower spring a 20 x 70 ft. concrete dam has been built across the creek bed, and the entire flow of water is diverted to a concrete intake tunnel which is provided with suitable gates to keep out rubbish. From this tunnel the stream enters a 5-ft. diameter semicircular steel flume, which is carried on wooden trestles supported by concrete footings. The flume has an hydraulic gradient of 0.1%, and

the wooden trestle varies from 5 to 60 ft. in height, with bridges spanning the numerous small canyons. From intake to the head of the pressure pipe the flume is 22,000 ft. long, with an inverted 480-ft. siphon that has a drop of 156 ft. in the middle of the flume. A concrete box fitted with gates, cleaning racks and electrical devices, which indicate the height of the water in the flume to the power-house operator, is placed at the end of the flume and is connected directly to a 3300-ft. steel pressure pipe which carries the water to a Francis turbine situated at the creek 500 ft. below. The pressure pipe is buried in the ground for the greater part of its length and, where exposed, is supported on concrete piers.

CURRENT RAISED TO 45,000 VOLTS BEFORE TRANSMISSION TO GENERATING STATION

A 2500-hp. turbine is connected directly to a 1500-kw. G. E. 2300-volt generator. The three-phase 60-cycle current as generated is raised by a bank of three transformers to 45,000 volts and transmitted to the main generating station on the Verde River, eight miles away.

The transmission line is supported by wooden towers 500 ft. apart and is insulated by double suspension type insulators, designed for 100,000 volts. Lightning arresters are installed at each end of the line to prevent, so far as possible, any interruption from the heavy lightning which is prevalent during the summer.

The power house and transformer houses are of solid reinforced concrete, and those of the operators are of wood and are supplied with numerous screen porches. For the comfort and health of the employees, a complete ice plant and refrigerator have been installed.

The tail race of the upper or Irving plant empties directly into the intake of the larger plant at Childs, on the Verde River. The intake is built of concrete and forms a pool 40 x 20 ft. and 15 ft. deep. From this intake the water is carried on a 0.1% grade to an artificial reservoir which has an area of 28 acres and is known as Stehr Lake. The water conduit consists of a 2200-ft. wooden flume on trestles, 12,000 ft. of 5 x 3-ft. concrete flume, 7500 ft. of 4-ft. gravity siphon buried in the ground and supported for 1400 ft. on steel bridges, and 5000 ft. of 6 x 3-ft. concrete-lined tunnels, making a total of 26,700 ft. The concrete flume has a 6-in. base with walls 4 in. thick at the top, 6 in. at the bottom and heavily reinforced with welded wire cloth. The tunnels are lined throughout with 6 in. of concrete.

STORAGE RESERVOIR PROVIDED AT STEHR LAKE

Stehr Lake, formed in a natural depression and having earthwork dams at either end, provides a storage reservoir of sufficient size to carry the rated load of the Childs station unassisted for a period of 24 hours. The portal of a pressure tunnel is at the lower end of the lake, 17 ft. below the normal level of the water. This tunnel is driven through the mountain 5200 ft. to the valley of the Verde River, on which the power house is situated. A 4-ft. reinforced-concrete pipe having a constant head of 30 ft. follows the edge of the mountain from the western end of the tunnel for 1400 ft. to a concrete surge tank 30 ft. in diameter and 36 ft. high.

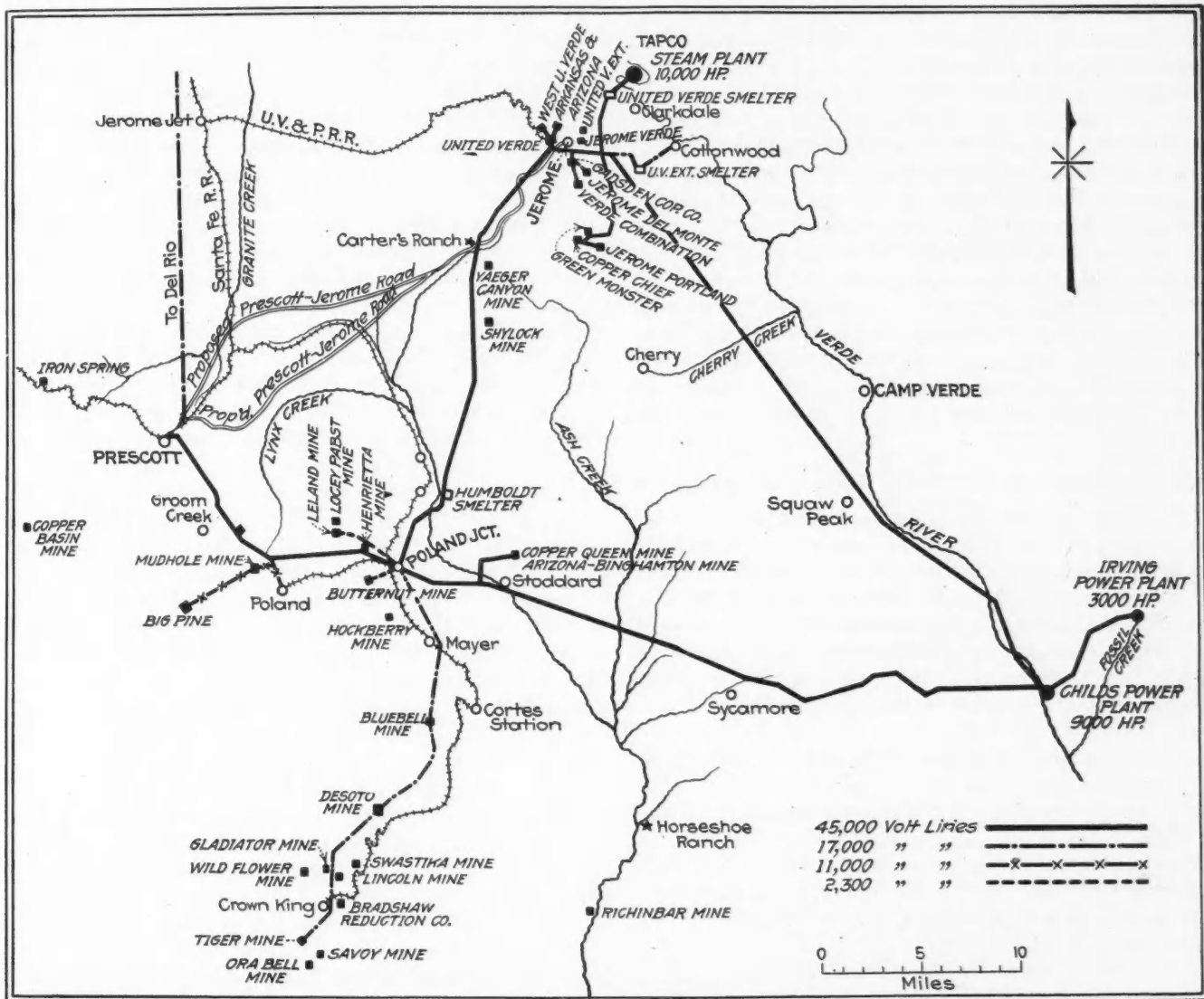
The water is carried from the bottom of the surge

tank through a 4800-ft. steel pressure pipe to the turbines in the power house 1080 ft. below. This pressure pipe is 48 in. in diameter at the surge tank, 36 in. diameter at the power house, and for the lower half of the distance is of  $\frac{3}{4}$ -in. welded steel.

The power house and the adjoining transformer house on the east bank of the Verde River are of solid concrete. The pressure pipe enters the power house at right angles and is connected to a steel header running the entire length of the building. From this header, the pipes to three impulse turbines are connected at 45°, each pipe being opened and closed by a heavy

the windmill type. Wires are suspended from three cross arms by clamps attached to double-suspension type insulators of the hook-and-eye type, each insulator being 15 in. in diameter. The entire system is protected by a galvanized-steel ground wire attached to the top of each tower. The base of the first towers outside of the power house is enclosed and provided with an electrolytic lightning arrester, and similar installations are placed at each substation and at each distributive point.

The transmission line extends across the river, from the east side and 3500 ft. up the rim of the western mountain, to a switching station at Poland Junction,



TRANSMISSION AND DISTRIBUTION CIRCUITS OF ARIZONA POWER CO.

hydraulic valve. Each of the three turbines has a rated capacity of 3000 hp. and is directly connected to an 1800-kw. generator supplying current at 2300 volts. Each generator is connected to a bank of three transformers, which raise the voltage to 45,000 volts, for transmission. The turbines are controlled by oil governors, and a special Tirrel regulator operates the excitors of each generator when working on the same transmission system.

Duplicate three-wire lines of No. 1 stranded copper lead to the tower lines from the transformers. The original transmission line consisted of steel towers of

on the Santa Fe, Prescott & Phoenix R. R., a distance of 35 miles. A double-circuit line of No. 4 B & G wire extends 18 miles northwest to a substation at Prescott, with an intermediate station at Walker, eight miles from the Junction. A second line runs nearly due north 25 miles to a substation at the property of the United Verde Copper Co. Current is distributed to various adjacent properties from the Poland and Walker substations by means of 11,000-volt lines on wooden poles. From the Jerome line at Humbolt, a branch supplies the smeltery of the Consolidated Arizona Smelting Co., and from this point, as well as from the Poland

station, a 17,000-volt line is extended 27 miles south to the Blue Bell and De Soto mines of the Consolidated Arizona Smelting Co. and continued to the Crown King district.

Light and power are supplied to Prescott and Whipple Barracks from the Prescott substation, and an 11,000-volt line extends 26 miles north to the Prescott pumping plant at Del Rio. From Jerome and Clarkdale substations, all of the various mines and prospects in the Jerome district are reached by branches from the main line or by 2300-volt distributing circuits.

In 1916 the demands for power increased so that the waterpower plants were inadequate, and a subsidiary company, the Arizona Steam Generating Co., was formed to build a steam-generating plant at Tapco, on the Verde River, three miles north of Clarkdale. Construction began in February, 1917, and the plant, representing an investment of \$700,000, was placed in operation Sept. 1, 1917. The building is of concrete throughout, with the exception of the western end, which has a corrugated-iron finish, so that any future additions can be made with a minimum of expense. The boiler room is 110 x 70 x 35 ft., and the turbine room adjoining is 66 x 40 x 42 ft. Adjoining the boiler room and connected to it by concrete flues is an 8-ft. diameter concrete stack 220 ft. high. Four Sterling boilers having a combined capacity of 10,000 hp. are provided with superheaters and economizers. Oil fuel is used, and an oil unloading station, consisting of a concrete trough with four openings, is situated on a spur track west of the boiler room.

#### POWER RAISED TO 45,000 VOLTS BEFORE TRANSMISSION

The steam turbine and electric generator, made by the General Electric Co., has a capacity of 10,000 hp. and is equipped with water-cooled bearings, oil circulating pumps, and an air-cooling device. Electricity generated by the turbine is delivered directly to a bank of four 2000 kw. transformers, raised from 2300 volts to 45,000 volts and transmitted through oil switches directly to the Clarkdale substation of the Arizona Power Company.

One mile of double transmission lines extends from the steam plant to Clarkdale. From the Clarkdale substation a new line is being built to the Hopewell Crushing Plant of the United Verde, and thence to the present Jerome substation. During an official test at full load conducted for three days, in November, 1917, the steam plant developed a maximum of 335 kw.-hr. per bbl. of California crude oil.

### Control of Oil Lands in Trinidad

By an ordinance known as the Lands (oil-bearing) Ordinance, 1917, says *Commerce Reports*, all lands in the British colony of Trinidad and Tobago south of latitude N. 10° 26' 36" are declared to be oil-bearing lands, and no person may acquire any right, title, or interest in or over such lands without the written consent of the Governor of the colony. The ordinance is made retroactive in operation and applies to any right, title, or interest in or over oil-bearing lands agreed to be acquired prior to its passage. It will remain in force during the continuance of the present war and for six months after the close thereof.

### Zinc Smelting Active in Wales

Swansea has been for a number of years the center of the zinc-smelting industry of the United Kingdom, says *Commerce Reports*. In 1913 only about 60,000 tons of spelter was produced in the United Kingdom out of a total consumption of 195,000 tons. Previous to the war about two-thirds of its spelter requirements were imported, principally from Belgium. In the pre-war period the Swansea spelter works, with a production of less than 60,000 tons, were not in a prosperous condition, on account of the keen competition of the Belgium and German works, where the low cost of labor made it almost impossible for the Swansea smelters to compete successfully. The result was that the Swansea works were old-fashioned and badly equipped, according to the report of the "Commission of Enquiry Into Industrial Unrest in Wales" (1917). Since the outbreak of war plants have been improved greatly, so that their capacities are now equal to nearly 100,000 tons of spelter per annum. Previous to the war Australia produced annually about 400,000 tons of zinc concentrates, of which 80% went to Germany. By means of assistance from the British government, the Australian producers hope, as soon as ships are available, to dispose of their entire production in the United Kingdom. The pre-war production of Australia, 400,000 tons of zinc concentrates, would equal about 154,000 tons of spelter. To accomplish this, the capacities of the local smelteries will have to be increased by at least 54,000 tons per annum. With this end in view, the Swansea Vale Spelter Co. is erecting a new plant at Avonmouth, near Bristol.

In 1913, only 56,517 tons of zinc ore was imported into Swansea; in 1914, about 97,450 tons. After the outbreak of war, the German market for Australian ores having closed, shipments were diverted to the United Kingdom, thus accounting for the large increase in that year of zinc ore imported into Swansea. In 1915, however, these imports declined to 58,048 tons and in 1916 to 54,958. These large decreases were due to the impossibility of obtaining ships for the transportation of the ore from Australia. According to the official returns of the Harbor Trust, imports of ores into Swansea from Australia amounted to 8579 tons in 1913, 37,889 in 1914, no imports in 1915, and 3007 tons in 1916. Figures for 1917 are not yet available, but it is learned that there was no importation of Australian ores in 1917. During 1915, 1916, and 1917 most of the supplies of zinc ore came from Spain, North Africa, and Italy. In 1917, the imports into Swansea increased to 86,499 tons, which is the largest importation on record with the exception of 1914, when increased supplies of Australian ore were received.

Official government figures of imports during 1917 are not available. It is estimated, however, that about 98% of the zinc ore imported into the United Kingdom is smelted in the Swansea district. During 1917, the Swansea Spelter Works worked at top speed, and facilities for increased production have been much improved. During the latter part of the year, however, a number of furnaces were idle on account of the shortage in the supplies of ore. Although greatly increased quantities of ore were imported in 1917, this increase did not keep up with the increased capacities of the furnaces and the result was many idle furnaces.

# Iron Ore Report of Advisory Council Department of Scientific and Industrial Research

**T**HE Advisory Council of the Department of Industrial Research, in England, has issued a report on the iron ores and other metalliferous ores used in the steel industry of the United Kingdom in the year 1917. The report was prepared by G. C. Lloyd, secretary of the Iron and Steel Institute, and revised by Prof. Henry Louis, of the University of Durham. It was compiled from a variety of official and private sources, and is one of the most up-to-date publications on the iron-ore situation now available. In addition to the iron ores, the report treats of allied minerals which mean so much to the successful continuation of the iron and steel industry. The report has been divided into the following three parts: (1) The iron ores of the United Kingdom and British dominions; (2) iron deposits of foreign countries; and (3) ores of the principal metals, other than iron, used in the iron and steel industry.

## IMPORTED CHEAPER THAN DOMESTIC ORES IN ENGLAND

Total iron-ore resources of Great Britain are given as 39,500 million tons. Of this, however, Professor Louis says that by far the largest proportion cannot be worked at a profit at the present time. The economic situation is such that it is cheaper to import foreign ore. Nevertheless, as a correction to a somewhat prevalent impression that England is entirely dependent on foreign ores, it is worthy of note that the iron ores imported during 1913 amounted to 8,025,860 tons, though the iron ore mined totalled 15,997,328 tons, nearly double that brought into the country.

## PRINCIPAL SOURCES EXIST IN FIVE COUNTIES

The chief sources of ore are the high-grade non-phosphorus ores of Cumberland and Lancashire, the stratified ore beds of Yorkshire, with its Cleveland ores, and the stratified iron ores of the secondary formations in Lincolnshire and Northamptonshire. In former times iron ore was mined from the carboniferous systems in the form of blackband and clayband ironstones, but these have been abandoned, although they are not entirely exhausted.

## CUMBERLAND ORES LOW IN PHOSPHORUS

Cumberland ores occur in a small strip of land five miles long and paralleling the coastline between Whitehaven and Ulverston. The ore, which is a red hematite with a low percentage of phosphorus, generally occurs in pockets in the carboniferous limestone of the district and usually follows the lines of fracture in limestone or the line of contact between the limestone and the Silurian rocks. The most important mine is the Hodbarrow, producing at the rate of about half a million tons a year. This mine is said to have developed reserves amounting to 25 million tons, and there is reason to believe that the deposit contains more than that. Between the Hodbarrow mine and the mines at Askam, under the sands of the Duddon estuary, is a stretch of

country two and a half miles along the faulted ground and over a mile and a quarter wide which has not been touched or proved for iron ore, but it is likely that this area will yield an immense reserve tonnage.

## YORKSHIRE ORES CONTAIN AVERAGE 32% IRON

The Yorkshire ores, as typified in those mines in the Cleveland hills, are entirely different in character and formation from those of the Cumberland fields. In Yorkshire the ore occurs in beds, the thickness of which varies from 2 to 15½ ft. The "Main Seam" is the only one mined, although others exist which may prove valuable. As compared with American standards, the quality of the ore is low, containing, as it does on the average, 32% iron. The following analysis, taken from the report, represents an average of the Cleveland ironstone:

### AVERAGE ANALYSIS OF CLEVELAND IRONSTONE

	Per Cent.
Ferrous oxide.....	32.50
Ferric oxide.....	3.00
Manganese oxide.....	0.70
Alumina.....	10.20
Lime.....	5.00
Magnesia.....	3.50
Carbon dioxide.....	19.00
Silica.....	13.50
Titanic acid.....	0.30
Phosphoric acid (phosphorus 0.43%).....	1.00
Carbonaceous matter.....	0.20
Combined water.....	2.90
Moisture.....	8.00
Iron.....	27.38
Loss by calcination.....	26.39
Iron in calcined stone.....	37.20

About six million tons of ore of this class is mined yearly, and it is evident that the use of lean iron ores in the steel trade is entirely feasible, under conditions of supply and demand that prevail in normal times. Two classes of ore exist in the Cleveland district, the first being blue in color, markedly oölitic, free from alumina and yielding 30% iron. The second is dull yellow in hue, contains alumina in place of iron and yields 28% iron.

## HEMATITE WITH HIGH LIME CONTENT CHARACTERISTIC OF LINCOLNSHIRE ORES

The third really important iron-ore district in England is that of Lincolnshire. In the Frodingham ore field there is an outcrop of ironstone 14 miles long, dipping slightly eastward, with a thickness of bed from 10 to 25 ft. All the ore within a mile of the outcrop is mined open cast, but borings have proved the continuation of the bed two miles further. According to Professor Louis, the area is probably 40 square miles and occurs in the geological system called the Middle or Lower Lias. The ore is a calcareous hematite, the lime content of which runs up to 20%. In color the stone is sometimes greenish when of carbonate of iron.

## ORE FOUND IN KENT AND ISLE OF RAASAY

A recent discovery of an area of 20 square miles of iron ore was made in Kent during the progress of the boring for coal in that county. In addition to the land area, the bed, which is 16 ft. thick, extends underneath the Straits of Dover. The ore is siliceous and contains

about 32% of iron, with 8 to 10% of lime. This discovery and that of the ore on the Isle of Raasay, Scotland, are especially interesting, because both were made at a time when the general opinion was that nothing more could be found in the mineral line in Great Britain. Both discoveries were the results of geological reasoning applied to actual conditions, and were emphatically not of the accidental type.

#### STAFFORDSHIRE SHOWS IRON-ORE BED CONTAINING COAL SEAM AND COVERING OF OIL-BEARING SHALE

Apart from the areas enumerated, the majority of the other iron sources, in the various counties from north to south, do not merit much attention. There are a number of small districts and mines now being operated which probably, when normal conditions return, will never yield another ton of ore. One curiosity exists in Staffordshire: an iron-ore bed 14 ft. thick has a seam of coal 6 in. thick in the centre and a roof of oil shale yielding in places 28 gal. to the ton.

#### ORE QUARRIED ON ISLE OF RAASAY

In Scotland, probably the most interesting area is that of the Isle of Raasay, one of the out-of-the-way islands of the Hebrides, hitherto given up to a few sheep and an occasional crofter. In 1910 the Geological Survey men discovered an area of Upper and Middle Lias rocks, extending under sea to the southern end of Skye, and thereafter followed the discovery of the ore beds, similar in character to the Cleveland beds in Yorkshire. At Raasay the beds are 6 to 17 ft. thick and can be readily quarried.

#### HIGH-GRADE IRON ORES NOT NECESSARY TO ENGLISH STEEL MAKING

Generally speaking, with the exception of the Cumberland deposits, all the iron ores mined in Great Britain are lean ores assaying 30% iron and less. The majority are carbonates or alter carbonates, and contain considerable quantities of carbon dioxide, which, together with the water, is driven off in the calcining of the ore. The impurities, the silica, sulphur and phosphorus, are not present in such quantities as to make the ores unworkable, though not by any means low. There is little doubt that the English steel industry has progressed and will do well in the future without the high-grade ores considered necessary in the United States. The question is one of economical assembling of the raw material, and when the time comes that leaner ores have to be used in America, the problems to be met and solved will be overcome in an equally successful fashion.

#### NEWFOUNDLAND HAS EXTENSIVE OREBODY

The second portion of Part I deals with the resources of the British dominions. Newfoundland is the first area dealt with, reference being made to what is now known as one of the largest single iron-ore deposits of the world and probably one of the most extraordinary developments of iron deposition. The iron occurs in a succession of beds, one above the other, and these outcrop on the northern or dip side of the small island of Belle Isle, the length of the outcrop being three miles and only some few hundred yards from the cliff edge. Claims have been staked twelve miles out to sea. One is inclined to note how easy it would have been for the

general processes of erosion to have lost this deposit to the world, as a few more years would have caused the outcrops to disappear, and the existence of over 3000 million tons of ore would never have been suspected. Though this ore is comparatively near to the English ports and iron districts, it does not appear to have been in great demand there, for it is thought that the silica in some of the shipments was too high. Germany evidently found the ore to her liking, and about one-third of the output was sold between that country and the United States. The port of entry for the ore to Germany was Rotterdam, and a cargo of this Newfoundland ore was captured on its way there soon after the war began, which led in turn to a sharp trial in the Scottish courts in which the agents of one of the Canadian steel companies were involved.

#### EASTERN CANADA IRON ORES NOT NOW BEING WORKED

In the section devoted to Canadian ore occurrences, the Torbrook and Nictau deposits, the Londonderry areas and the Bathurst mine are mentioned as in eastern Canada. The first of these contained ore of the following character: metallic iron, 49.20%; insoluble, 15.60%; phosphorus, 0.922%; and sulphur, 0.77%. The report states that this deposit is being worked, which is not true, as the deposit and the other areas mentioned in Eastern Canada have all been abandoned, mainly owing to the use of the cheaper and better ores from Newfoundland. The above analysis is also applicable to the brown hematites of Londonderry, and is not far from being equally applicable to the magnetites of Bathurst, in that the iron content and the silica content of all these ores run about the same.

Mention is also made of the magnetites containing titanium which are scattered along the north shore of the Gulf of St. Lawrence, and beyond these the only district named is that north of Lake Superior, which has been the goal of many hopes. With the exception of the Helen mine, in Michipicoten, this great area still remains largely speculative, and is likely to remain so until the competition of the Minnesota and associated fields decreases considerably or until a discovery of equal value is made in Canada, which is now hardly probable. Canada is not one of the first-rank countries in iron ores, being overshadowed by the tonnages available in the states just across the border. Given other circumstances and conditions, she might have exhibited to her credit, by comparison, a fair tonnage of ore.

#### HIGH-GRADE IRON ORES IN INDIA

India is the first of the British dominions mentioned that contains high-grade iron ore in quantity which averages 60 and 65% in iron content. These deposits are situated at Orissa, in the Bengal presidency, and supply the Tata Iron and Steel Co. with ore. The analysis is as follows: Iron, 61.85 to 64.33%; phosphorus, 0.05 to 0.135%; sulphur, 0.02 to 0.036%; and silica, 1.64 to 4.08 per cent.

#### SOUTH AFRICAN IRON DEPOSITS ERRATIC

South Africa, which is still in the early exploratory stages in the matter of industrial minerals, does not appear to contain great deposits of iron. From the description of such occurrences as are known, the bodies appear to be erratic in both quality and quantity, and



most of them are concentrations from surrounding iron-bearing rocks, which are not rich enough to be classed as orebodies.

This part of the report may be subject to some criticism, because of the possibility that some of the information is not entirely reliable. The tendency in new countries that are only slowly developing their industrial possibilities is toward inaccurate statements about natural resources, and from the analyses and short descriptions given one is often justified in assuming that many of the areas which it is suggested may exist have been predicated on the production of picked samples. An iron-ore area of outstanding importance is essential to either create an iron-ore export trade or to support an internal iron and steel trade; such a deposit as it would be impossible to miss tumbling over in a country like South Africa, which has been prospected for some time for other minerals.

#### STEEL PLANTS IN AUSTRALIA HAVE INCREASED IRON-ORE PRODUCTION THERE

In Australia, where the steel industry has been increasing its production mainly through the plants recently begun in South Australia, some large resources of iron ore are found. The Iron Monarch hill, which feeds the furnaces of the Broken Hill Proprietary Co., is said to contain 20 million tons of ore which shows analysis of 52 to 54.5% iron, 12.5 to 15% manganese and 2.3% silica or less. At Iron Knob, where the resources are estimated at one million tons, the ore is of equal quality and contains no phosphorus or sulphur. Iron ores also appear to be widely distributed in other Australian states, but so far there has been no attempt systematically to operate any of them, presumably because of the lack of a local market and the distance from shipping points for an export trade, added to the long freight carriage to European countries, where the only outside market could be obtained. In the Murchison region of Western Australia, once famous as a gold center, it is said that some of the largest iron deposits of the world exist, but no detailed surveys or accurate information is available. The analysis shows remarkable ore in the small percentage of silica—less than 3%—and the corresponding large percentage of iron.

Summarizing, it appears that the principal ore countries of the British dominions are Newfoundland, India, and Australia, and that of these Newfoundland is admittedly in the first rank as an iron-ore country through the existence of one single deposit. The others present nothing that will enable them to enter the lists as iron-ore exporters unless further exploration should add considerably to the estimate of their resources.

#### IRON HOLDINGS OF NATIONS EXERT POTENT INFLUENCE

Part II of the report consists of notes on iron-ore deposits in foreign countries. A comprehensive résumé is presented of the iron-ore resources of the world generally and the relative importance of the countries concerned. The part each country may play in the future may thus in a measure be visualized, because, after all, iron-ore deposits, coupled with the existence of a few other allied natural resources, will make the country possessing them a powerful factor in the world's progress.

The Swedish ore fields situated in Lapland are remarkable for their high iron content. The whole of

the Lapland region, which is still partly unexplored, is said to contain over 1158 million tons, and all of the ore is over 58% iron and much of it as high as 68%. Gellivare ore is classified at the mines as follows: Gellivare A, averages 68% iron and under 0.02% phosphorus; Gellivare C, averages 65% iron and under 0.06% phosphorus, and Gellivare D, averages 63% iron and under 1.10% phosphorus, with the sulphur in all grades under 0.05%. In addition to these huge deposits, there are in Southern and Central Sweden many millions of tons of low phosphorus ores, such as Dannemora and Persberg, from which the famous Swedish iron is mainly produced. In Sweden, as in Norway, concentration of lean magnetic ores is an important feature of the iron-ore export trade, and 23 concentration plants are in operation and treat annually over 600,000 tons of ore.

#### IRON PRODUCTION OF NORWAY RETARDED BECAUSE OF SWEDISH ORES

Norway is not classified as an iron-ore country in the report, yet from Norway Great Britain imported 489,000 tons of ore in 1913, and, noting the analysis of the raw ores, it would appear that the statement that Norway is not an iron country should be modified, for there exist hundreds of millions of tons of ore averaging 40% iron, but by reason of comparison with the rich Swedish ores of 60% iron and upward, Norway's deposits are not especially valuable. It is an interesting commentary on the economics of iron mining, for many other countries would be gratified to possess the so-called lean ores of Norway.

A remarkable concentration project is carried on at Elsfjord, where there are a number of relatively small deposits averaging 20 to 25% iron, 60% insoluble residue and 0.15% phosphorus. The ores average 25% magnetite, and the rest of the iron is present as hematite. By suitable methods of magnetic concentration, a concentrate of magnetite consisting of 70% iron and 0.035% phosphorus is obtained. An equally remarkable result is achieved at the Dunderland mines, which ship hundreds of tons to Great Britain and are said to have 80 million tons in reserve. Here the ore contains 11.5% magnetite, 25% hematite, and 0.3% phosphorus. By concentration the product finally produced contains 68% iron, 0.03% phosphorus, and 2.5% silica.

#### RUSSIAN IRON AND STEEL INDUSTRY UNDERDEVELOPED

Comments on the Russian ore fields are in rather fragmentary form. There is apparently little that is new since the date of the Stockholm conference. The various resources, amounting to 1746 million tons, are divided as follows: Krivol Big Basin, 86 millions; Ural region, 280 millions; central Russia, 780 millions; and Poland, 600 million tons. In the Central Russian regions most of the deposits are said to be of calcareous ores, ironstones and bog ores, and therefore relatively lean, and, being low in phosphorus, they have been used in small local furnaces. In this respect the development of the iron and steel industry in Russia is similar to that which existed in Great Britain in the days when many local furnaces operated and flourished entirely on the ironstones of the coal measures.

The iron-ore position in France is of peculiar and somewhat pathetic interest, owing to conditions resulting from the war. The Briey ore fields contain over 2000

million tons, and with the other fields in Meurthe-et-Moselle, represent a total reserve of about 3000 million tons. The ore is a hydrated oölitic hematite, the analysis being iron, 33 to 40%; lime, 9 to 14%; silica, 4 to 7%; and phosphorus, 1.7 to 1.9%. One peculiarity of the ore which recommends it to iron and steel plants is that the ratio of iron to phosphorus is so regular that it is not necessary to make routine analyses for phosphorus at the works. The entire Briey and Meurthe-et-Moselle ore field is at present in German hands, and no doubt con-

mont, and though some of the ore produced was used in France, a fair-sized tonnage was sent to the Thyssen works, in Westphalia. Thus the spectacle is presented of both England and France unsuspectingly sending iron ore to their future enemy, right up to the beginning of the war.

Spain has always been known as an iron-ore country *par excellence*, and though the statement has been made that the ores are becoming exhausted, that is only relatively true in regard to some of the most accessible and

AVERAGE AND TYPICAL IRON ORE ANALYSES

District	Iron %	Iron Oxide %	Phosphorus				Alumina %	Lime %	Magnesia %	Moisture %	Insoluble %	Manganese %	Carbonic Acid %
			Silica %	Phos. %	Acid %	Sulphur %							
Cumberland, England	50.3				0.013	Trace			6.8	16.6			
Cornwall, Bodmin, England		87.78	5.90		Trace		Trace	Trace	5.10				
Haytor, Devon, England	46.0		0.28	0.08						44.0	0.35		
Cleveland, Yorkshire, England		42.98	9.45	1.44	0.06	6.80	6.15	4.17	4.50		0.47	23.00	
Ironstones of the Coal Measures, England		36.14		0.34		0.52	2.70	2.05		25.27	Oxide	26.57	
Lincolnshire, England		47.14	11.95	0.87	0.10	4.08	11.45	2.97	12.40		1.38	6.87	
Raasay, Scotland		32.6	6.5	2.3	0.2	5.6	17.6	2.0	4.5		1.72	28.3	
Bellefleur, Newfoundland		71.88	18.80	0.94	0.02		1.12						
Nictaux, Nova Scotia, Canada	49.20			0.92	0.77					15.60			
Londonderry, Nova Scotia, Canada	46.93		15.97	0.27	0.02	3.62					1.90		
Bathurst, New Brunswick, Canada	47.4		17.0	0.84	0.2						2.5		
Helen Mine, Ontario, Canada	53-60												
Orissa, Bengal, India	61.85		1.64	0.05	0.02								
Jubbulpore Ores, India	60.7		7.5	0.08	0.02								
Iron Monarch, South Australia	52.0		2.3								15.0		
Cadia, New South Wales		79.71	7.45	0.30	0.05	1.49	0.25		8.72		0.54		
Buchan, Victoria		99.04	1.03	0.04									
Wilgi Mia, Western Australia	64.0		1.00	0.05	0.02								
Beaconsfield, Tasmania	55.0				0.14								
Parapara, New Zealand		73.0	9.56	0.35	0.21	3.36	0.51	0.10	11.84		0.65	0.10	
Kirunavaara, Sweden		76.81	0.91	0.02	0.02	0.18	0.60	0.62			0.13		
Cellvare, Sweden		73.00	0.07	0.04	0.03	0.44	0.60	0.66			0.08		
Dannemora, Sweden	50.0			0.002									
Arendal, Norway	43.24		13.60	0.01	0.03	3.20	10.40	7.93			1.66		
Dunderland, Norway	35.0			0.3									
Sydvaranger (concentrated)	68.0		2.5	0.03									
	35.0			0.05									
	70.0			0.02									
Krivoi Rog Basin, Russia (concentrated)		85.0	4.0			2.2	0.02						
Nicolaiev, South Russia	66.0		3.0	0.01	0.02						0.07		
Kertsch Peninsula, Russia	42.0		14.0	2.7		4.0	3.0				3.0		
Czenstochow, Poland	50.0		5.0	3.0	0.10	12.0	9.0				10.0		
Briey, France	40.0		4.0	1.7			9.0						
St. Remy, Normandy	55.0		10.0	6.0	3.0	2.5		3.0					
Biscay, Spain		78.03	5.91	0.03	0.03	0.21	3.61	1.65	4.60		0.86	5.00	
Santander, Spain	55.0		5.0	0.04	0.08						0.7		
Gergal, Spain	58.0		8.0	0.018							1.0		
Murcia, Spain	56.0		8.0	0.15							0.3		
Huelva, Spain	57.0		13.0	0.015	0.1								
Gerona, Spain	52.0		9.0	0.2	0.03						2.0		
San Thiago, Portugal	55.0		3.0	0.01	0.5								
Cogne Mines, Italy	55.0			0.005	0.03						0.2		
Rio Albano, Elba		93.3	4.3	0.03		0.60						1.50	
Calamita, Elba		87.8	8.0	0.02		2.0						2.0	
La Nurra, Sardinia	49.0		12.0	1.90	0.25	7.0	3.0						
Grecian chromiferous ores	52.0		11.0	0.03	0.05	1.0		3.0	1.20	0.30			
Seriphos, Greece	53.7		7.02	0.067	0.179						0.93		
Djebel Djerissa, Tunis	60.0		2.5	0.025			40.0				3.0		
Sebabna, Algiers	56.7		3.6	0.056	0.018						2.6		
Dept Algiers, Algeria	59.0		8.2	0.07	0.37	4.30	6.3	2.1			1.3		
Djebel Cuenza, Constantine, Algeria	60.0		0.7	0.005	0.019		2.2	0.4		1.62			
Uixan Ore, Morocco	67.0			0.02	0.11								
Netta Ore, Morocco	63.62			0.023	0.06								
Rogelia Ore, Morocco	60.0			0.012	0.01						5.04		
Togoland, West Africa		89.5	9.47	0.03		0.24					0.16		
Ta-Yeh, China	62.0		5.0	0.25	0.12	2.0					0.4		
Mayari, Cuba		71.89	2.7			7.13			12.90				
Durango, Mexico	60.0		3.0	0.20	0.20						0.15		
Monclova, Monterrey, Mexico	63.39		3.85	0.02	0.18						0.27		
Minas Geraes, Brazil	69.65		0.24	0.125					0.38				
Tofo, Chile	67.47		2.0	0.008							0.12		
(a) Mesabi, Lake Superior	58.83		6.8	0.062	0.069	2.23	0.32	0.32			0.82		
(a) Vermillion, Lake Superior	63.79		4.9	0.052		2.93	0.23	0.05			0.11		
(a) Marquette, Lake Superior	57.05		10.16	0.105		2.18							
(a) Menominee, Lake Superior	52.13		16.77	0.074	0.012	1.41	1.31	2.70			0.19		
Cornwall, Penn.	64.9		3.89	0.014	0.071	0.234	1.010	1.131			0.158		
Oriskany, Va.		52.86	33.26	1.312	0.014	5.26	0.28		1.90		0.61	0.21	
Barton Hill, Va.	68.24		0.59	0.038		0.028	0.14		0.38	4.32			
Birmingham, Alabama	45.0		25.0	0.25	0.5	2.0	20.0	1.0	0.5				
Texan ores, Texas	32.0		2.0	1.5	Trace	5.0	5.0	3.0	3.0				
Providence Mountain, California	68.42		14.47	0.172	0.083	8.17							
			3.04	0.044	0.059	0.568	0.444	0.201				0.278	

(a) All extracted from E. C. Eckel, "Iron Ores," 1914.

stitutes one of the prizes of war for which Germany is fighting. The value to France of that small strip of territory is great because of the vast stores of iron ores that it contains and its position relative to European markets and manufacturing centres.

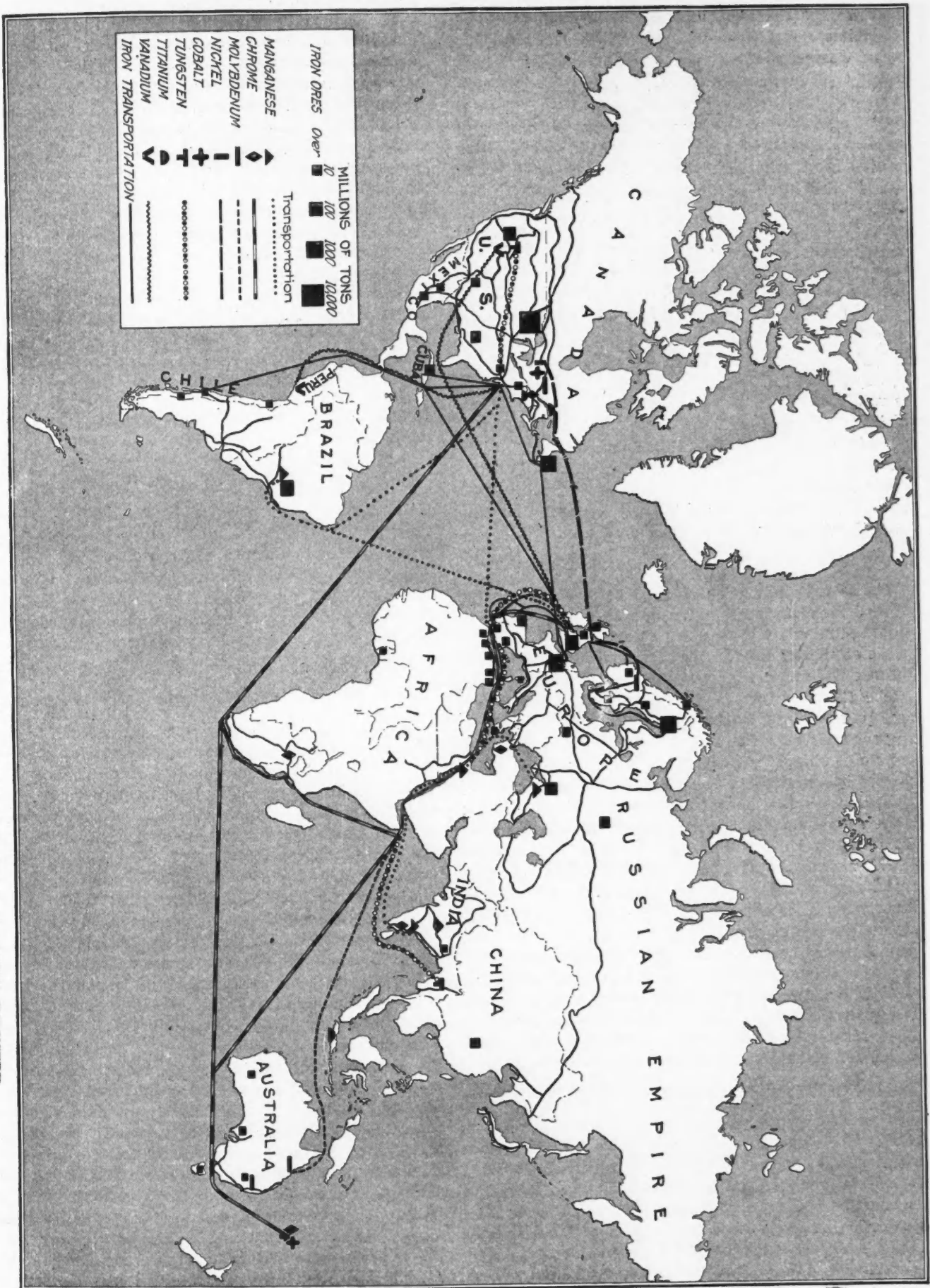
France, however, possesses other ore fields in Normandy, Anjou and Brittany. In these areas the output has risen in recent years to about a million tons. The ores are hematites and carbonates running 46 to 50% iron. In 1914 considerable developing was done at Sou-

higher grade deposits. Spanish ore has long been used in England, where it is generally classed as follows:

Vena, a soft, purple, compact and often powdery ore, usually of high quality.

Campanil, a compact and crystalline ore associated with carbonate of lime. This was the best known of the bessemer ores which made the Spanish fields famous. It is this class of ore that is nearly exhausted.

Rubio, which is mixed with clay and siliceous matter and is the principal export ore.



MAP SHOWING ECONOMIC SITUATION IN REGARD TO RAW MATERIALS OF THE IRON AND STEEL INDUSTRY

Carbonato, which occurs in certain districts in large masses.

Vena and Campanil ores are hematites; Rubio ores, limonites, and Carbonato, spathic. Typical analysis of these classes are:

TYPICAL ANALYSES OF SPANISH ORES

	Vena, Per Cent.	Campanil, Per Cent.	Rubio, Per Cent.	Carbonato, Per Cent.
Ferrous oxide.....				2.402
Ferric oxide.....	79.96	78.03	78.29	87.14
Alumina.....	1.44	0.21	1.15	0.100
Manganous oxide.....	0.70	0.86	0.74	1.860
Protoxide.....				
Lime.....	1.00	3.61	0.50	2.650
Magnesia.....	0.55	1.65	0.02	0.105
Silica.....	8.10	5.91	8.80	4.800
Sulphuric anhydride.....	0.10	0.10	0.05	0.645
Pyrites.....				Trace
Sulphur.....	0.05	Trace	0.04	
Phosphorus anhydride.....	0.03	0.03	0.02	0.016
Carbonic anhydride.....		5.00		0.285
Combined water.....	8.25	4.60	10.55	
Metallic iron.....	55.97	54.62	54.80	62.85

The still available resources of this district—Biscay and Santander—are given as 80 million tons, and the output is stated as being six million, which would presumably leave this field a life of only about 13 years. It is said that the output is beginning to decline. Other districts in Spain, however, still contain untouched ore deposits estimated at 226 million tons, tributary to the Atlantic coast, while inland and close to the Mediterranean coasts are deposits of unknown quantity which, owing to the easy operation of the other areas, have not been thought worthy of much examination.

#### OPEN-CAST MINING ON ISLAND OF ELBA

The Island of Elba contains a deposit which has been worked for many years. Ten mines are operating, and all are situated on the eastern side of the island. Mining is open cast, and the ore is transported directly into the vessels lying alongside of the loading piers.

The Elba iron ores are classified as ordinary crude ore, quartzose ore, washed ore, pulverised ore and feruginous earths. The output consists mainly of crude ore and is shipped principally to Italy. Analysis shows the ore to contain 93.3% oxide, 4.60% silica and 0.03% phosphoric acid. The annual production is over half a million tons, and the areas are operated under a lease from the Italian government. Owing to the growing scarcity of native ores belonging to Italian interests, exploitation and operation are restricted to this tonnage, exportation is practically prohibited and all the iron is utilized in Italian furnaces.

In Sardinia a number of small deposits have been intermittently operated for a number of years, but only recently has any accurate exploratory work been done. The quality of the ore is good, but nothing is known as to quantity. As in Elba, this ore will probably be reserved for Italian iron and steel works.

#### GRECIAN ORES CONTAIN CHROMIUM, NICKEL AND COBALT

Greece has been exporting iron ores for a number of years. The ore contains between 2 and 3% chromium, with small quantities of nickel and cobalt, and is used for special purposes. A great deal of it is friable and as much as 50% is classed as fine, powdery ore. The suggestion has been made that sintering the ore would improve the condition for smelting, but naturally this would increase the cost of production in a country where fuel is scarce and would have to be imported. In the Island of Seriphos, a normal deposit of iron ore has been

worked for several years, much of the ore being exported to the Scottish furnaces.

The next group of countries referred to in the report forms the respective spheres of influence of Italy and France; namely, Tunis, Morocco and Algiers. Considerable space is devoted to these countries, and the impression grows steadily that all three will in the future be remarkable iron-ore producers. One interesting feature is the constant percentage of manganese that exists with the iron in nearly all the deposits described. The position of the mines and ore fields is excellent, as they are mainly along the coast, with easy shipping conditions. The interior of the country remains to be explored, but if it should be relatively as rich as the coast strip, many millions of tons will be added to the iron resources of the world. It is possible that a knowledge of these facts might have been one of the leading causes in the establishment of the respective spheres of influence and also a basic reason in some of the European political crises that have arisen over these countries.

#### ONE TUNIS DEPOSIT HAS SEVEN ORE-BEARING FORMATIONS

The Tunisian ores are manganiferous hematites of exceptional purity as regards sulphur and phosphorus content. Nearly all the deposits are near the Algerian frontier and about 180 miles southwest of Tunis. At Djebel Djerissa, the ore contains 55 to 60% metallic iron, 2 to 3% manganese, 1.0 to 2.5% silica and a maximum of 0.025% phosphorus. At Nebur, near Kef, seven ore-bearing formations have been discovered on a cliff 75 meters high. The ore assays 50 to 60% iron, 3 to 5% manganese, and is free from phosphorus and sulphur.

#### WESTERN ALGERIAN DEPOSITS LITTLE EXPLORED

In Algiers, the deposits occur mainly on the coast line and extend along the entire length of the coast from the frontier of Morocco to that of Tunis. In the Department of Oran, which is the most westerly, a number of deposits are known to exist, but they have been little explored. One which has been surveyed shows the following analysis: Metallic iron, 43 to 56%; manganese, 15 to 2.6%; silica, 5.7 to 3.6%; sulphur, 0.092%; phosphorus 0.097 to 0.56%; arsenic, 0.005 to 0.014%. To the east, other mines of a similar kind of ore are found in the departments of Algiers and Constantine. In all, from 25 to 30 districts are mentioned, most of these being of considerable extent. In 1912 the production was over a million tons, all of the ore being of a grade averaging below 0.075% phosphorus. Considering that it is only within the last 10 or 15 years that these deposits have been really known, owing to the fanatical ideas of the inhabitants and the fact that the country is inhospitable both from native and natural causes, the extensive exploration and development are remarkable, indicating the actual necessity that compels European powers and especially England and Germany, constantly to be reaching out for new iron-ore fields. The iron-ore concessions of these three countries have been the subjects of international struggles for many years.

Iron mountains have been discovered in the interior of Togoland similar to deposits of a like character in Honduras, Mexico and Australia. About 20 millions appears to be the average tonnage in these deposits,

though the similarity in this respect is doubtless nothing more than coincidence.

The report states that little information concerning iron-ore deposits of China is available, but sufficient to indicate that China is one of the countries blessed with both coal and iron. In this respect it differs from Sweden and Brazil in the want of coal, and from South Africa in the want of iron, but having plenty of coal. The resources of the Han-Yeh Ping Iron and Steel Co. are estimated at 100 million tons of good hematite ore averaging 60 to 62% iron; 0.05 to 0.25% phosphorus; 0.05 to 0.12% sulphur; 3 to 5% silica and 1 to 2% alumina, with smaller quantities of sulphur and silica.

CUBAN DEPOSITS TRIBUTARY TO AMERICAN STEEL INDUSTRY

The information on Cuba has been acquired mostly from the transactions of the A. I. M. E., and is probably familiar ground to American mining men. The Mayari, Moa, and Baracoa fields are mentioned, as well as the Daiquiri, the Juragua and the El Cuero areas. Analyses are given of the surface ore, the middle layer and the bottom layer of the Mayari deposit. From the British point of view, these deposits are not particularly attractive, because it is understood that owing to accident of position they will always be tributary to the American steel industry.

MEXICAN DEPOSITS AVERAGE OVER 60% IRON CONTENT

There is mention of a number of occurrences in Mexico, and that at Durango is said to be the best known. Several deposits at Monterrey and others at Las Vegas and Vera Cruz are also described. There is nothing striking about these areas, and not much more than their existence appears to be known, but the quality of the ores is high. Durango is estimated to contain 360 million tons of ore averaging over 60% iron.

BRAZIL DEPOSITS SIMILAR TO LAKE SUPERIOR FORMATION

The Brazilian deposits in the Province of Minas Geraes have been the subject of much dispute as to their economic value. In 1914 it appears that 275 miles of a mineral line out of a required 375 miles was constructed. This reaches from Victoria, on the coast, and serves the district, which is controlled mainly by English, French and American interests. The western area is served by the Central of Brazil Ry., but as there are several changes of gage and breaks in the transportation of the ore, as well as heavy grades and sharp curves, this line is not suitable as an outlet for exports of iron ore. In this part of the country much German capital has been invested. The iron deposits are of large size and much greater than the estimated tonnage would appear to indicate, the principal evidence of this being the investment of capital that has taken place from interests representing many countries and under conditions which would not in general be considered economical. It has been said that these deposits are the only rivals in the world to the supremacy of the Lake Superior region in quantity, and being at the same time of higher quantity.

Next to Brazil, Chile appears to be the most important iron country in South America. It is well known that one of the largest areas is under the control of the

Bethlehem Steel Works, and from this deposit one-third of the output was shipped to England and the rest to the United States. A number of other deposits are mentioned in the report, and all appear to be of relative importance, close to points of shipment, and of high-grade material. Mention is also made of ores in Uruguay, Venezuela, and the Republic of Honduras, but beyond work of a prospecting nature not much has been learned of the iron resources in these countries. One or two unsuccessful attempts have been made to operate.

GENERAL REVIEW AND SUMMARY OF UNITED STATES IRON ORE DEPOSITS

An interesting summary is given of the iron-ore resources of the United States. The Lake Superior region, the magnetite deposits of the Appalachians, the Adirondack region, the Oriskany ores of Virginia, the Alabama hematites, the Mississippi Valley and the Texas and Cordilleran regions are mentioned, and the essential points of each in regard to quality of ores, tonnages and general economic values are clearly brought out. Though all this is, perhaps, familiar ground, it is nevertheless interesting to note how concisely the subject has been treated within the scope of a few pages, bearing in mind

ORE RESOURCES OF THE WORLD

Country	Resources, Tons	Remarks
United States...	4,578,000,000	Actual average-grade material
Canada.....	74,566,000,000	Possible tonnage, utilizing material comparative with English resources
Great Britain...	39,500,000,000	Total possible. Includes much low-grade ore
Newfoundland.	3,500,000,000	In one deposit
India.....		Not estimated—scattered and relatively small
South Africa.....		Not estimated—said to be large
Australia.....	113,000,000	Not estimated—little definite data
Tasmania.....	25,000,000	Many other deposits known but not estimated
New Zealand...	64,000,000	
Sweden.....	279,000,000	Many other areas unexplored
Norway.....	180,000,000	Tonnage in two deposits. Many others extent unknown; concentrating propositions
Russia.....	1,747,000,000	Includes fair proportion low-grade ore
France.....	3,000,000,000	From one district now in German hands—no statement for other fields
Spain.....	548,000,000	In addition, many unexplored areas
Portugal.....	64,000,000	Many areas not estimated
Italy.....		Total not stated
Elba.....		Not estimated. Relatively small
Sardinia.....		Not estimated
Greece.....		Not estimated
Tunis.....	40,000,000	Total for few deposits; others known; exploration poor beyond coast line
Algiers.....	70,000,000	One deposit only; others known; exploration poor beyond coast line
Morocco.....	20,000,000	Several deposits; others known; exploration poor beyond coast line
Togoland.....	20,000,000	One deposit only
China.....	100,000,000	One deposit only; little known
Cuba.....	800,000,000	Mayari only; other areas
Mexico.....	360,000,000	Durango only; other areas
Chil.....	100,000,000	Tofo only; other areas
Uruguay.....		No estimates
Venezuela.....		No estimates
Honduras.....		No estimates

the wealth of material which is available and which would have to be perused in order that a proper conception of the countries' resources in relation to each other and to the steel industry as a whole might be acquired.

No mention is made of the iron-ore resources of Germany or Austria-Hungary, as it is considered improbable that they will be utilized in the near future in the British industry.

DISTANCE NO DRAWBACK IN TRANSPORTATION OF STEEL INGREDIENTS

Part III of the report takes up the subject of all the other metals now so essential to the successful operation of the steel industry. The method of treatment is unique, as it is doubtful if ever before a survey so general and so broad has been attempted in regard to these metals. The report brings within the covers of one book a review of the iron industry as a whole, in-

cluding all the minerals required in the production of iron. The most interesting feature is the fact, made clear, that the supplies of a modern steel plant in the way of raw materials are drawn from the ends of the earth, and there appears to be practically no limits, as regards distance, over which iron ore or any allied mineral ore cannot be brought to a market, provided it is up to established standard of quality.

#### ESSENTIAL METALS IMPORTED FROM MANY COUNTRIES

As evidence of this, it is shown that in 1913, the year before the war and one in which shipping was unrestricted, Great Britain imported iron ores from Spain, Greece, Algiers, Italy, Tunis, Morocco, Sweden, Norway, Newfoundland, Chile, France, Germany and Belgium; manganese from South Russia, India and Brazil; chrome from Rhodesia and New Caledonia; nickel from New Caledonia and Canada; molybdenite from Australia and Norway; tungsten from Burma and Queensland; vanadium from the United States; and zirconium from Brazil.

#### NEW CALEDONIA RANKS FIRST IN CHROMITE PRODUCTION

Chromite is the first mineral discussed, and the chrome-producing countries in the order of their importance are New Caledonia, Rhodesia, Russia, Canada, Greece, India, the United States, Japan and Australia. The Rhodesian chromite deposits are the second in size

AVERAGE AND TYPICAL ANALYSES OF CHROME ORES

District	Cr <sub>2</sub> O <sub>3</sub> %	FeO %	Al <sub>2</sub> O <sub>3</sub> %	SiO <sub>2</sub> %	MgO %	CaO %
Killin, Scotland	37.18	19.30		10.94		Trace
Unst, Shetland, Footland	44.56	17.52	23.74	11.09	Trace	1.29
Rhodesia, Selukwe	46.36	18.66	13.18	4.58	13.64	
Magaliesberg, Transvaal	36.16	41.35	9.26	3.08	5.91	2.10
Black Lake, Canada	43.57	17.61	13.90	12.62	3.85	0.20
Port au Port, Newfoundland	49.23	17.21	7.50	6.51	18.66	
Broussa, Asiatic Turkey	56.80	12.06	14.00	1.45	15.00	0.70
New Caledonia	54.50	17.70	11.00	3.10	8.00	1.50
Lower Silesia, Germany	35.00	19.00	19.00	3.00	16.00	
Orsova, Danube, Austria	38.95	16.13	17.50	8.00	17.2	2.2
Govt. of Perm, Urals, Russia	55.75	21.56	3.37	5.37	13.85	0.60
California	42.45	15.00	16.75	7.50	16.50	0.90
Togoland, Africa West	40.00					

and importance, and the output from them, in conjunction with a combine of the interests operating in New Caledonia, dominates the chrome situation in normal times. This is all the more remarkable in that the Rhodesian areas are situated at Selukwe, 560 miles inland from the shipping port, at Beira, in Portuguese Africa, which port is itself a long voyage from the markets for this material. The production has increased five times since 1908, rising from 12,000 tons to over 63,000 tons in 1913. In 1912, the United States imported 32,500 tons. The ore occurs in a talc schist and serpentine rock, which forms narrow if regular bodies, widening toward the northern end, where the principal mine is situated. An analysis shows over 46% chromic oxide.

India contains a number of chrome deposits, and at one time had a production of about 20,000 tons, but this declined, owing to the New Caledonia competition, and in 1912 the tonnage mined was only 3000. One of the most interesting deposits, situated in the Pishin district, consists of a vein 400 ft. long with a width of 5 ft., consisting of almost pure chrome of great richness, an analysis by the Geological Survey of India giving over 54% chrome.

The largest chrome deposits of the world appear to be situated in Asiatic Turkey, where, at Broussa, there is

an estimated tonnage of over 10 million, averaging 51% to 55% chrome. It is owing mainly to the imbecility of the Turkish government that these areas are not in absolute and complete control of the chrome markets. A typical analysis of the Broussa chrome runs as high as 56.80% Cr<sub>2</sub>O<sub>3</sub>, with 1.45% silica.

New Caledonia at present holds the premier position in the chrome situation. The largest mine, known as the Tiebaghi, in the north of the island, yields chrome grading 67% chromic oxide. All of the mines, with one exception, are worked open cast. A combination of the company La Chrome, which controls these areas, and the Rhodesian company, makes possible the manipulation of the sales of two-thirds of the world's production.

#### UNITED STATES DEVELOPING CHROME DEPOSITS IN CALIFORNIA

Fifty chrome mines were in operation recently in Russia, in the Urals. The ore runs from 55 to 51% Cr<sub>2</sub>O<sub>3</sub>. Evidently this production is mainly utilized internally. In the United States, the chrome industry, owing mainly to cessation of imports because of existing shipping conditions, has been developing in California, and the same may be said to some extent of the Canadian deposits in Quebec. Here, however, as elsewhere, the production from New Caledonia and Rhodesia caused the cessation of all operation before the war.

Chrome also exists in small quantities in the Transvaal, Newfoundland, New South Wales, Germany, Greece, Hungary, Norway, Macedonia, and Togoland, although none of these areas is at present commercially valuable, and in most the ore is of low grade, below 46 per cent.

#### CANADA PRINCIPAL PRODUCER OF COBALT

The use of cobalt in steel making is relatively a recent development of the industry and one which is now important in the production of a cobalt tool steel. In 1910 the production of cobalt largely exceeded the demand, and as a result research was undertaken to find new uses for this material. This work has been conducted by the Canadian Department of Mines with considerable success.

The principal cobalt-producing area is the district of that name in Canada. The metal is recovered in the form of cobalt oxide, and 268 tons of 70% cobalt oxide were produced in 1915. Cobalt has also been found and mined in New South Wales, Prussia, Saxony, Norway, Spain, and Chile, but the opening up of the Canadian deposits caused these workings to close down. New Caledonia at one time controlled 90% of the cobalt business, but, just as the New Caledonia chromite production put the Canadian chrome mines out of business, so the Canadian cobalt ores have driven the New Caledonian cobalt works from the market.

#### INDIA, RUSSIA AND BRAZIL ARE PRINCIPAL MANGANESE EXPORTERS

In the same manner as in chrome and cobalt production, manganese production has also drifted, by reason of good quality ores and easy mining, into the hands of several countries. Of these India and South Russia contend for first place, with Brazil a close second. Comparing Indian and Russian returns, it is seen that the Vizagapatam ores cost less to deliver in London than the

ores of South Russia and Central India, the two last mentioned costing about the same, and since Indian and Russian ores make up a large proportion of the world's production, the price per unit of first-grade ore cannot fall below 17 to 18 cents. In India the deposits are all worked by open methods, using coolie labor; the mines are crude in operation, simple and primitive, and owing to their richness there appears to be no need of scientific methods.

A recent discovery of manganese of some importance has been made in the Sinai mines, in Egypt. The areas, in which a number of companies have started operations, are situated 12 miles from shipment and 60 miles from Suez. Over 15 million tons are reported in sight, with an average quality of 60%. Another discovery not yet fully authenticated was made on the Tarquah Bankit Range, in West Africa.

#### RUSSIAN MANGANESE ORES HIGH, BUT MINING PRIMITIVE

The Russian ores contain on an average 48 to 53% manganese, but concentrates, containing 81 to 90%  $MnO_2$ , from washed granular ore are shipped and used for chemical purposes. The mines are situated in the Caucasus, 126 miles from the Black Sea ports of Barum and Poti. The mining is primitive and is also a conservative proposition, as the operation is in the hands of Georgian peasants who own the ground and mine and sell their ore.

Brazil, third in point of production, which in 1915 reached 350,000 tons, is, like Russia and India, one of the three outstanding manganese countries. Most of the ore occurs in the Minas Geraes district. One mine owned by Belgian capital has mined 3000 tons per month, and several others are rapidly nearing this production. The Morro de Mina mine produced over a million tons of ore up to April, 1916, and is stated to have a reserve of 10 million tons. Brazil, owing to its situation, naturally supplied about 90% of the imports to the United States, and is likely to become a greater source for American steel plants, as the Indian and the Russian ores will be required for the European markets. Despite the fact that America possesses great quantities of manganiferous ores, it still appears unlikely that domestic supplies will become a serious factor in manganese production. The 1915 production was only 9651 tons.

#### SMALL MOLYBDENUM PRODUCTION, AS PER CENT. OF METAL IN ORES IS LOW

Molybdenum is produced mainly in Australia, Norway and Canada. New South Wales and Queensland have been mining ores since 1902, and Canada entered the field with 12 tons in 1915. Queensland produced 99 tons in that year and 35 tons is accredited to New South Wales. Norway mined 88 tons in 1914. Molybdenite has also been found in England, Scotland, India, Austria, France, Germany, Russia, Sweden, Japan, Mexico and Peru, but has not been produced in these countries on anything approaching a commercial scale. The United States mined 15 tons in 1908, and 66 tons came from Natal in 1904. In New South Wales the ore is hand picked, crushed, washed and finally treated on Wilfley tables. In Norway the Elmore process is being successfully worked. The marketable concentrates contain about 90% molybdenite, and, owing to the erratic

production, prices are constantly fluctuating. Grouping molybdenite mines the world over, 1% ore is considered high, and 0.5% ore is profitable if it can be easily mined.

North Queensland contains some of the principal known sources of molybdenum. The ore occurs in connection with tungsten and with bismuth, and the greater part has been obtained from hand picking wolframite dumps. Ilsemanite, the blue molybdate of molybdenum, and one of the rarest minerals known, has been obtained at several mines.

#### SUDBURY DISTRICT OF CANADA CONTAINS MOST IMPORTANT NICKEL DEPOSITS

Nickel is now a metal of great and widely growing uses in steel making, and it also finds a wide application in the electroplating industry. Several alloys are on the market under various trade names. The most important nickel deposits are found in the Sudbury district, in Ontario, Canada. The International Nickel Co. has 57 million tons of reserves in this region. Production of nickel matte is carried on by the Canadian Copper Co. and the Mond Nickel Co., the output of the first going to the International Nickel Co., in New Jersey, and that of the Mond Nickel Co. to Wales. Next to Canada, New Caledonia is the most productive. The New Caledonian ores contain no sulphur, are free from copper and arsenic and the nickel exists solely in the serpentine rock, the ores running in irregular veins through the fissures and joints. The average analysis is:  $NiO$ , 19.73%;  $SiO_2$ , 44.75%; and  $MgO$ , 15.25%. Russia has some nickel deposits in the Urals, and the United States has produced ore from Webster, N. C., and from Fredericktown, Missouri.

#### NO GREAT DEMAND FOR TITANIUM ORES

Titanium is used chiefly in the steel industry as a deoxidizer, and is added to the steel in the form of carbon-free or ferrocyan titanium. Owing to its affinity for nitrogen, it has the additional advantage of cleansing steel of that impurity. The titaniferous ores are of greater economic importance than rutile or ilmenite, as the iron content enables them to be smelted direct into ferrotitanium. Canada, New South Wales, South Australia, Queensland, New Zealand, Norway, Sweden and the United States are all reported as containing deposits of rutile, but most attention is given to the titaniferous iron ores. In addition to those countries mentioned in the part of the report dealing with the iron ores, Java, heretofore obscure as a mineral country, reports the discovery of considerable accumulations of titaniferous iron sands along the south coast. Crude sand analysis of these deposits showed 9.5%  $SiO_2$ , 49% Fe and 14.5%  $TiO_2$ . Magnetic concentration gave 1.6%  $SiO_2$ , 57% Fe, 16%  $TiO_2$ , 0.04% P and 0.03% S. At present, however, titaniferous ores are a drug on the market, owing to the small demand, and it is difficult to find an outlet for the large quantities known to exist in readily accessible quantities.

In the tungsten field, honors go to another new entry in the iron and steel industries, namely Burma, with the United States either an equal producer or a close second. Owing to the non-publication of the recent figures, exact comparison cannot be made. Portugal at

one time was a relatively large producer, but lately has fallen off. The Burma mines are situated at Tavoy, where the ore is extracted from openpit workings on the outcrop of quartz reefs. Concentrates assay up to 73% tungstic trioxide. In many occurrences the Burmese ore is associated with cassiterite. Before the war Great Britain allowed all this material to be shipped to Germany and then bought almost all her own supplies through Hamburg. Production in 1914 was 2326 tons. In the Malay Peninsula some important deposits have recently been opened up.

#### PORTUGUESE TUNGSTEN ORES CONTAIN FEW IMPURITIES

In Portugal, the tungsten ores of the Castelo Branco district are remarkable for their purity, containing neither tin, sulphur, phosphorus nor bismuth. The concentrates assay up to 70 and 72% tungstic trioxide, and the production of 1380 tons was absorbed mainly by the French metallurgical industry. Production in the states of Colorado and California is rapidly increasing. Other countries mining this metal are Spain, France, Tasmania, Japan, Siam, Argentina, Bolivia, Chile, Peru, and Australia, the highest production being about 250 tons per annum and with most about 50 and 70 tons.

#### LARGE DEPOSITS OF VANADIUM IN COLORADO AND UTAH

The most important deposits of vanadium are in the United States and Peru, which are also the only countries making exports of the ores of this mineral. The former deposits are mostly in Colorado and Utah. The United States exports this material to England, but no figures have been published. The United States minerals are carnotite and roscoelite, while the Peruvian ore is patronite, which contains as much as 19.5% vanadium, 54.29% combined sulphur, and 4.5% sulphur soluble in carbon disulphide. The whole of this output goes to the United States, and amounted in recent years to between 2000 and 3000 tons.

A curious occurrence of vanadium is reported from Argentina, where coal from the Mendoza district was found to contain five pounds of vanadium pentoxide to the ton. After combustion, the ashes contain up to 39.22%  $V_2O_5$ , but no attempt has been made to work the vanadium content, although the quantity is large. Spain also contains important quantities of this metal, and although operation was attempted some years ago by an English company, the work has since ceased.

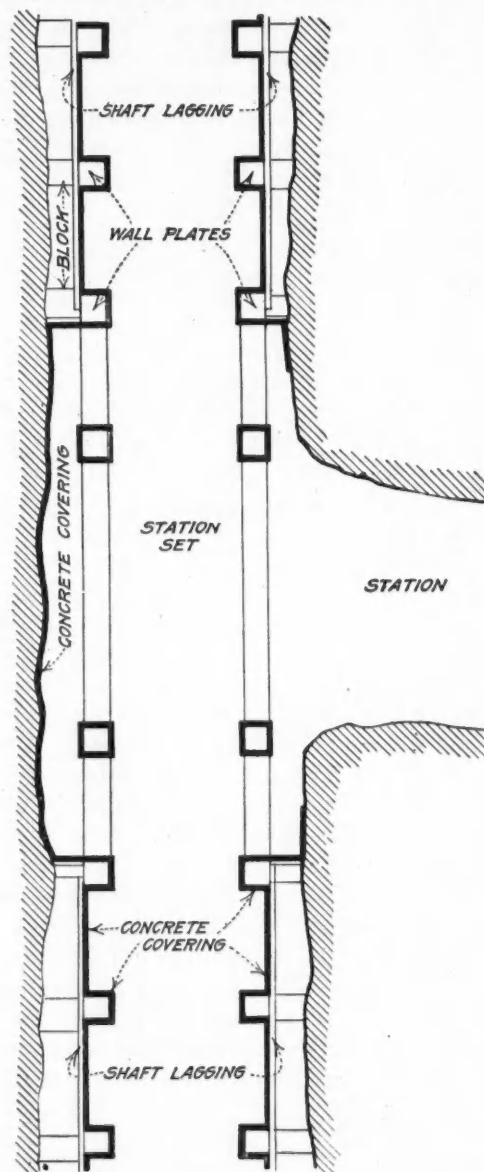
This practically concludes the descriptions of the various ores and their occurrences. No maps or tables accompany the report, but from data in the pages the tables of iron ore and chrome analysis have been compiled, and also the summary of the reserves as brought out in the review. The map has been produced from data given in all parts of the pamphlet, and gives a graphic representation of the world-wide ramifications and requirements of modern iron and steel industry and also denotes the relative position of the various iron-ore and other mineral reserves necessary to that industry.

Ammonium Nitrate and Nitroglycerine substitutes in commercial explosives are being considered by Government specialists. The U. S. Bureau of Mines is continuing its experiments with liquid oxygen as a substitute for dynamite in mining and quarrying operations.

## Fireproofing Mine Shaft of the Anaconda Copper Mining Co.\*

BY E. M. NORRIS†

In the summer of 1917 it was decided to fireproof the \*tramway hoisting shaft of the Anaconda Copper Mining Co. at Butte, Mont. The shaft has three hoisting compartments and one pump compartment; it is timbered with 12 x 12-in. fir timber, and is 2475 ft.



TRANSVERSE CROSS-SECTION OF SHAFT

deep. Subsidence and displacement of the surrounding country rock had produced exceedingly heavy ground, and had carried the shaft out of line, in several places, by as much as 2 ft. displacement. Constant repairing and realigning of the timbers had been necessary in order to maintain clearance for the cages. The most feasible method of fireproofing, therefore, seemed to be to cover the timbers with a coat of concrete applied with the cement gun.

The cement gun, which is operated by compressed air at ordinary mine pressures, feeds a mixture of sand and

\*Originally presented at a meeting of the Montana Section of the American Institute of Mining Engineers and to be presented at the Colorado Meeting of the A. I. M. E.

†Butte, Mont.



cement through a hose to a nozzle having a water connection. The mortar in fluid form is thus sprayed upon the prepared surface in thin layers, which can be built up to any desired thickness. The cement gun can be set up at any convenient point; satisfactory results have been obtained with the nozzle a distance of 500 ft. from the gun.

The shaft was thoroughly overhauled and the timbers were put in the best possible state of repair. Between the 1000 and the 1400 levels, much loose ground lay against the shaft timbers on the north side; this was breast-boarded back and a 30-in. reinforced-concrete retaining wall was erected, leaving a space of 12 in. outside the shaft timbers to allow for future movements of the ground. For convenience in handling men and materials, it was arranged to concrete the auxiliary hoisting-cage compartment and the pump compartment first, using the cages of the main hoist to serve the cementing crews. The auxiliary cage was then available while the remainder of the shaft was being concreted.

A tight partition of 2-in. plank was erected between the auxiliary and the adjoining hoisting compartments, for better protection of men riding on the cages. The application of concrete made this partition air-tight, which should prove a valuable feature of the fireproofing measures. It was considered necessary to guard against the spreading of fire in the timbers behind the concrete covering, as once happened in a Michigan shaft. A set of shaft lagging was therefore removed just above and below each station, and a concrete casing was built back to the walls so as to form an air-tight seal at these points. Another seal was made at the rear end of each station in a similar manner as illustrated.

#### CONCRETE REINFORCED BY METAL LATH

Experiments were made to determine whether reinforcing material was necessary to hold the concrete to the timber and, if so, what kind of material was best. It was found that if the timbers were wet down thoroughly the concrete would stick without reinforcement, but subsequent distortion of the timbers caused the concrete coating to shell off in large slabs. Tests of chicken wire, herringbone metal lath, and diamond-mesh metal lath showed that all these materials made equally satisfactory reinforcement for the concrete coating, the only difference being the matter of cost. Chicken wire was the cheapest to buy, but the labor of nailing it to the timbers was much greater than with metal lath. After using several thousand square yards of each of these materials, it was found that the 27-gage diamond-mesh metal lath, 24 by 96 in., was the most economical and satisfactory reinforcing material; it was also determined that 6-d wire nails driven two-thirds of their length into the timber, and bent over, made the best fasteners.

The compartments to be concreted were covered with timber bulkheads at each level and lathing was begun. The lathing crews consisted of six men to a lift, two or more lifts being lathed at one time, according to the number of men available. With the diamond-mesh material the rate of lathing was 225 sq.ft. per man per 8-hour shift.

Two cement guns, type N-L, were set up on mine trucks so that they could be pushed on the cages and moved from level to level as required. With an air

pressure of 75 lb. per sq.in. it was found that 200 ft. above, and 75 ft. below, were the greatest vertical distances from the gun at which satisfactory work could be done with the nozzle. Where lifts greater than 275 ft. occurred, it was necessary to set the guns on bulkheads in the shaft. The sand was dried, when necessary, and screened through a  $\frac{1}{4}$ -in. screen. It was then mixed with the cement, on the surface, and put into old cement sacks for convenience in handling. It was found necessary to screen the cement also, as lumps blocked the discharge and caused frequent delays. Mixtures of 3, 3 $\frac{1}{2}$ , and 4 parts of sand to 1 of cement were tried. Where thin coatings ( $\frac{1}{4}$  in. or less) were applied, the 3 to 1 mixture was the most satisfactory, as it went on more evenly and formed a tougher coating.

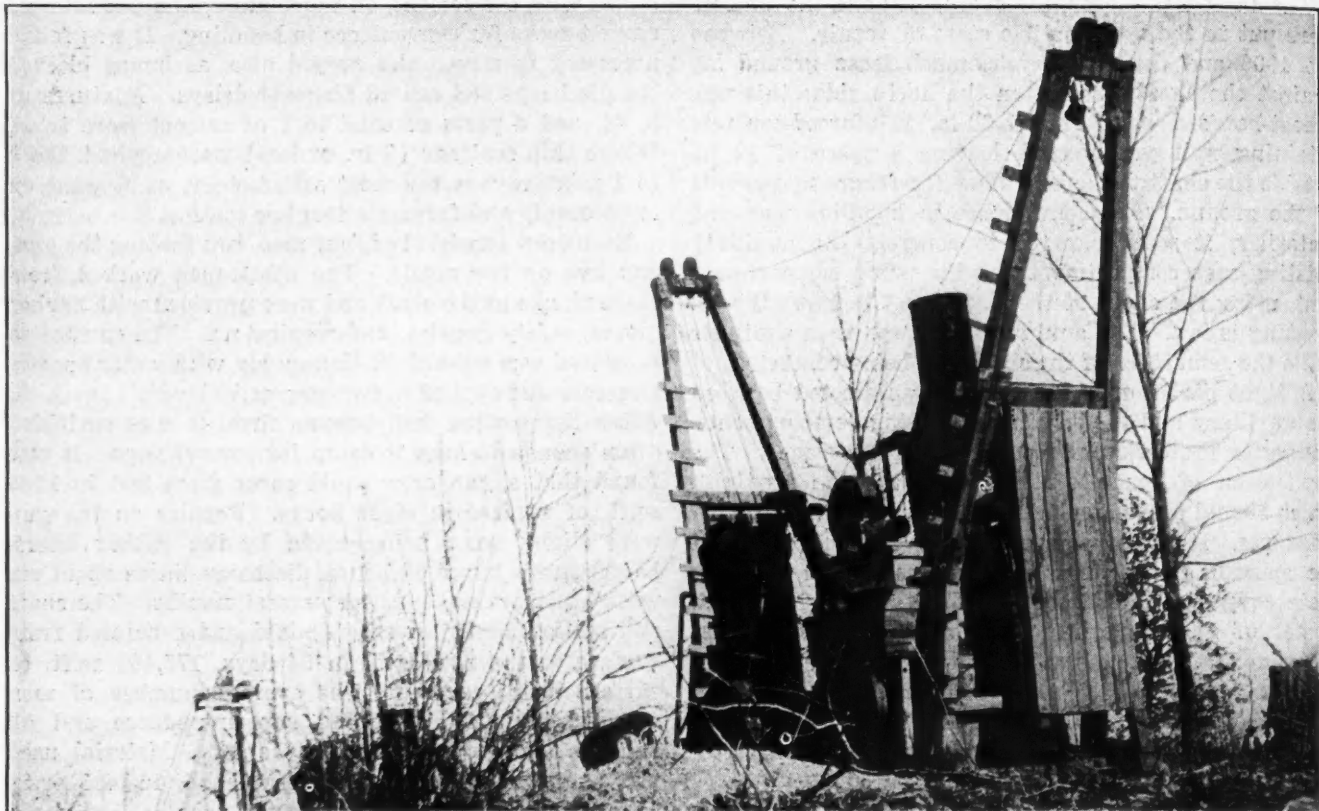
Each crew consisted of four men, two feeding the gun, and two on the nozzle. The nozzle-men worked from stage planks in the shaft and were provided with rubber gloves, safety goggles, and respirators. The surface to be coated was washed off thoroughly with water sprays. Concrete was applied in two successive layers  $\frac{1}{4}$  in. thick. After the coating had become firm, it was sprinkled often enough to keep it damp for several days. It was found that a gun crew could cover from 800 to 1200 sq.ft. of surface in eight hours. Repairs on the gun were slight, wear being taken by the rubber liners. Nozzle liners lasted 48 hours, discharge liners about six weeks, and the cement hose several months. The shaft and station timbers were repaired and concreted from surface to the 2000-level in 94 days, 175,465 sq.ft. of surface being covered. The average number of men employed was 54, including superintendence and all surface labor connected with the job. Material used was 6102 sacks cement, 1500 tons sand, 165,495 sq.ft. of lathing, 2600 lb. nails and staples.

#### FIRE TEST INDICATES UTILITY OF SPRINKLING SURFACES TREATED WITH CONCRETE

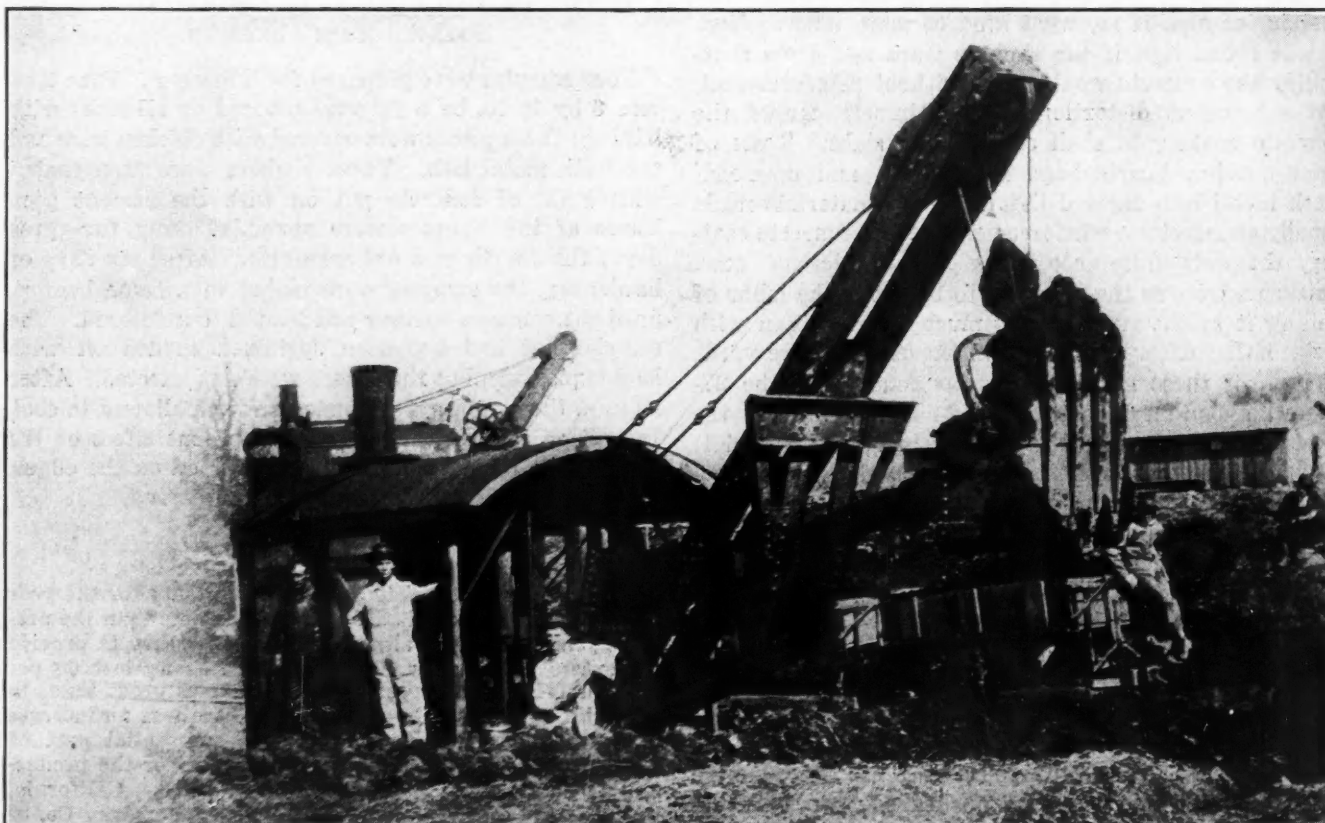
Four samples were prepared for a fire test. Pine timbers 6 by 10 in. by 5 ft. were covered on all sides with lathing; three pieces were covered with chicken wire and one with metal lath. These timbers were then coated with  $\frac{1}{4}$  in. of concrete put on with the cement gun. Three of the samples were sprinkled daily for three days; the fourth was not sprinkled. After six days of hardening, the samples were placed in a large bonfire, until the concrete coating was heated to a dull red. The sample that had not been sprinkled shelled off with loud explosions, but the others were not affected. After 30 min. the samples were pulled out and allowed to cool. Inspection showed that the only apparent effect of the baking was a slight charring of the wood on the edges, where the concrete had cracked while drying.

Borax Consolidated, Ltd., reports net profits for the year ended Sept. 30, 1917, of £385,527, which is less than the previous year by £34,319, although it was necessary to provide for excess profits duty at 75 per cent. as against 60 per cent. in 1916. This does not include excess profit taxes in countries other than Great Britain. There was an increase in the building and plant account, a substantial part of which went for the construction of a plant for the production of potash from the brine of Searles Lake, California, in which the company is interested with the Solvay Co. of America.

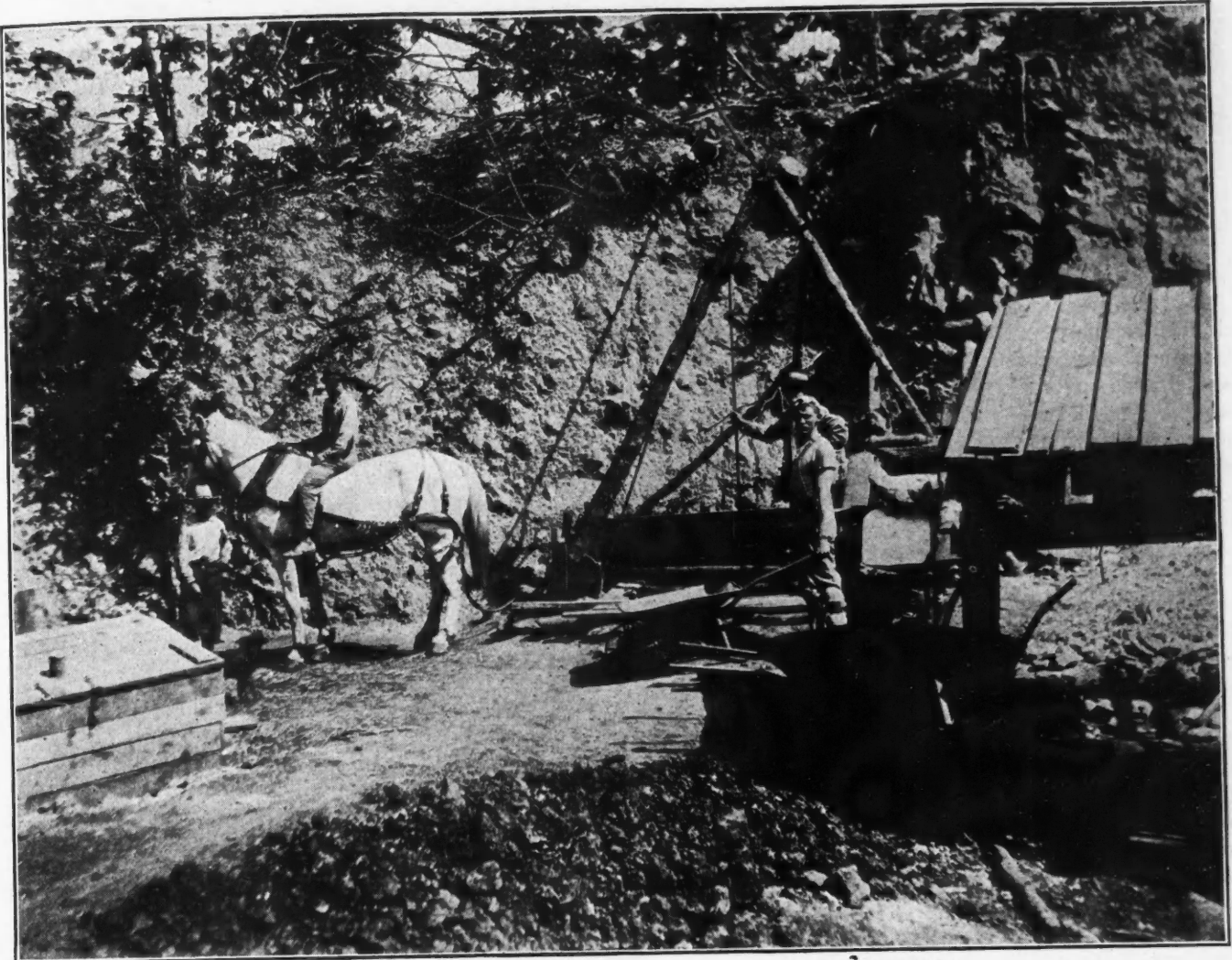
# Manganese Mining in Arkansas



CLAM DIGGER IN OPERATION ON SOUTHERN HILL, NEAR CUSHMAN, ARKANSAS



MARION TYPE STEAM SHOVEL IN OPERATION AT POLK-SOUTHARD MINE, NEAR BATESVILLE, ARKANSAS



SHAFT AND OPENCUT MINING AT GRUB CUT, NEAR CUSHMAN



PIT, TUNNEL AND SHAFT WORKINGS OF BROOKS MINE, NEAR CUSHMAN

## Correspondence and Discussion

### "The Use of Powder in Opencut Blasting"

I notice in the *Journal* of Mar. 30 a criticism by S. R. Russell of my article published in the *Journal* of Feb. 23, under the above title. At the same time Mr. Russell gives his own experience in this class of work. I have read it carefully, and I find that Mr. Russell does not figure so much on the quantity he can break with each hole as he does on the proper fragmentation of the rock, which places his kind of blasting in a separate class from the work I described.

In regard to placing holes, the object, in this section of the country, is to take in as much ground as possible, and at the same time break the bottom clean. Granting that powder will exert an equal pressure on all sides, evidently a hole with 20 ft. of rock in front and 30 ft. of rock on top must give way on the short side, if there is powder enough in the pocket to move the load. Often I find that if the rock has no cleavages, and is inclined to be tough, the bottom will break clean, but the top will be left intact. To overcome this, I set my holes further back. If Mr. Russell should attempt to spring his holes sufficiently to hold all the powder within 3 ft. of the bottom, most of his holes would blow out at the bottom and leave the top standing or hanging.

My article dealt with holes of 30 ft. depth or less, because most of them can be sprung sufficiently to hold the amount of powder necessary. Holes deeper than 30 ft. usually have to be placed closer together, in order to insure sufficient pocket capacity to hold the required amount of powder, but I still adhere to the rule of 8 in. back for every foot in depth. I have used it with good results up to 48 ft. in depth. How far it might be carried I am not prepared to say.

#### SPRINGING HOLES TWICE

I have one pit at this mine where the rock is so badly broken that I have difficulty in putting down holes, and in addition to being broken, it is also hard. The ground cannot be sprung by the ordinary method; therefore, I drill three holes 10 ft. apart, 24 ft. back from the face and 28 ft. deep. Then I pass a 1-in. pipe down each hole to within 3 ft. of the bottom. In this way I am able to spring the holes twice, and each hole will hold a little more than one-half of the amount of powder that would be necessary for a single hole. I have had excellent results with this method. The three holes combined will cover about one and one-half times the area that a single hole would cover, provided it can be properly sprung.

I never use lifters, or "snake holes," except as explained in my former article, under the head of "Blasting for Steam Shovels," in which case they serve two purposes: first, being drilled well below grade, they insure a clean-cut bottom; second, being close together

and an addition to the main holes, they break the rock smaller. I also use the "snake holes" where the surface rock is so badly broken that it is not practicable to drill vertical holes, providing the rock is good at the bottom.

"Snake holes," when sprung, are more difficult to load than vertical holes. If the holes are fractured from springing, it is necessary to place a tube in the hole and load through that. Another difficulty is that one cannot fill the upper half of the hole to advantage. So, in order to get a sufficient chamber for the powder, more holes have to be drilled. I use the Sullivan piston machine, and also the Waugh 60, a hammer drill. The holes are finished to 1.5-in. gage. These holes can be drilled much cheaper than if made with a well or churn drill, and they serve the same purpose up to 40 feet.

#### STOPE FILLING BY GRAVITATION METHODS

At the Pilares mine, of the Moctezuma Copper Co., the gloryhole system for the handling of all rock used in filling the stopes underground has been adopted. At the beginning, a tunnel is driven into a mountain until a sufficient back is attained. A station is then cut on one side of the tunnel, and a raise is run up, say, 50 ft., where a second station is cut about 14 x 22 ft., including the raise. The raise is widened until it will hold the desired amount of rock, and is then covered with a grizzly, with openings 17 x 17 in. The grizzly should be at one end of the 14 x 22 ft. station. A second raise is next driven from the tunnel level to connect with the station and serve as a manway. The station is extended 20 ft. from the grizzly. From the center of this station a 20 x 20 ft. raise is put through to the surface, usually about 200 ft. or more.

It is now possible to begin breaking rock from the surface, and holes 24 ft. deep, are put down on each side of the opening. The rock broken falls to the bottom of the raise, at which point all of it that will not pass through the 17 x 17-in. grizzly, is block-holed with a self-rotating Jackhammer.

For the second round of holes, the men clean down the loose rock and then lower a rope down to the bench left from the first round and clean it off. From this bench, which is 24 ft. deep, the operation is simply repeated, drilling one hole on each side of the opening. This leaves a face 48 ft. high. The raise is then reamed out by shooting only one hole at a time, except in cases where slips interfere.

When handling rock by the gravitation method, it is evident that the bottom must form an incline steep enough for all rock to slide freely. So the first hole for reaming out the raise, with a face 48 ft. high, would be 40 ft. deep and 27 ft. back. In most cases the hole will break from the pocket downward, and leave the ground sloping off to the bottom of the 48-ft. face. This operation is repeated until the entire circle of the

opening is made, which leaves a face 40 ft. high and calls for holes about 32 ft. deep. It is the practice to continue falling back until the bench runs out. Again, the operation is begun at the bottom of the incline and the process repeated.

Seven gloryholes are being worked at the Moctezuma mines with only slight variations from the above. I am writing from my experience at this place only, simply because I have the figures to substantiate my claims.

SEVEN TONS OF ROCK PER LB. OF POWDER

In my article of Feb. 23 black powder was used as the unit, 45 lb. of 40% dynamite being equal to 100 lb. of black powder. According to the company engineers' figures for the year 1917, I have to my credit 505,000 tons of rock. In breaking this rock I used 66,775 lb. of black powder and 500 lb. of dynamite. Thus, there has been broken a little more than seven tons of rock for every pound of black powder used. This does not include springing nor block-holing, for which work dynamite is used. Mr. Russell, no doubt, knows the relative value between black powder and 40% dynamite. In the work described, the average total cost for rock passed through the grizzlies and delivered into chutes is 12c. per ton for the year 1917.

I think Mr. Russell does me an injustice by considering as absolutely invariable figures which I used as averages. For instance, in placing holes, I allowed 8 in. back from the face for every foot depth hole, with a variation of 20% to suit the different kinds of rock. Likewise with the powder, I allowed one-half pound of black powder for every cubic yard of rock as an average, with variations of 30% to cover the different kinds of rock, and an additional 25% for holes placed in tight corners.

I call attention to these facts because Mr. Russell's comments are inclined to be misleading to those who have not read carefully the article on the use of powder in opencut blasting which is under discussion.

CONDITIONS AT MOCTEZUMA ABOUT THE AVERAGE

The rock at Pilares mine requires three to six springings where I expect to use 500 lb. of powder in one charge. Mr. Russell seems to think that conditions obtaining here are exceptionally favorable. Perhaps they are. I find the average to be about the same here as in Montana, Idaho, Chihuahua and Coahuila. To treat every phase in the use of powder in a single article is out of the question, nor was my contribution so intended, the expectation being that it might serve as a guide to beginners. The finer points must be learned by experience. Any one who has learned so much about powder that he can learn no more, should retire. My experience has been that the hardest rock is not necessarily the hardest to break. Often it takes less powder than soft rock does.

All of my work, with but few exceptions, has been accomplished within the variations stated in my former article. The figures above mentioned, giving the results for the year 1917, speak for themselves.

E. S. JACOBSON,

Surface Fill Hole Foreman.

The Moctezuma Copper Company, Pilares de Nacozari, Sonora, Mexico, May 27, 1918.

Mining-Camp Welfare and the Future Generation

As the green verdure of the grass begins to carpet the earth, can we not steal a busy moment from this sickening world strife to think of our future man-power—the children? What steps are we in the mining camps taking to make their life and progress toward manhood and womanhood more happy and less exposed to the many evils, moral or physical, which surround them? We are likely to pass these things on to some civic body, to a labor organization, or to the parents themselves. But the time is coming—no, it is here—when we must face the future. We must not, as in the past, leave these things to chance. We must study the needs of the children; we must study the needs of the parents of children and must see that both are of the best. We can sympathize with our Topsyies, and try to make of them the best, but we must go further than this and provide good clean recreation for our workmen, for ourselves and for the children.

What have we got to tempt the tired workman after eight or ten hours of arduous labor? In most cases, simply nothing; his only relaxation is a road house or saloon. What have we got for the children? In some places a school, good or bad, which is in direct ratio to the caliber of the teachers and of the parents, and in indirect ratio to the cooperation of the corporation. Have they a playground? A strip of land, perhaps, which we have generously donated, thinking our duties ended there, and forgetting entirely that our own plant would not be producing unless we equipped it with buildings and machinery. We should furnish this playground with horizontal bars, ladders, slides and swings, where the children, the bold and the timid, may get healthful bodily exercise. We should not forget some generous flower beds and shrubs, so that the eye and artistic sense may be unconsciously directed toward the beautiful things of life. Going further, let us see that these flowers find their way into the home and garden plot, that the men and women may absorb these refining influences.

But it must not end here. We must train the teachers to understand and use this equipment. We should have a physical test for the teacher, just as we have for the army officer, in order that he or she may direct the children properly. A teacher's berth should not be a charitable affair; it should be an office of privilege, selection and ability and subject to regular examinations for fitness.

We must get the employers interested in the playground; we must organize friendly rivalries among them, and between neighboring mines. We must go back in our history and bring forth some of the old-time sports, the tug-of-war, baseball, football, and even polo. We, the makers of metal, must also become the makers of men. We, who hold the future in our hand, must build deeply by beginning with the children. Turn their thoughts, not into gentle things (we do not want a race of weaklings), but into clean things—bold, strong, clean things, that our future may be safeguarded and our country remain the refuge of all that is best, the country of the strong, clean and honest.

C. R. B.  
Nevada City, Calif., May 18, 1918.

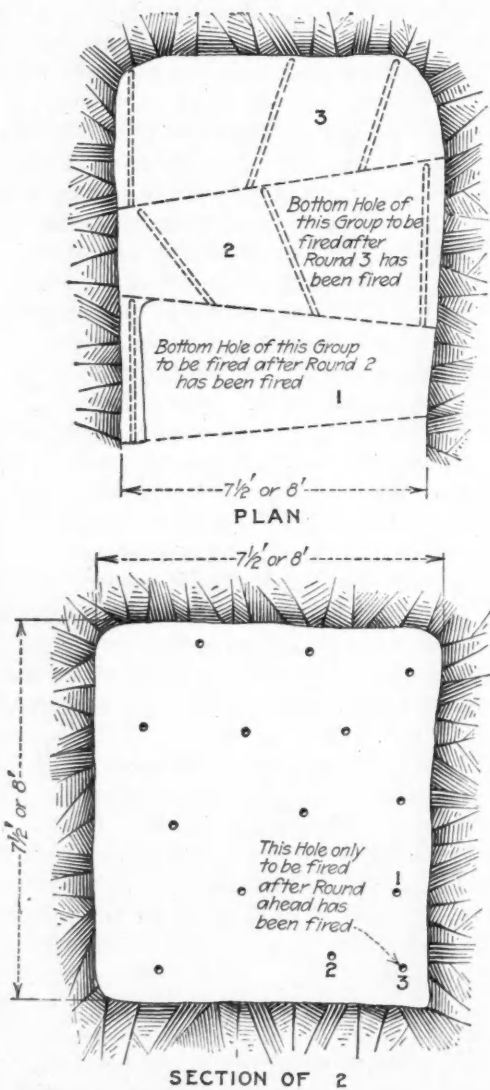
# Details of Practical Mining

## Advantageous Method of Firing a Drift Round

In the Southeast Missouri disseminated lead district, where some drifts of moderate size (about 6 x 8 ft. in cross section) are driven by contract on a footage basis, it is customary to have a shoveler clean out the rock broken on the opposite shift while the machine man is drilling the round for the shoveler on the next shift. To facilitate this operation, it is advantageous

If the driller has to "shovel back," it means a serious loss in drilling time, and often delays completion of the round to such an extent that it cannot be broken on the same shift.

In order to eliminate this set-back in the normal cycle of operations, the rounds shown in the illustration were devised. Successive rounds are shown in a composite plan of three rounds and by one vertical section. The drift bottom is considerably cleared by merely leaving the bottom "square-up" hole No. 3 of each round fired to be blasted immediately after the last hole of the succeeding round ahead in the drift. This serves to throw most of the broken rock to the other side of the drift, leaving a place that may be easily and quickly cleaned out by the machine man for the set-up of his column and machine. No change in the ordinary system of placing the drill holes is necessary, except that hole No. 2 may be drilled a little closer to hole No. 3, in order that too large an obstruction be not left to drill around and shovel over.



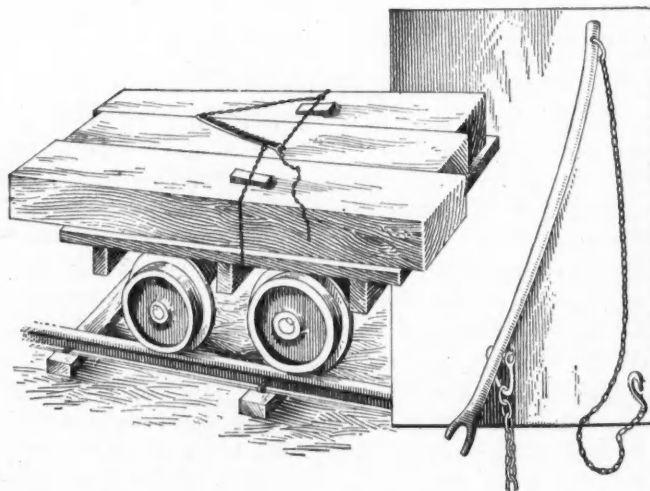
ALTERNATE SIDE LIFTERS ARE BLASTED WITH THE NEXT ROUND AHEAD

for as much of the rock as possible to be thrown away from the face on one side of the drift, thereby saving time "mucking back" for a column set-up. Most development drifts follow flat-lying, heavy-bedded strata of dolomite. According to the practice at some of the mines of the district, columns are set up alternately by rounds opposite one corner of the heading, and all the holes are drilled from the column as a center.

## Device for Binding Timbers on a Truck

BY C. T. RICE

In the accompanying sketch are shown the details of a device that is useful for binding round timber and lagging securely on a timber truck. It consists of a lever made of a slightly bent piece of one-inch steel, through which two holes are punched, one about a fifth



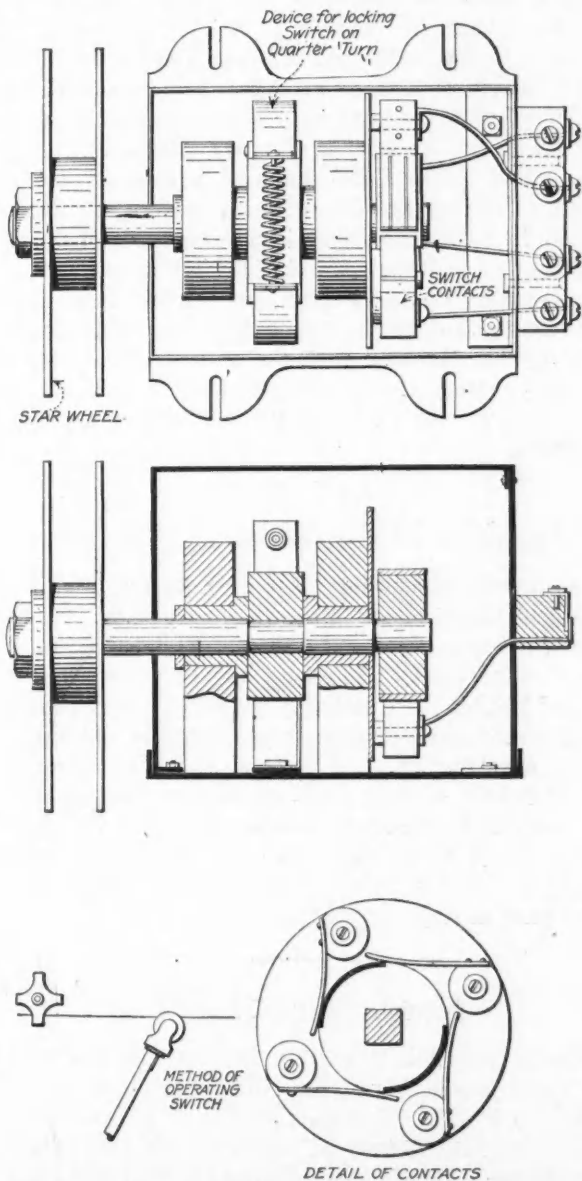
TIMBERS HELD ON TRUCK BY BAR AND CHAIN DEVICE

way from one end, which is fashioned into a claw, and the other hole near the opposite end. A clevis is attached to the hole near the claw, as shown, to which clevis is connected a 3/4-in. binding chain, which is long enough to go around the load of timber and the truck. The other hole is for a small chain, the same length as the binding lever, that has on its end a hook for going around a link of the binding chain itself.

In using the device, the binding chain is passed around the load and the timber truck, and then brought back on top, so that it can be gripped by the claw in the end of the lever. The lever is pulled back as tightly as possible, and the fastening chain brought back and hooked around the binding chain, holding everything tightly. When plank lagging, covered with ice, is being taken into the mine, as is often the case in winter, it is well to drive a wedge between the chain and the top planks of the outer rows in the load, for in that way a better grip is obtained between the chain and the slippery planks.

### Safety Signal Switch for Mine Use

W. A. Pearce, of Virginia, Minn., has been granted United States patent No. 1,146,204 on an electric switch for operating safety signal lights, which is intended for use in mines where electric haulage is employed. The



DETAILS OF SAFETY SIGNAL SWITCH OPERATED AUTOMATICALLY BY TROLLEY WHEELS

illustration shows the construction of the switch in some detail. The switch is operated by the trolley wheel of the electric locomotive as it enters the safety block. It is enclosed in an iron cover, not shown in the cut,

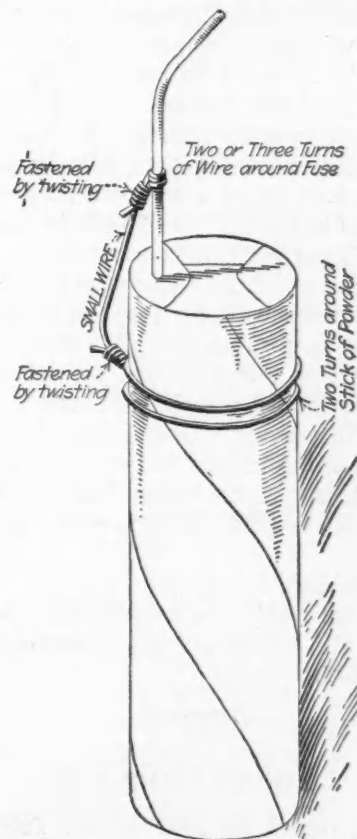
and is bolted to the timbers with lagscrews, so that the star wheel shown, which has an insulated hub, straddles the trolley wire and clears it by about 1/2 in. All switches are set so that the green lamps are burning at all danger points such as cross-overs, curves, spur switches, etc. A locomotive entering either place turns the star wheel one-quarter turn, which opens the circuit through the switch to the green lamps and closes the circuit through the switch to the red lamps, which stay thus until the locomotive passes through again. Then it again turns the star wheel of the switch it passes, which immediately changes all the circuits back again.

The first locomotive entering either of the danger zones has the block until it passes out. The switch used is the single pole variety. One pole of any switch is fed from the trolley wire, the current returning through the lamp to the rails. The switches can be used to give any signal, such as light, bell, etc. They work in either direction. A one-quarter turn of the star wheel opens all the closed circuits and closes all the open circuits.

### Attaching Fuse to Primers

BY WILLIAM CROCKER

A method of attaching fuse to primers is shown in the accompanying illustration. I have made thousands of these primers with perfect success. The fuse is anchored to the stick of powder with wire. The wire used was obtained from the strands of an ordinary bell cord cut into lengths of about eight inches. After inserting the copper fuse in the regular manner, the wire is



DETAIL OF WIRING FUSE TO PRIMER CARTRIDGE

twisted around the cartridge, imbedding itself into the wax paper. One end of the wire is twisted around the fuse two or three times, and the tie will not slip or yield. The whole operation is accomplished quickly.

## Company Reports

### Annual Report of the Alaska Juneau Gold Mining Co.

The third annual report of the Alaska Juneau Gold Mining Co., covering the calendar year 1917, is characterized by a recital of disappointments in the mine and mill alike. The mill was in a combined process of completion and operation during nine months of the year, and the best it was made to accomplish was less than one-half its expected capacity at a cost of more than twice the expected operating cost. Its failure to handle a larger tonnage was owing largely to the inability of the ball mills to maintain their capacity, because of the coarseness of the feed, a condition which was corrected to a minor degree only by finer crushing in the gyratories. Mechanical weaknesses of the ball mills, especially of their liners, and the many changes and additions incidental to getting a large mill tuned up kept tonnage down.

The "wholesale" mining method, adopted nearly three years ago, proved unsatisfactory, as it resulted in a caved mixture containing an undue proportion of waste, and a reversion to the former sorting method is in progress. The fact that the assay values are carried by small quartz stringers, which average \$6 per ton in gold, in a large mass of barren vein matter, indicates the desirability of this method. Also a pronounced difference in color between quartz and vein matter, with marked friability of the quartz, aids in sorting. The mine has not been called upon for a large tonnage, but is in a position to deliver from 10,000 to 12,000 tons per day. The mining method is economical. The actual cost of drawing ore from the stopes was 10c. per ton, the tramming cost was 9c. per ton, and 1c. per ton covers all other charges, making the total direct mining cost of ore delivered to mill bins 20c. per ton.

The total ore milled was 672,424 tons, of an average value of \$0.875 per ton. Gold bullion to the value of \$227,835, and silver bullion to the value of \$1630 were produced. Galena concentrates totaling 1419.04 tons yielded \$208,445 in gold, \$7224 in silver and \$23.089 in lead.

New construction for the year was of a net value of \$540,424. Total receipts were \$490,049, and operating charges \$710,623, showing a net operating loss for the year of \$220,574.

### Yukon Gold Co.

The annual report for 1917 of the Yukon Gold Co. shows that the amount realized from the year's operations was \$1,373,145.51, against which were charges of \$1,439,668.85 for depreciation of the plant and depletion of the property, leaving a net deficit for the year of \$66,523.34. Distributions of \$1,050,000 were made to stockholders during the year.

The Starlight mine, in the Jarbidge district, with an estimated content of 9800 tons, valued at \$212,000, was purchased. Additional ground on Pritchard Creek, near Murray, Idaho, has been developed through prospecting and now contains 10,600,000 cu.yd., with gold content estimated at \$1,530,000. The seven Dawson dredges in the Yukon operated 151 days and mined 4,583,326 cu.yd. at an average cost of 25.81c. per cu.yd., and yielded an average of 37.87c. per cu.yd. A total of 65 acres, or 60%, of the ground was frozen and had to be thawed with steam. The Greenstone dredge at Ruby, Alaska, operated 153 days and mined 264,132 cu.yd., which yielded an average of \$1.174 per cu.yd. The Iditarod dredges operated 192 days and handled 871,045 cu.yd. which yielded an average of 91.5c. per cu.yd. at a cost of 48.1c. per cu.yd. The five California dredges operating on American, Feather, Yuba and Trinity rivers and Butte Creek handled a total of 6,161,941 cu.yd. at an average cost of 3.71c. per cu.yd. Yardage mined in hydraulic operations amounted to 2,143,444 cu.yd. at an average cost of 11.8c. per cu.yd. The duty of the water was 4.18 cu.yd. per miners' inch. Leases or claims owned by the company in the Yukon territory and Alaska, together with the returns for water used on other than company's ground, also assay office cleanings, yielded a total of \$90,259 with an expenditure of \$3223.

### Goldfield Consolidated Mines Co.

Ore mined (including lease ore) during 1917 by the Goldfield Consolidated Mines Co. amounted to 250,550 tons, having a recovered value of \$1,762,970.05. Tailings treated were 81,885 tons, having a recovered value of \$62,326.54. Ore valuing \$85,649.32 was purchased from lessees, and mining, transportation, milling, taxation, construction, and general expense amounted to \$1,543,012.82, leaving a net realization from operations for 1917 of \$196,634.45. Exploration and development expenditures were \$68,133.69, and this sum deducted leaves a net realization of \$128,500.76. No dividends were paid during the year.

### North Star Mines Co.

The North Star Mines Co. reports that during 1917 the gross production of the North Star mine amounted to \$1,148,684.89. Dividends paid were \$250,000. There was mined 126,474 tons, of which 100,500 tons of dry ore was crushed. Development during the year was 3216 ft.; in drifts, 1910 ft.; raises, 1205 ft.; and winzes, 101 ft. The Central mill was equipped with 60 1500-lb. stamps and the Central cyanide plant was enlarged. The Champion mines showed a total deficit of \$57,810.89. During 1917, 41,650 tons of rock was crushed and development work was 2494 feet.



### Portland Gold Mining Co.

During 1917 the Portland Gold Mining Co. distributed to its reduction plants 535,280 tons of ore, valued at \$2,535,554.34, which was treated as follows: At the Colorado Springs plant, 56,272 tons of company ore and 19,270 tons of lessee ore; at the Victor mill, 222,832 tons, and 236,915 tons at the Independence mill. Net profits for 1917 were \$198,036.84, and dividends paid amounted to \$360,000.

### Annual Report of the Tonopah Belmont Development Co.

The Tonopah Belmont Development Co.'s annual report is for the fiscal year ended Feb. 28, 1918. The company operates a large silver mine at Tonopah, Nev., and maintains a development organization which has thus far acquired ownership or interests in the following mines: Belmont Surf Inlet Mines, Ltd., operating a gold mine, with subsidiary values in silver and copper, at Surf Inlet, Princess Royal Island, B. C.; the Belmont Shawmut Mining Co., operating the Eagle-Shawmut mine on the Mother Lode at Shawmut, Tuolumne Co., Calif., and the Belmont Wagner Mining Co., holding the newly acquired interests in several groups of claims near Telluride, Colorado.

The operations at the Tonopah property are summarized in the accompanying table:

#### OPERATIONS OF TONOPAH BELMONT, 1917

Total mine production, wet tons.....	162,051
Waste sorted out, tons.....	27,458
<hr/>	
Net mine production, dry tons.....	130,991
Tons milled.....	131,100
Average gold content, oz.....	0.159
Average silver content, oz.....	16.86
Gross value per ton.....	\$16.57
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Loss in tailings, per ton.....	\$0.94
Operating expenses, per ton.....	8.38
Net profit, per ton.....	7.25
<hr/>	
Total.....	\$16.57

The total silver recovered at the mill amounted to 2,170,519 oz. and of gold 22,547.13 oz. The silver was sold at 84.13c. per oz. The direct mining cost was \$4.44, the direct milling cost, \$2.86, marketing concentrates and bullion cost \$0.33 and general expense was \$0.83 per ton; miscellaneous earnings were \$0.09 per ton, making total operating expense \$8.38, as indicated in the table. The ore reserves at the end of the period were 66,003 tons of positive ore and 9820 tons of possible ore.

The exploration department considered 205 different properties with the view of possible purchase. Of these, 147 were rejected without examination other than was afforded by consideration of reports and other data. The remaining 58 properties were examined and sampled as thoroughly as the indications justified. Metallurgical tests were made upon ores from ten of these properties. Of the properties examined only two were taken under option, the Alta-St. Louis-Palmyra and the Andrus group of claims, both in the Upper San Miguel mining district, San Miguel Co., Colorado.

At the Surf Inlet property development was con-

tinued, the construction of mining and milling plants was completed and production was begun in September. Ore milled during the remainder of the year totaled 33,207 tons, and a net income of \$86,154 resulted. At the Eagle-Shawmut property the main shaft was deepened 409 ft. to the 2243-ft. point. A large amount of experimental mill work was done, and the flow sheet determined. The process is to be a combination of gravity separation and flotation, and will employ the old stamps, Butchart tables, a tube mill and flotation cells.

### Annual Report of the Tonopah Extension Mining Co.

The report of the Tonopah Extension Mining Co. for its fiscal year, which ended Mar. 31, 1918, shows a profit of \$230,332, which compares with \$673,394 in the year preceding. This marked shrinkage in earnings was occasioned by a decrease in the value per ton of the ore treated. Silver was sold at 86.08c. per oz., an increase of 15½c. per oz. over that received the preceding year.

Ore produced totaled 110,188 tons, averaging 11.771 oz. silver and 0.117 oz. gold per ton. Milling recovery was 90.51%. The cost of mining was \$5.26 per ton, an increase of \$0.36 over the preceding year. The milling cost was \$3.21 per ton, a decrease of \$0.41, and the marketing expense was \$0.17 per ton, a decrease \$0.12 per ton. The net decrease in working costs was \$0.18 per ton. New construction and equipment cost \$40,486. No dividends were paid during the year.

### Daly West Mining Company, Report and Statements

The assumption of control of the Daly West Mining Co., Park City, Utah, by a new management on Mar. 1 gave occasion for a general statement, covering its condition, prospects and plans for future development, which accompanies the financial statement of the former management for 1917. New financing is necessary to furnish funds for a campaign of development and exploration, and the directors recommend that the capital stock be increased from 180,000 to 250,000 shares, the new stock to be sold at not less than \$2 per share.

The physical condition of the property leaves much to be desired. The hoist and air compressor with their housing, are the only surface equipment in operating condition. The concentrator is not suitable to Daly West ores, nor could it be made suitable at reasonable expense, so an arrangement has been made with the Judge Mining and Smelting Co. to use its mill. The mine also is in poor condition. In its upper area, which furnishes ore of shipping grade, lessees have operated for eight years, and during that time have done practically no repairs or maintenance work. Its lower portion furnishes concentrating ore, and is in better condition. Favorable developments in the adjoining Judge mine, and the recent discovery of similar geological conditions in the Daly West, afford the basis of hopes for future ore-bodies.

Ore sales for 1917 netted \$133,545, lessees' ore brought in \$57,528, and miscellaneous income amounted to \$5738. Total expenses were \$188,868, which left \$7945 as the net earnings for the year.

## Events and Economics of the War

The effort of the Germans to straighten their line between Montdidier and Chateau Thierry gained for them a narrow strip of territory at heavy cost in lives but with no decisive result, their objective not being attained; the Teuton advance was completely stopped. Austria's long-expected offensive against the Italian front began on June 15 with attacks along the 97-mile line from Asiago to the Adriatic; the Piave was crossed at two points; several thousand prisoners were claimed by both sides. An Austrian dreadnaught was sunk and another one damaged by the Italians off the Dalmatian coast. Peru seized 50,000 tons of German shipping.

The United States has now passed the 800,000 mark in troops shipped overseas, it was announced by General March, Chief of the Army General Staff. Further conservation of beef on the part of the public was asked by Food Administrator Hoover. A plan to sell \$6,000,000,000 of debt certificates by next October in anticipation of the Fourth Liberty Loan was announced by Secretary McAdoo. The rule affecting draft registrants in regard to marriage was changed by the Provost Marshal General. Jeremiah O'Leary, the Irish agitator under Federal indictment, was caught in Sara, Wash., after having fled from New York.

### Organization of Research Work on a National Scale

The proposal has often been made that the work of scientific and technical research now carried on independently by a multitude of institutions and individuals should be organized on a national scale. Such an organization, could it be effected, would make unnecessary a vast amount of needless duplication of work. It would further be possible, by concentrating research workers on a particular task, to make much more rapid progress; and, by giving the results of successful research greater prestige and standing, it would be possible to secure the adoption of developments in practical work to a much greater extent than at present. The magnitude of the task of controlling and coordinating the research work of the entire country is such, however, that no serious attempt to do this had been undertaken until the war brought the need and opportunity home.

Two years ago President Wilson accepted an offer by the National Academy of Sciences to undertake the organization of the scientific resources and research facilities of the country. The National Research Council was organized, in accordance with this offer, a year in advance of this country's actual declaration of war, and it was officially recognized by the Council of National Defense and arranged to serve during the war as a department of that body early in 1917.

While the National Academy of Sciences, from which the National Research Council sprung, deals only with

so-called "pure" science, it was recognized from the outset that the business of the Council was to promote research which aimed at definite, practical results.

The executive order of President Wilson, issued on May 11, recognized the work which has already been accomplished by the Council and ordered the cooperation with it of the scientific and technical branches of the Government. The practical nature of the Council's work was disclosed at the outset by the fact that its first financial support came from the Engineering Foundation; and is attested now by the fact that Governmental appropriations to the amount of \$270,000 have been made to finance special branches of its work.

The work accomplished by the Council and its organization and plans were the subject of an address by the Council's chairman, Dr. George Ellery Hale, delivered on May 28 before a joint meeting of the National Engineering Societies in New York City.

As much of the research directed by the Council relates to apparatus useful in the war, detailed statements concerning such work cannot be made public. It may be said, however, that among the problems with which it is dealing are processes for making nitrates, the manufacture of optical glass, methods of combating the submarine, the development of body armor, range finders, discovery of enemy heavy artillery by sound, and psychological tests of recruits. These are only samples at random of the numerous fields in which committees of the Council are at work.

Dr. Hale, in his address, emphasized that the Council recognizes the great value of individual initiative and direction. It will aim to cooperate with and aid the individual worker and not to supersede him. A statement of Dr. Hale's which won hearty applause from his audience was the following:

"It should be said here, once for all, that the policy of the National Research Council has been from the outset invariably to recommend the immediate development and utilization for military and naval purposes of the best devices or methods known at the time, with the understanding that research for the purposes of improving such devices should not retard production demanded to meet pressing military needs."

In the special work of cooperating with existing research agencies, a census has been made under direction of Dr. S. W. Stratton, Chief of the Bureau of Standards, of the research workers and facilities in the universities, manufacturing plants, Federal Government bureaus, commercial testing laboratories, etc., throughout the United States. Another committee, of which Dr. John C. Merriam, of the University of California, is chairman, has secured the organization of local research committees in 72 universities and colleges to cooperate with the National Council and in many cases with local industries.

There has also been organized, with the approval and cooperation of the Secretaries of War and the

Navy, a committee to interchange information and compare results of research work with the authorities of Great Britain and France. This committee has offices in Paris, London and Washington. Dr. W. F. Durand represents the committee in Paris and Dr. H. A. Bumstead in London. The Council of National Defense has provided funds to the amount of \$33,400 for this committee's work for the current year.

In the direct carrying on of research, the Council is coöperating with Government and other organizations, such as the Bureau of Mines, the Bureau of Standards and others. The division of engineering is now under the chairmanship of Dr. Henry M. Howe.

At the present time the Council, in coöperation with the Engineering Foundation, is undertaking a campaign for the promotion of industrial research by commercial organizations. This work is in charge of a strong committee on which the heads of the leading industrial research laboratories are represented. To back this movement an advisory committee has been formed made up of such men as Elihu Root, E. W. Rice, Jr., president of the General Electric Co.; Theodore N. Vail, Dr. Henry S. Pritchett, George Eastman, Pierre S. du Pont, A. W. Mellon, E. H. Gary, and Cleveland H. Dodge. This committee held its first meeting in New York on May 29.

### Will Examine Engineers in Cities

The following is authorized by the Secretary of War:

The Chief of Engineers announces that the cities to be visited by the Engineer Examining Board in its campaign to recruit 2000 candidates for commission as first lieutenant and captain are as follows:

Washington, Philadelphia, New York, Boston, Albany, Buffalo, Cleveland, Detroit, Pittsburgh, Youngstown, Ohio; Cincinnati, Louisville, Indianapolis, Chicago, St. Louis, Kansas City, St. Paul, Denver, Salt Lake City, Butte, Seattle, Portland, San Francisco, Los Angeles, Deming, N. Mex.; Dallas, New Orleans, Memphis, Nashville, Birmingham, Atlanta, Charleston, S. C., and Richmond.

All who have sent in application blanks will be notified as to when they should appear at one of the cities named for physical and mental examination. The board will leave Washington in a few days. All candidates must be citizens of the United States. Those trying for captaincies should be between 36 and 42 years old, and those seeking first lieutenantcies should be between 32 and 36. No men of draft age will be considered.

### Must Save the Coal

A detailed survey of the coal required during the present coal year for war purposes and for domestic consumers foots up to about 80 million tons more than was produced last year, the U. S. Fuel Administration announces. This was the figure on June 1.

In spite of intense efforts to increase the production of coal, says the Administration, the first five months of 1918 have produced only 10 million tons in excess of the same period of 1917. If this is considered in relation to the immense physical task involved in producing 12 million tons of coal per week, it is easy to draw the conclusion that the increased demand cannot, to any large extent, be met by increased production.

It is estimated that the industries not employed on war work will require something less than 100,000,000 tons of coal. All consumers of fuel, war industries and otherwise, must participate in the saving campaign, but non-war industries are especially interested because, whatever the deficiency turns out to be, it will come out of their quota. Hence, the general prosperity of our industries and the full employment of labor will depend upon saving, by economies and prevention of waste, between 50,000,000 and 60,000,000 tons of coal.

### Withdrawal of Anthracite from West Unavoidable

Concerning the allotment of anthracite for the coal year recently announced by the Anthracite Committee, J. D. A. Morrow, director general of distribution for the U. S. Fuel Administration, addressing the National Coal Association, said:

"The withdrawal of anthracite from the central west and southwest will require the taking of 5,000,000 of tons of bituminous over and above any amount of bituminous which has been used heretofore for that purpose. We realize perfectly well that that change will impose a definite inconvenience and even a hardship on the consumers of coal in that territory, but I want you and the people generally to understand that there is no escape at this time from that condition.

"It is not possible to get enough coal into this eastern territory to take care of it on any basis that can be tolerated unless this change in anthracite distribution which has been outlined by this committee is made. It has been gone over thoroughly in Washington by the various managers of bituminous distribution and worked out with great care. The Railroad Administration has also been consulted in respect to it, and this allotment of anthracite goes."

### War to Transform Unionism

A banker who has been giving a great deal of consideration to the labor problem believes the death-knell of unionism has been sounded and that its demise will be due to the war, in spite of the fact that labor and socialistic tendencies are apparently growing stronger the longer the war lasts, says the *Boston News Bureau*.

"The answer to the whole question, it seems to me," he says, "can be found in the difference between 400 rivets customarily driven by a riveting crew before the war and the wonderful totals now demonstrated as the possibility of a day's labor. The international riveting contest has shown that the pre-war average day's work was about 5% of possible production, and perhaps half what it should be as an average output.

"All of which proves that labor unionism has within itself the seed that will eventually destroy it. That is the principle that the average day's labor production shall be measured by the weakest and not by the strongest of human endeavor. A principle founded on minimum effort and maximum remuneration is economically unsound and, therefore, headed for disaster.

"The war is teaching our workers a new standard of effort and likewise of national responsibility. Shirkers are henceforth going to be unpopular, not only with employers, but with the workmen themselves. Force of public opinion among the men themselves will sub-

stitute quality for quantity in the workshops of the country. The country, I believe, is facing an economic revolution of the first magnitude."

## Electrical Manufacturers Asked To Conserve Tin

The general war service committee of the electrical manufacturing industry at 50 Church St., New York, recently called the attention of electrical manufacturers to the necessity of economizing in the use of tin in the industry. It recommends the use of other metals whenever possible. The bulletin reads as follows:

The U. S. Government has assumed control of the importation and distribution of tin in the United States. Den and is made that the use of tin cease for all non-essential purposes and be reduced elsewhere to the minimum consistent with the production of material and apparatus which will function safely and satisfactorily.

If electrical manufacturers are to obtain their supply of tin, it will be necessary for every one to economize to the fullest extent possible.

The uses of tin are for three general purposes, namely, babbitt metal, alloy castings, and tinning and soldering, in which tin consumption can be reduced by

1. (a) Use of lead-base babbitt metal in substitution for tin-base babbitt. (b) The reduction of tin content in a tin-base babbitt where the use of the latter is necessary. (c) The use of the thinnest section of babbitt metal consistent with a satisfactory bearing. Babbitt is frequently wasted in thick linings. Layers of babbitt metal not exceeding one-sixteenth inch thickness will make a satisfactory lining if sweated to a proper backing metal.

2. The percentage of tin in most alloy castings is unnecessarily high. It is common practice in brass foundries to look on tin as the cure for most troubles in producing brass or bronze castings. Even a 1% reduction throughout the country would result in an enormous saving in the total consumption.

3. (a) Pure tin solder is frequently used where mixtures of lead and tin in varying proportions may safely be substituted. (b) Half tin to half lead solder is commonly used, whereas a mixture of 55 to 60% lead is often equally satisfactory. In many cases lead may be safely increased to 70% with 30% tin. (c) It is common practice to dip ends of leads and other parts to be soldered into molten tin in preference to common solder mixtures because mixtures when kept melted for a long time tend to separate into layers of different composition. The eutectic alloy, 63% tin to 37% lead, which melts at 180° C., will not separate as long as this proportion is fairly well maintained. Use such a bath when soldering with lead-tin alloys and use tin only when parts must be soldered with pure tin.

The foregoing suggestions cover only a few means of reducing the consumption of tin to the necessary minimum. Other suggestions which you can furnish your general war service committee will be welcomed.

The war needs of our industry in this respect are fundamental; consequently, your immediate, active coöperation is of vital importance.

## Lawmaking for the Engineer

A German union of technical and scientific societies has been organized, according to a statement attributed to Sir Robert Hadfield by the *Monetary Times*, of Canada. Its first general meeting was held in November last. The object of the union was stated by the chairman to be the establishment of a balance between science and practice.

"Many a technical task," the proceedings state, "could not be carried through without the participation and collaboration of several branches of science; the metallurgist requires the coöperation of the technician; the architect, that of the engineer. An influence was also to be exerted on technical instruction and education and toward ensuring that the academically trained

technician should be admitted to all administrative departments of the federal states. The technical world ought to be represented, more than was hitherto the case, in the legislative bodies. The union had also applied to the authorities with a view to being consulted in the preparatory work of drafting regulations or enactments."

## The United States as an Employer

Uncle Sam in his capacity as the world's greatest employer is discovering that workers will not "live by bread alone" and that high wages are not of themselves a sufficient inducement to hold men to their work, declares a statement issued by the War Department. He is discovering that men are social animals, and that employees must have certain social and community facilities if they are to remain contented.

Many cities having munitions factories are congested by war workers beyond their power to furnish community facilities for the newcomers. Part of the program to be worked out in such cities by the community organization branch of the Ordnance Department is as follows:

Campaign of patriotic education to impress upon workers that they are the second line of defense and their efforts absolutely essential to the safety of the men in France and the winning of the war.

Formation of housing companies and of building and loan associations and the encouragement of home-building by individuals.

Extension of trolley tracks to new districts and increased service.

Extension of water, sewer, gas and electric service to the new housing districts.

Ordinances to prevent the exploitation of the workers.

Encouragement of growing of produce by nearby farmers, and installation of public markets for producer and consumer.

Provision of facilities for plowing and harrowing home gardens.

Installation of branch libraries for convenient use of new workers and their families.

Erection of community center "huts," with moving pictures, supervised dances, concerts, lectures, and like recreation.

Increased school facilities for children of new workers, and night school during winter months for adults.

Control of alcohol and social evils, and education of workers by medical specialists.

Complete Americanization movement for naturalization of aliens, and instruction in history and citizenship.

Education of workers, their families and, especially, the children, to the need for thrift, and the complete utilization of the workers' time.

It is confidently believed that all this, properly worked out, will have a direct influence upon the stability of labor and the production of munitions.

## Preparing for Taxation

Chairman Kitchin of the House Ways and Means Committee is prepared to contend for a continuance of excess-profits taxes. Republican Senators, led by Smoot, of Utah, will work for a "simon-pure" war profits tax. Senator Smoot has drafted a bill clearly defining war profits and fixing rates of levies upon them. He holds that the Government should not disturb normal business, even if it should be abnormally prosperous, but should, if necessary, take all war profits. He defines war profits as all earnings over normal earnings for the five-year period preceding the outbreak of the war.

# Industrial News from Washington

BY PAUL WOOTON, SPECIAL CORRESPONDENT

## Taxing the Mining Industry

Much comment was occasioned by a statement made to the Ways and Means Committee during the hearings on the revenue bill by Temple Chapman, who appeared as the representative of mine operators in the Joplin district. In the course of his remarks Mr. Chapman said: "It seems to me, as a stockholder in several other mining companies and as a worker in my field, that our industry has been very profitable, and can well afford to pay a very high tax, and I should say, from what I hear of taxes being paid in my field and elsewhere, that we can pay more tax than we have paid in the past."

This statement, which is the unrevised transcription of the official stenographer, led to the wide publication of a statement to the effect that the representative of the zinc operators had urged an increased taxation for that industry. Mr. Chapman thereupon gave to the press a statement in which he asserted that he referred to the mining industry as a whole, and not to zinc mining, which is already struggling against almost insurmountable obstacles. An extract from another portion of Mr. Chapman's remarks follows:

"The Joplin mining district is producing about half the zinc of this country, and the zinc is going into war use to some extent. The district is an important factor in zinc production as a whole, but unlike some of the great copper mines of the West, owning great beds of ore in fee, the zinc body of ore in the corner of Oklahoma is divided up into more than a hundred parcels, Indian leases, limited in their term by the Government and owned by 100 different operating companies. So, though we are a big factor as a whole, we are weak individually.

"Though the district as a whole has lasted 50 years, and is likely to last 50 years, the individual companies are limited by the Government in the term of the lease and in the size of their ore bed, each company owning only a small portion, 20 to 40 acres of the whole mass of ore. For this reason a tax, we feel, needs to be considered as against the brief life of the individual mines. The compilations which we have made for the advisory board of the Treasury Department of one hundred and seventy-odd mines show that the average life of these mines for the last 20 years has been two and a half years."

## Four Manganese Districts Created

That its war work on manganese may be handled more efficiently, the U. S. Bureau of Mines has divided the country into four districts. The Appalachian district is to be in charge of H. W. Hardinge. The Lake Superior district is to be headed by Edmund Newton. The work in the Rocky Mountain district is to be under the immediate direction of C. E. van Barneveld. Work in the Pacific Coast states will be under the supervision

of Albert Burch. Mr. Burch will be assisted by F. B. Caldwell, R. Clyde Cameron, E. L. Young, Harry Thompson and R. H. Toll.

In each of the four districts, a painstaking survey is to be made of all manganese operations and deposits. Each of the district directors is to have the services of a number of volunteer engineers who are intimately familiar with local conditions. In addition, they will be assisted by the regular technical staff of the Bureau of Mines.

Ore beneficiation and metallurgical work are to be given just as careful attention as will be given to production. Experiments in concentration will be centered at the Lake Superior station of the Bureau, at Minneapolis. The hydro-metallurgical work will be done at the Golden and the Tucson stations. At Golden, the work will be chiefly the study of the recovery of manganese as a byproduct in the treatment of silver ores by the Caron process. G. H. Clevenger is in charge. The work is being done jointly by the Bureau of Mines, the Netherlands government and the Research Corporation.

At Tucson, the success which has followed the experiments with the sulphurous acid process in the treatment of copper ores has led to a variation of the process which is being applied to the recovery of manganese from manganese ores.

Another phase of the work will be in cooperation with the operators of steel plants. Metallurgists of the Bureau will keep in the closest touch with the experimentation in change of practice which will permit of the use of lower grade ferromanganese and spiegeleisen.

Work on other war minerals is to be under the direction of widely known engineers as follows: Pyrites, H. A. Buehler; sulphur, Carl O. Lindberg; sulphuric acid, A. E. Wells; graphite, G. D. Dub; tin, H. Foster Bain; mercury and antimony, L. H. Duschak; potash, A. W. Stockett; tungsten, John H. Mackensie. Vanadium and molybdenum will be handled by the Bureau's engineers at Golden. Chrome will be handled in the West by Albert Burch and in the East by John H. Mackensie. Experiments on magnesite will be conducted at the Columbus station.

## Chrome Ore Imports Limited

Imports of chrome ore and chromite from Cuba, Guatemala, Newfoundland and Brazil must not aggregate in excess of 43,500 tons by Mar. 31, 1919. Imports from New Caledonia must not exceed 10,000 tons during the period to end Dec. 31, 1918. A ruling to this effect has been issued by the War Trade Board. It was based on a recommendation made by the Committee on Mineral Imports and Exports. Imports by rail from Canada and Mexico will be permitted. The order became effective June 15.

Remember the Comfort Fund of the 27th Engineers.

## The 27th Engineers

Your subscription to the Comfort Fund will help insure real smokes for our representatives on the firing line. A list of those who have contributed to the fund subsequently to that given in our issue of May 18 follows:

Previously acknowledged.....	\$13,664.00
Students of Wisconsin Mining School.....	50.00
A. M. Plumb.....	5.00
C. W. Snow.....	2.50
Charles A. Mitke.....	5.00
A. A. Hassan.....	10.00
A. A. Hassan, Jr.....	5.00
Emin A. Hassan.....	5.00
Bernard MacDonald.....	5.00
C. F. Rand.....	50.00
Calumet & Arizona Mining Co. and New Cornelia Copper Co.....	400.00
Oscar Lachmund (fourth contribution).....	10.00
C. N. Bell.....	10.00
C. S. Witherell.....	25.00
W. G. McBride.....	25.00
Karl Eilers.....	50.00
R. T. Hancock.....	5.00
E. E. White.....	100.00
S. Ringlund.....	10.00
H. Foster Bain.....	10.00
Marc Bailey.....	10.00
Charles le Vasseur (second contribution).....	25.00
William Wraith.....	10.00
H. A. Wheeler.....	10.00
Nevada Mine Operators' Association.....	100.00
Louis R. Wallace.....	50.00
H. P. Bowen.....	5.00
H. L. Brown and M. W. Hayward.....	16.00
Iron Cap Copper Co.....	50.00
W. N. Smith.....	10.00
E. S. Geary.....	5.00
H. J. Wolf.....	10.00
F. H. Siebold.....	10.00
H. A. Kee.....	10.00
W. S. Grether.....	5.00
Total.....	\$14,767.50

Make your checks payable to W. R. Ingalls, treasurer of the Association of the 27th Engineers. Because of the work involved in administering the Comfort Fund, contributions are acknowledged only by publication in the *Journal*.

## The Tofo Iron Mines in Chile

High-grade iron ores, said to be equal to the best Swedish ores, are found at the Tofo iron mines of Chile, according to *Commerce Reports*. These ores can be delivered in Bethlehem, Penn., at a price to compete with ores from Cuba, Lake Champlain or Minnesota, chiefly because the orebody lies in a solid mass at a point near the seaboard and will be worked on an efficient, large-scale basis. The Bethlehem Steel Co. controls, under long-term lease, the iron deposits of Tofo, for which the port of Cruz Grande has been developed.

The deposits at Tofo, which is situated about five miles inland, are estimated to contain over 100,000,000 tons of ore, averaging 68% iron. The ore lies in a solid mass; no stripping will be required, and no shafts need be sunk. After blasting, the ore will be loaded into cars by electric cranes and hauled to the crushing plant on the side of the mountain. At this plant, by means of a jaw crusher, the ore will be reduced to a size not to exceed four inches and will flow into a bin and thence be drawn off into cars for shipment.

Manganese Mining will be conducted by the Sociedade Anonyma Barcellos (Barcellos Corporation) which Vice Consul Richard P. Momsen has reported was incorporated in Rio de Janeiro, Brazil, on Mar. 4 with a capital of 600 contos of reis (about \$150,000 in American currency) for the purpose of carrying on mining operations. One-fourth of the entire capital stock is represented by manganese mining properties, options, and leases.

## Petroleum Production of the United States and of the World

The increasing demand for petroleum and its products all over the world lends interest to statistics compiled by the National City Bank of New York showing the world production of petroleum. The compilation shows that the United States in 1917 produced 342,000,000 bbl. of crude oil, against 300,000,000 in 1916, 210,000,000 in 1910, and 64,000,000 in 1900, and that this country now produces two-thirds of the oil of the world. Of the world's output of crude petroleum, the United States supplied 66% in 1916, against 64% in 1910, 43% in 1900, 60% in 1890, and 88% in 1880. World production in 1916 is stated at 461,000,000 bbl. of 42 gallons each, against 427,000,000 bbl. in 1915, 328,000,000 in 1910, 149,000,000 in 1900, 77,000,000 in 1890, 30,000,000 in 1880, 6,000,000 in 1870 and about 500,000 in 1860. The world production in 1917 is estimated at about 500,000,000 barrels.

America's total production of petroleum in 1917 was larger than in any other year, exceeding that of 1916 by 42,000,000 bbl. The world production in 1916 was larger than in any earlier year, exceeding that of 1915 by 34,000,000 bbl. For 1917 there are no complete figures of world production, owing to the absence of data on production in Russia and Roumania in that year. Though presumably there was a large reduction in the production of Russia in 1917, the fact that the United States output increased about 40,000,000 bbl. and that of Mexico increased 16,000,000 may make the total world production of 1917 about 500,000,000 barrels.

The United States has been the world's largest producer continuously since the development of petroleum production, except in the period 1898-1901, in which Russian production slightly exceeded that of the United States, the output of the United States in 1898 being 55,000,000 bbl., that of Russia 62,000,000; in 1899 United States 57,000,000, Russia 66,000,000; in 1900 United States 64,000,000, Russia 76,000,000, and in 1901 United States 69,000,000, Russia 85,000,000. Beginning with 1902, however, the product of the United States exceeded that of Russia by 8,000,000 bbl., and the excess of American production over that of Russia, chief competitor in the world's oil field, has rapidly increased, so that in 1914 the United States output was nearly four times as much as that of Russia, the 1914 figures of production being for the United States 266,000,000 bbl., against 67,000,000 bbl. produced by Russia. Russia's largest production in any year was in 1901, 85,000,000 bbl., falling to 67,000,000 in 1914, but in the case of the United States the product of 1901 was 69,000,000 bbl., having advanced meantime to 266,000,000 in 1914, 292,000,000 in 1915, and to 300,000,000 bbl. in 1916, and 342,000,000 in 1917, the United States figures for recent years being those of "marketed product."

America's share of the world's petroleum was in 1869 98%, in 1870 91%, in 1880 88%, in 1890 60%, in 1900 43%, in 1910 64%, and in 1916 66%, the figures being in round terms. The world's principal mineral-oil producers and their output in 1916 were the United States, with a product of 300,000,000 bbl.; Russia, 76,000,000; Mexico, 40,000,000; Roumania, 10,000,000; Dutch East Indies, 13,000,000, and India, 8,000,000 barrels.

The principal production of the United States by states in 1916 was: Oklahoma, 107,000,000 bbl.; California, 91,000,000; Texas, 28,000,000; Illinois, 18,000,000; Louisiana, 15,000,000; West Virginia, 9,000,000; Ohio, 8,000,000, and Pennsylvania, 8,000,000 bbl., the figures being also in round terms. The chief increase in 1917 occurred in the "Oklahoma-Kansas" district, which showed a gain of 32,000,000 bbl. out of the total gain of 42,000,000 bbl. in the United States in 1917.

The United States, despite the fact that it is by far the world's largest producer of petroleum, is becoming a considerable importer, the quantity of crude petroleum imported in the fiscal year 1915 being 652,000,000 gal., in 1916 871,000,000 and in 1917 1,079,000, a large proportion of this coming from Mexico and seeking a market in the United States because of superior facilities for refining the crude product.

### Mining Engineers Meet in Washington

More than 200 of the leading mining engineers of the country, now stationed in Washington and engaged in important war work, gave a dinner at the Food Administration cafeteria, 18th and D Streets, on June 21, at 7 o'clock, in honor of the board of directors of the American Institute of Mining Engineers.

Among those invited to speak were H. C. Hoover, Food Administrator; Charles M. Schwab, Director General of the Emergency Fleet Corporation; John D. Ryan, Director General of the Aircraft Production Board; Vance McCormick, chairman of the War Trade Board; W. L. Saunders, chairman of the Naval Consulting Board; Benedict Crowell, Assistant Secretary of War; Pope Yeatman, of the War Industries Board; Mark L. Requa, head of the Oil Division, Fuel Administration; F. A. Delano, member Federal Reserve Board; Sidney Jennings, president of the American Institute of Mining Engineers; Francis S. Peabody, chief of the explosives section of the U. S. Bureau of Mines, and others.

Although Washington is remote from the big mining centers of the country, it is estimated that there are more prominent mining engineers in the city engaged in war work than in any other single part of the United States. The American Institute of Mining Engineers is composed of more than 6000 mining engineers of the country. Since the beginning of the European war, 500 members have entered active service with the American or British forces. In addition, about 50 members are engaged in war work in the different departments in civilian capacities.

The activities of the members cover a wide field and include the Engineer Officers' Reserve Corps, Ordnance and Signal Corps branches of the Army and Navy, Aircraft Production, Food and Fuel Administrations, War Industries Board, War Trade Board, and the Department of the Interior. Several members of the Institute have also joined the Royal Engineers, English Army.

The meetings of the board of directors of the Institute are generally held in New York, and the change to Washington for this meeting was in recognition of the large number of mining engineers who are engaged in war work there. The arrangements for the dinner were in charge of Van. H. Manning, Director of the Bureau of Mines. Francis S. Peabody, of Chicago, was the toastmaster.

### April Metal and Ore Imports and Exports

Imports of the more important minerals and metals during April, 1918, and the corresponding month of 1917 were as follows, the figures being the returns to the Department of Commerce:

IMPORTS, APRIL, 1917 AND 1918			
Metal and Ore		April, 1917	April, 1918
Antimony ore, contents, lb.		440,792	264,857
Antimony matte, regulus or metal, lb.		1,727,426	1,734,790
<b>Copper:</b>			
Ore, contents, lb.		11,260,023	7,611,711
Concentrates, contents, lb.		3,372,598	2,793,200
Matte, regulus, etc., contents, lb.		3,617,594	3,642,542
Imported from (in part):			
Canada, lb.		2,609,244	2,215,712
Mexico, lb.		2,976,224	6,074,997
Cuba, lb.		4,403,561	2,399,040
Chile, lb.		7,151,168	2,564,125
Peru, lb.		173,704	422,602
Unrefined block, blister, etc., lb.		29,600,136	31,294,232
Refined, in bars, plates, etc., lb.		224,005	2,192,706
Old, etc., for remanufacture, lb.		1,853,157	76,008
Composition metal, copper chief value, lb.		11,330	8,427
<b>Lead:</b>			
Ore, contents, lb.		3,628,651	3,859,129
Bullion, contents, lb.		6,953,531	9,529,400
Imported from (in part):			
Canada, lb.		1,029,317	3,210,714
Mexico, lb.		8,323,618	10,114,520
Chile, lb.		1,142,854	10,510
Pigs, bars and old, lb.		66,338	1,663,021
Pyrites, long tons.		70,229	37,697
Imported from:			
Spain, long tons.		66,612	34,255
Canada, long tons.		3,617	3,442
<b>Zinc:</b>			
Ore, contents, lb.		10,632,907	4,907,025
Imported from:			
Canada, lb.		145,000	612,000
Mexico, lb.		10,487,907	4,295,025
Blocks or pigs, and old, lb.		26,609	10,463
Manganese ore, long tons.		27,023	58,036
Imported from (in part):			
Cuba.			17,615
Brazil.		22,650	33,084
Br. India.		4,000	4,950

Exports of copper, lead and zinc for April, as shown by the returns to the Department of Commerce, are as follows, figures as finally revised for April, 1917, being given for purposes of comparison:

EXPORTS OF COPPER, LEAD AND ZINC, APRIL 1917 AND 1918			
		April, 1917	April, 1918
<b>Copper:</b>			
Ore, contents, lb.		381,758	350,186
Concentrates, contents, lb.		135,200	168,100
Unrefined, black, blister, etc., lb.		591,550	1,509,016
Refined in ingots, bars, etc.		103,879,911	49,854,754
Exported to (in part):			
France, lb.		41,116,208	12,906,783
Italy, lb.		18,092,737	8,911,644
Russia.		6,121,654	
United Kingdom, lb.		33,270,786	26,744,174
Canada, lb.		5,073,749	1,199,517
Composition metal, copper chief value, lb.			13,058
Old and scrap, lb.		1,236	157,450
Pipes and tubes, lb.			286,345
Plates and sheets, lb.		3,834,546	1,162,607
Wire, except insulated, lb.		2,651,964	811,722
<b>Lead:</b>			
Pigs, bars, etc., produced from domestic ore, lb.		6,907,870	12,512,185
Produced from foreign ore, lb.		4,764,612	1,882,788
Exported to (in part):			
Denmark, lb.		111,923	
Canada, lb.		11,335,208	2,529,632
United Kingdom, lb.			10,303,271
Argentina, lb.		99,228	168,000
Japan, lb.			672,379
<b>Zinc:</b>			
Dross, lb.		2,461,839	1,621,909
<b>Spelter:</b>			
Produced from domestic ore, lb.		23,858,688	12,175,585
Produced from foreign ore, lb.		6,495,603	3,427,139
Exported to (in part):			
France, lb.		8,502,720	7,083,495
Italy, lb.		1,119,355	193,668
United Kingdom, lb.		17,076,957	5,509,354
Canada, lb.		3,524,476	2,190,381
Mexico, lb.		3,219	396,320
In sheets, strips, etc., lb.		2,378,683	2,842,090

### Minerals Separation—Butte & Superior

Minerals Separation North American Corporation will file with the United States Supreme Court a petition for a writ of certiorari to review the decision of the Ninth Circuit Court of Appeals in its suit against the Butte & Superior Mining Company.

## California Oil Production in 1917

Total production of petroleum in California in 1917 amounted to 94,433,547 bbl., according to the report of oil and gas department of the state mining bureau. The figures were compiled under the supervision of Fletcher Hamilton, state mineralogist, from the sworn statements of producers. The official figures are less than the total figures published by private concerns, as the latter make no allowance for water and other impurities in the oil when first produced and gaged. In other respects the official figures of the state mining bureau correspond with those of the Standard Oil Co. and the Independent Oil Producers' Association. No important additions were made in 1917 to the proved oil-land area as determined by the assessment of 1916. The increase in production, which was 7,370,352 bbl., resulted from drilling activity throughout the state and an increase in output of every petroleum-producing county in the state. The production of the new Montebello field was the outstanding feature of the year, and Los Angeles County showed an increased output of 82% over 1916.

The number of wells reported for drilling in 1917 totaled 984. The rate of assessment levied to pay for supervision of drilling operations to protect the fields from damage by water is not based on the number of wells reported for drilling but upon the amounts of oil and gas produced and the acreage of proved lands.

CALIFORNIA OIL AND GAS PRODUCTION, 1917

County	Proved Land, Acres	Oil, Bbl.	Gas, 10M. Cu. Ft.	Number of Wells
Fresno	12,993	16,146,797	59,189	1,131
Kern	56,947	52,688,711	1,927,506	4,716
Los Angeles	2,401	4,357,162	24,175	748
Orange	3,418	14,568,930	655,027	467
Ventura	1,726	989,726		355
Santa Barbara	9,023	5,589,223	60,157	365
San Luis Obispo	772	74,143		18
Santa Clara	80	18,855		14
Totals	87,360	94,433,547	2,726,054	7,834

The rate for the coming year is 14.6c per acre of proved land and 0.119c. per bbl. of oil produced or per 10,000 cu.ft. of gas produced. The total amount to be collected is about \$130,000. The proved land and oil and gas production by counties are shown in the table.

## Trimountain's Copper Sheet

The great sheet of mass copper at the Trimountain mine of the Copper Range Co., Trimountain, Mich., is an interesting as well as a profitable disclosure, and remarkable even in a district where mass copper abounds and is found in sizes ranging from small nuggets to large slabs weighing as much as 525 lb. The sheet apparently covers nine levels on the dip, with an average width of about 100 ft. and a thickness of  $\frac{3}{4}$  in. It was first discovered on the 25 level, was then followed down below the 27, up to the 24 without a break, and has been cut on the 23, 22, and 18 levels. These showings are generally thought to belong to one sheet, but the opinion of some observers is that the upper part from above the 24 level and up to the 18 level comprises another sheet. The mass assays 90% refined copper and is easily separated from the vein matter or the trap, as it does not shade off into the latter and end in small particles, as is frequently the condition. When the mass copper was first found it was in the lode at an angle of

35° and then passed into the trap for about 100 ft., being narrow in some places and wide in others.

The management has had two models constructed, one of glass sheets and the other of sheets of transparent celluloid, each sheet representing a level of the mine with the courses of the lode and the copper sheet traced in colors, which gives the observer a clear and realistic conception of the copper's occurrence. The copper obtained aids to a marked degree in sweetening the Trimountain production, and the tonnage is timely in its appearance, as it comes in when the bottom of the mine is not as good as usual.

## Potash in 1917

The output of all potash materials produced and marketed in the United States in 1917, as reported by the manufacturers to the U. S. Geological Survey, was 126,577 short tons, which contained 32,366 short tons, or an average of 26.4% of pure potash ( $K_2O$ ). This is more than three times the quantity produced in 1916. The approximate average selling price of these potash materials at the points of shipment was \$4.26 a unit—that is, \$4.26 a ton for every 1% of pure potash ( $K_2O$ ) in the material marketed. This price corresponds to \$426 a ton of pure potash.

Potash was produced in 1917 by 82 firms, including 36 wood-ash leachers, most of them operating small works. The total production is about 13% of the normal consumption of potash in the country during the years immediately preceding the war. In 1916 the output of potash salts and potash products in the United States was reported to the amount of 35,739 short tons, having a mean potash content of about 27%  $K_2O$  and a total potash content of 9720 short tons of  $K_2O$ . This was almost exactly 10 times the production reported for 1915.

## May Pig-Iron Production

Pig-iron production in May was 3,446,412 gross tons, as compared with 3,288,211 tons in April, according to *Iron Age*. The daily rate for May was 111,175 gross tons, as against 109,607 in April, and is the highest daily rate, with the exception of October, 1916, which was 113,189. A total of 54,633 gross tons of ferromanganese and spiegeleisen was produced, exceeding all records. Nearly 40% of this was spiegeleisen. The net increase in active furnaces was five.

## New Regiments of Railway Engineers

The War Department has announced that the organization of five new regiments and 19 battalions of railway engineers, to be used in addition to regiments already working in France, is being completed by the staff of the Director General of Military Railways, Samuel M. Felton. The work has been done in conjunction with the engineer corps. When the new forces are put on duty, there will be 50,000 Americans engaged in railroad construction and operation in France.

Tin Exports from the Dutch East Indies to the United States in 1917 amounted to 28,559,997 lb., according to a recent Consular report. In 1916 the amount exported to this country was 31,294,425 pounds.



## Editorials

### The Index—Volume 105

WE INTEND to publish the Index to Volume 105 with our issue of Aug. 3. Believing that many who receive the Index do not bind their copies, and in compliance with the Government's request to conserve paper, we will send the Index only to those who request it by postcard.

*If you want a copy of the Index, send in your request promptly.*

### They Call Them Devil-Hounds, but They Are Simply Hounding the Devil

THE American spirit of progress and success has been carried into the enemy's lines by our marines with characteristic effect. In this issue we present a poster which well recalls the slogan of the Marine Corps recruiting posters—"Join the U. S. Marines and Be the First to Fight." The news that has come to us has filled every American heart with pride born of fulfilled expectations.

Following the slogan that brought the country's best to this branch of the service, we hear of the advance of our marines for a depth of two and one-half miles, over a six-mile front, in a sector northwest of Chateau Thierry; the capture by them of the towns of Torcy and Bouresches, together with 300 prisoners; and the new slogan—"Each Man Get a German; Don't Let Him Get You."

Our marines have set the pace—the standard of our American fighting efficiency. We have no fear that it will not be maintained in all branches of the service.

### The Situation in Lead

LAST spring there was a decline in the price for lead, which followed a temporary disappearance of buyers from the market. There had previously been a large quantity of lead locked up in railway cars in transit. The breaking of the freight blockade released supplies and produced such a sense of easiness that consumers deemed it unnecessary to stay in the market. Not long ago, however, they reëntered. We were then uncertain whether they did so in order to replace scant supplies or whether their motive was to stock up in preparation for transportation difficulties next winter. Now it seems clear that their supplies are short. Important consumers have been obliged to cease work owing to lack of lead.

The fundamental factor in the situation is that we have not been producing enough lead since the collapse of the market last fall. Even more fundamental has been the Governmental interference with the market, which is the reason why we have not produced enough lead. It is true that the price for lead has not been fixed, but the producers have been threatened, which amounted to the same thing; and previous to that the market had been messed up by Governmental bungling.

Producers are now sold up for weeks ahead. There are no stocks. The situation as to Mexican lead, refined in this country, is about as tight. Great Britain is taking a large part of that supply. Canada has lately been buying in this market. Japan has been trying to. It is clear that there is not lead enough, especially of domestic, in spite of the increased production in May and the diminished consumption for building purposes. Reviewing the first five months of 1918, the lead production of the United States was far below the average rate of 1917.

It seems rather preposterous that we should be carrying on this great war business without any stock of lead. What if there should be some trouble in Spain and both Great Britain and France should have to turn to us for lead? But, for that matter, how dangerous is it that we should be running without any stock of copper? No well-managed corporation would think of taking such chances. It would have been pretty bad for Great Britain last spring if she had not previously stocked up with copper. We wonder if the authorities in Washington have thought of this in any broad way, and how they expect to increase the production of lead and copper to such an extent as will result in an accumulation of supplies beyond what is immediately required. The recent rise and strength in the lead market reflect the present situation. How high will the Government permit the price to go? Will it again, for the sake of its theories, prefer to threaten the lead producers and court the dangers of short production; or will it say "*Laissez faire*," in other words, "Let 'er go," and stimulate every little lead mine throughout the country?

### The Plight of the Gold Miners

THE present plight of the gold miners has been the subject of much discussion. They get the same number of dollars for an ounce of their product that they used to, but their dollars will buy only about half as much labor and material; in other words, their operating costs have risen enormously. Some publicists have argued that gold is non-essential, that the gold mines ought to be shut down, so as to release their men for the mining of copper, lead, and other metals directly needed. Others, including ourselves, have argued to the contrary. The Secretary of the Treasury has now expressed the view of the Administration on this subject in a letter to the Alaskan Delegate in Congress as follows:

I beg leave to acknowledge receipt of your letter of June 1, in relation to the present conditions surrounding the production of gold in Alaska. I fully appreciate that, with the rising cost of raw material and labor and with a fixed value for their output, the gold miners of the world are facing difficult conditions. I should be sorry, however, if for this reason there were any relaxation in the effort to produce gold. At no time has this country so much required the largest possible production of gold as at present. Next to food and ammunition, gold is one of the most-needed

war essentials. In order to place the enormous amount of Government bonds required to finance our war expenditures, a large credit structure will inevitably be erected on our gold reserves, and it is necessary that those reserves, which are the foundation of the structure, shall be maintained on the broadest possible basis.

The United States and its associates in the war are heavy purchasers of raw materials and other commodities for the war in many neutral countries, and our war requirements make it impossible for us to pay our bills in those neutral countries as we have been in the habit of paying them in times of peace, viz. through the shipment of manufactured goods and commodities which those countries are eager to buy from us. This means that a certain amount of debt to those countries must be paid for in credits or in gold.

This brief statement will, I hope, make clear to your constituents the great necessity that exists for the maintenance of gold production at the maximum point. The man or the community that maintains or increases its production of gold in the face of difficulties and discouragement is performing a patriotic service which deserves recognition no less than the more obvious but not less useful services that are more in the public eye.

We shall not take the time and space to elaborate upon our endorsement of the soundness of Mr. McAdoo's views respecting this matter. Let us rather direct attention to what may be done to ameliorate the present adversity of the gold miners. They must bow to the operation of immutable economic laws. But is it too much to ask that they be exempted from all Federal taxation? We think not. We hope that this important matter may receive adequate attention in the course of framing the new tax legislation that is now going on in Congress.

### Let Us Not Be Too Late in Russia

THE dissolution of the Eastern front was the thing that made possible the great German drive on the Western. If the Germans are permitted to permeate prostrate Russia with economic propaganda, the situation will become worse than it is now. These principles are generally recognized, but no policy to meet them seems to have been devised. We talk about helping Russia to rehabilitate herself; we are disposed to do so, but we do not know what to do. Yet the time has become ripe for action if there is ever to be any. Bearing upon the situation, we have received privately the suggestions of a distinguished American engineer, experienced in Russian affairs and still in close touch with them. He says:

There should be a joint Allied commercial and trading mission advancing westward across Siberia and following the railway.

Military support, only sufficient to guard the line of communication, police the towns and protect the mission.

The commission to purchase food, hides and flax—all acute needs of the Allies and all plentiful in the country—paying therefor in commission rubles issued by the Allies.

The commission to sell in return for commission rubles, and only for these, the necessaries of life that are so urgently needed by the people.

The commission to take in hand the repair of the Trans-Siberian Railway, both for its own needs and to provide communication with Russia proper when the time comes, as it will.

The commission to be accompanied by influential Russians, and these to supply a center where the reasonable classes of the country may unite. This is the fundamental idea, and if it be considered "intervention" I can have no objection to the term.

In reply to the suggestion "that things in Russia have got to run their natural course and we deprecate any intervention as being bad policy."

Does not this ignore the fact that the Germans are even today preventing things in Russia from running their natural course, are even today intervening by force and guile? The question is not between Allied intervention and no intervention, but between unopposed German intervention and an Allied counter-move taking the form of a commercial mission, with military support to insure its safety.

Recent events leave us with no illusions: the Russian people will and do welcome the Germans as offering them escape from the hopeless disorders of the Bolsheviks. It is a case of any port in a storm. But more readily still would they welcome the Allies, and the Allies are in an immeasurably more favorable position to assist them than are the Germans. They, and not Germany, can provide the clothes, boots and implements of which the country has been swept clean, and they, by purchasing the hides, flax and foods in Siberia, will be satisfying their own needs and will be keeping these supplies out of the hands of the Germans. It is clear that the Ukraine has been a disappointment, and they are now pressing eastward toward Orenburg, one of the gateways of Siberia; and with what force? A mere handful of old men effected the occupation of Rostoff, and that is the measure of the resistance the Allies may expect.

On the other hand, we see the gallant Cossack, Semenoff, short of money and with only a thousand or so followers, pressing back the forces of disorder in Trans-Baikal, occupying Chita and controlling both the main line to Vladivostok and the Amur branch as well. It is his voice that is calling to the Allies, a voice that speaks in as truly Russian tones as any in the country.

I end on the note of help to the people, as one that sounds loud in my ears and should be equally insistent to all Americans. Consequent on the nationalization of the land last November, the crops in Russia proper this year promise to be more inadequate than even those of 1917, and there will be the German demand upon these. If last winter was one of starvation in the towns, what will the next one be? If in May, 1918, despairing appeals are being issued for bread, what will May, 1919, see? Famine will be facing a whole people, and the only granary will be Siberia. Siberia is well supplied today, but with no market such as the commission would provide it is likely that the peasant will consume his stocks and take little pains with this summer's harvest. But even should the autumn find him with full stores, it will be physically impossible for him to bring the wheat to the railway unless he can secure strap iron for his tires and nails and bolts for current repairs. This is to a large extent the condition today, as we know from our own properties; in six months it will be universal.

Even if some of the grain reaches the railway, it must lie there untransported unless the commission has done the job of repair; and, mark you, this time the transport must be toward the west, toward Russia, if one of the most terrible catastrophes of history is to be avoided.

The appeal of the Cadet party for help last week was like an S. O. S. call. We know now that the intelligence of Russia wants our aid. Besides this, there is plenty of evidence that all kinds of people in the great Slavonic country are anxious to resist German conquest and encroachments and overthrow the tyranny of those Bolshevik fanatics who sacrificed a great nation for the sake of an idea which is nothing but economic and social lunacy. What Russia needs and will welcome is the help of supplies, which should first be given, and then a leader. An Allied military expedition, following the commercial, with a popular Russian general at the head of it, would inspire confidence among the Russian people, would cause them to throw off the yokes, both German and Bolshevik, and would put Russia back on the firing line. For the commercial, economic and political mission, let Theodore Roosevelt be the head. There

is no American or Britisher who would be so welcomed by the Russians as he.

The shadowy separation between the Ukraine and Great Russia will not be lasting. Their people are of the same race and have the same economic interests. They cannot remain apart. Poland and Lithuania will be glad to return to Russia as autonomous states. The real economic and political forces in Russia are centripetal, not centrifugal.

The first objection to any plan for helping Russia now will be the lack of ships. The Western front must be made secure. But after that? We need do something more than merely render the Western front secure. We must break up the Western front. The surest way to do so is to recreate an Eastern front. We have got to find the ships, divert them if necessary. In the meanwhile it is high time that we be arranging the preliminaries. Let the commercial mission be started promptly. Let us not once more have to write down the mournful, remorseful words "Too Late!"

### BY THE WAY

Some interesting historical prices of iron in England were given by A. F. Johnson in a paper before an English technical society recently. Johnson stated that in 1436, the price of Spanish iron was about \$70 per ton; in 1462, \$85 per ton; in 1562, raw English iron sold at \$62.50 per ton; Bilbow (Bilboa) at \$57 and Spanish at \$60; in 1571, steel bars sold at \$50 per ton; in 1622 steel sold at \$160 per ton; in 1624, iron bars weighing 24 lb. each sold at a rate of \$186 per ton.

William Heyliger, of D. Appleton & Co., accounts in part for the indecencies and barbarities of German warfare by saying: "Germany has no national sport. Her boys have no books dealing with fair play and boyish standards of honor in competition. Perhaps that is why Germany today stands convicted of the foulest crimes against fair play and decency. The Anglo-Saxon cry of 'fair field and no favor' has no counterpart in the German language. Germany doesn't understand fair play. We would be dealing with a different Germany perhaps, if her boys had been taught that a crooked victory was something to be despised, and if their juvenile literature had driven that lesson home."

In the official statement made by the Railroad Administration at the time the increase in freight and passenger rates was announced, the increase in wages because of the award just made was given as from \$300,000,000 to \$350,000,000. Those figures may prove to be correct; but the facts are that the men on the inside, that is, railway employees themselves, who are to get the increases, have been unable so far to find out what their individual increases will amount to, says the *Evening Post*. The formula given by the Railway Wage Commission for figuring the increase, railroad men declare, is past understanding. "As near as I can make out," one railway official declared, "the way to figure the increases in pay to be allowed by the Govern-

ment is to divide the number of suspender buttons remaining on your trousers, into the number of your watch; multiply the result by the number of your unfilled back teeth; add three ciphers; then divide by the average age of your children. The answer is the increase in pay you will get, minus any increase that has been allowed since December 31, 1915."

A farmer boy drifted into the Joplin district some time ago, attracted by the high wages that were then being paid; but after a few shifts in one of the sheet-ground mines the height of the back got the best of his nerve. So he quit and "rustled" at a mine which he had heard spoken of as safe to work in, but which happened to be in soft ground. Getting a job, he went down with the crew the following morning. The shift boss took him through a long, closely timbered drift to the face, which was also closely timbered, where he was told to sail in and muck out the pile.

The sheet-ground mine had been bad enough, with its high roof, but here he found himself, as he viewed it, in a worse predicament than ever. There the ground had stood alone, but here everything had to be closely timbered. After a few hours he could stand the strain no longer. So hurrying to the shaft, he went on top. On being questioned, he said he was not fool enough to work in such an unsafe mine.

"I may look green," he said, "but this is not the first mine I have worked in. Why, the rock in the other mine was so strong that you could put a barn on it, and yet it didn't need any timbers. Here the ground is so bad that you have to timber it, no matter how small the opening. I'm not fool enough to work in rock so rotten that you have to hold it up."

A writer in a recent number of *The World's Work* on "Baruch and the Grim Job" applauds the subject of his sketch for his service in securing for the Government a lot of copper at 16½c. Thus the legend: "The public remembers of his record primarily the fact that when copper prices were climbing around 35c. per lb., he succeeded in procuring for the Government 45,000,000 lb. at 16½c.—a theatrical arrangement at a theatrical price—obtaining a theatrical applause. If a price is below the cost of sound production it cannot be maintained or even used fairly in the long pull; the country needs the copper, and prices which are too low will not bring copper. It was a good, daring trade smoothly consummated and pleasing to the first thought of persons who uttered glad cries because Baruch had squeezed the copper barons, but a government in the business of making daring trades is a government which rocks the industrial boat. A government which with infinite pains and foresight treats prices as a means first to get the goods and only secondly to pay as little as it has to pay to get plenty of goods is the wise government. Just now we are paying 23½c. for copper." This story will no doubt descend in popular belief like that of the "Angels of Mons," phantom warriors (English bowmen from Agincourt) who intervened just when the British Army seemed to be overwhelmed (in 1914) and kept the German hordes at bay. Similarly will survive the legend of how Mr. Baruch brought Mr. Draper's platinum out of Russia.

## Personals

### Have You Contributed to the Association of the 27th Engineers?

A. W. Allen has joined the editorial staff of the "Engineering and Mining Journal."

W. D. Abel is mining engineer with the Consolidated Coppermines Co., at Kimberly, Nevada.

Cecil Gordon Fennell, of St. Louis, recently investigated the Batesville manganese field, in Arkansas.

L. O. Howard, professor of mining, Washington State College, was in Salt Lake City recently for several days.

Walter S. Brown expects to enter the research department of the New Jersey Zinc Co. at Palmerton, Penn., on Aug. 1.

L. G. Huntley, lecturer on foreign oil and gas fields at the University of Pittsburgh, has accepted the presidency of the Island Oil and Transport Corporation.

J. F. Murphy, formerly assistant professor of mining at the University of Minnesota, has been appointed superintendent of the Savage properties on the Mesabi range.

Daniel Herring, of Joplin, Mo., visited the Batesville, Ark., district last week where he holds certain manganese interests. He contemplates the erection of a washing plant soon.

C. A. Smith, manager of the Coahuila Lead and Zinc Co.'s mines in the Webb City district of Missouri, has been commissioned a captain in the engineering corps of the Army.

James O'Gara, of Bessemer, Ala., a stockholder in the Eureka Mining and Manganese Co., spent several days last week looking over the company's property near Cushman, Arkansas.

Earl T. Stannard, general manager of the Kennecott Copper Corporation, was married to Miss Jeannette Condon, of 440 Riverside Drive, New York, on June 11, and has left with his bride for Alaska.

Woolsey McA. Johnson has married Miss Kathryn Veronica O'Hara, daughter of Mr. and Mrs. W. S. O'Hara, of Philadelphia. The couple are now at Washington, but later will reside at Cynwyd, Pennsylvania.

Hugh D. Miser, of the U. S. Geological Survey, who has been making a survey of the Batesville, Ark., manganese field for the past two months, states that he will finish his work within the next two weeks.

E. P. McCorken, who left the editorial staff of the "Engineering and Mining Journal" a few months ago to enlist in the Navy, has been commissioned an ensign in the Naval Aviation Service and is at present in Washington.

William Wraith has returned to Salt Lake City from his visit to the properties of the Andes Copper Co. in Peru. He expects to move to New York soon to become general manager of the International Smelting and Refining Company.

Milo W. Krejci, assistant superintendent of the Great Falls Reduction Works of the Anaconda Copper Mining Co., resigned on June 4 after 19 years' service with the company to go into consulting metallurgical practice. He is succeeded at the Great Falls works by J. O. Elton.

D. A. Dunlap has been named vice president of the Hollinger Consolidated Gold Mines, Ltd., at Porcupine, Ont., to fill the vacancy caused by the death of John McMartin. Dr. W. L. McDougald, president of the Ogdensburg Coal and Towing Co., succeeds to the vacancy on the board.

A. L. Queneau is engaged in metallurgical work at Wallsend-on-Tyne, England, according to communications received from him within the last few months. A report in the New York papers that he had died in 1917 is not true, and we are glad to publish this notice for the benefit of his many friends.

## Obituary

Cyrus Osborne Baker, president of Baker & Co. of Newark, N. J., died on June 13.

B. Sprague, well known in Western smelting circles through his studies of the effects of smeltery gases upon vegetation, and through his invention, about nine years ago, of the zinc-oxide method of neutralizing sulphur tri-oxide to render smeltery gases less injurious to the bags in the mechanical treatment of blast-furnace and roaster gases, died on June 8 at St. Mark's Hospital, Salt Lake City, as a result of in-

juries received on June 4, in an automobile accident. Mr. Sprague was born Nov. 23, 1875, at Salt Lake City, and was educated there, attending the University of Utah for several years, where he specialized in chemistry. Prior to 1906, when he became research chemist for the United States Smelting, Refining and Mining Co., which position he held up to the time of his death, Mr. Sprague was engaged in analytical work for several coal-mining companies of the intermountain region. Since his connection with the United States company in 1906, he had devoted his attention entirely to the effect of smeltery gases upon vegetation, in which work he was an authority.

## Societies

Engineers' Club of Northern Minnesota met at Hibbing on June 15. Papers were presented by E. J. Hawley on "Garbage Disposal" and M. R. Jenkins on "Underground Stations."

American Institute of Mining Engineers, New York section, met on June 20 at the Machinery Club, 50 Church St., New York at 8 p.m. An illustrated lecture entitled "The Telephone and the World War" was delivered by H. J. Carroll, of the New York Telephone Co. The session was preceded by a dinner at 6.30 p.m. Following are the new officers of the executive committee of the New York section: Allen H. Rogers, chairman; Forest Rutherford, H. C. Parmelee, vice-chairmen; H. C. Parmelee, treasurer; Walter S. Dickson, secretary; J. E. Johnson, Jr., F. T. Rubidge, P. G. Spillsbury.

Canadian Mining Institute, Western branch, held its annual meeting at Vancouver, B. C., on May 27. The following council was elected: J. D. Galloway, Provincial resident engineer of Mineral Survey District No. 2, with headquarters at Hazelton, B. C.; George Winkler, Victoria, B. C.; John Hunt, general superintendent of the Canadian Western Fuel Co., Nanaimo, B. C.; Thomas Graham, general superintendent of the Canadian Collieries, Cumberland, B. C.; Prof. N. Turnbull, professor of mining at the University of British Columbia; Prof. J. G. Davidson, professor of physics at the University of British Columbia; A. B. Clabon, president of the Vancouver Chamber of Mines; E. A. Hagen, editor of the "Mining and Engineering Journal," of Vancouver, B. C.; Robert R. Bruce, manager of the Paradise mine, East Kootenay, B. C.; S. S. Fowler, manager of the New Canadian Metal Co.; Oscar Lachmund, general manager of the Canada Copper Corp.; E. E. Campbell, superintendent of mines of the Granby Consolidated Mining and Smelting Corp. R. H. Stewart, manager of the Sunloch mines, was made chairman and W. Fleet Robertson, Provincial mineralogist, vice-chairman. Papers presented were "Flotation Practices," at Highland Valley Mines, by Frederick Keffer; "Petroleum in British Columbia," by E. A. Hagen, and "Mining Operations at Anyox, B. C.," by E. E. Campbell.

## Industrial News

Suzuki & Co., of New York, dealers in metals, have occupied the 19th floor at 220 Broadway. Their new telephone numbers are Cortlandt 1269 and 1270.

Homestead Valve Manufacturing Co., of Homestead, Penn., has opened a branch office at 1 Franklin St., New York.

National Antimony Co. and Valdor Dredging Co. have moved their offices in San Francisco to 1213 Hobart Bldg., 582 Market Street.

Sullivan Machinery Co. has changed its Lake Superior sales office from Ishpeming, Mich., to Duluth, Minn. The district manager, Jonathan A. Noyes, has made his headquarters at Room 311, Alworth Bldg., Duluth.

H. D. Staley, 132 Lick Bldg., San Francisco, Calif., formerly with the International High Speed Steel Co., is now Pacific Coast representative for Halcomb & Davidson, Inc., 149 Broadway, New York, makers of "Beaver" brand hollow and solid drill steel.

J. M. Riordan, until recently sales engineer of the Grant Lees Gear Co., of Cleveland, Ohio, and formerly with the Fellows Gear Shaper Co., of Springfield, Vt., is now in the sales organization of the Cleveland Milling Machine Co., Cleveland.

Torreon Trading Co. has been organized at Laredo, Texas, Box 327, Salinas Av. 608, by I. A. Porter and Juan M. Oviedo. The firm will do a commission business and

is ready to act as agent for purchasing all kinds of Mexican products or for selling goods in Mexico.

Alberger Pump and Condenser Co., 140 Cedar Street, New York, announces that George Q. Palmer was elected chairman of the board of directors; William S. Doran was elected president; W. R. Wilson, vice president; R. C. Williams, secretary; and Frederick A. Brockmeier, treasurer.

## Trade Catalogs

Universal Displayers, Universal Fixture Corporation, 135 West 23rd St., New York. Circular descriptive of means of displaying maps, plans, blueprints, etc.

Centrifugal Boiler Feed Pumps, De Laval Steam Turbine Co., Trenton, N. J. Bulletin N; pp. 8; 8½ x 11; illustrated. A discussion of the De Laval combined steam turbine and centrifugal boiler feed pump.

Hazard Wire Rope, Hazard Manufacturing Co., Wilkes-Barre, Penn. Catalog and price list No. 17; pp. 50; 4½ x 7½; illustrated. A catalog of wire rope, rope clips, clamps, thimbles, etc., with telegraph code.

Marks' Centrifugal Impact Pulverizer, Marks' Pulverizing Mining and Milling Machinery Co., 712 North Main St., Los Angeles, Calif. Booklet. Pp. 12; 6 x 9½ in. Illustrated. Description of the design and operation of an ore pulverizer with detailed drawings.

Metal Melting Furnace, Monarch Engineering and Manufacturing Co., Baltimore, Md. Folder. Pp. 8, 9 x 12; illustrated. Descriptive of the new Monarch vertical, non-crucible, tilting furnace for melting any of the ordinary metal mixtures used in general foundry practice, except those containing 40% zinc or more; gas or oil-fired.

Cresus Saver, Cresus Co., 164 West Fourth South St., Salt Lake City, Utah. Booklet. Pp. 18; 6x3½ in. Illustrated. Description of a device, attachable to vanners, designed to secure a greater recovery of values with an increased capacity per vanner and to save mineral that is lost or wasted after concentration is effected.

## New Patents

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

"Little David" Pneumatic Tools, Ingersoll-Rand Co., New York. Form 901; 4-page flier; 8½ x 11; illustrated. Tables of sizes and capacities are given and illustrations show all tools and their applications.

Hydrometallurgy—Apparatus for Extracting Metal from Ores, James N. Lewis, Detroit, Mich., assignor to William L. Wilson, trustee, Detroit, Mich. (U. S. No. 1,265,459; May 7, 1918.)

Lead—Extraction of Lead from Its Ores or Lead-Containing Materials, Henry Livingstone Sulman and Hugh Fitzalis Kirkpatrick Picard, London, England, assignors to the Metals Extraction Corp., Ltd., London, England. (U. S. No. 1,265,547; May 7, 1918.)

Mine-Car Stop—William Hartman, Mascoutah, Ill. (U. S. No. 1,265,446; May 7, 1918.)

Phosphate, Iron—Process of Making Ferrophosphorus from Iron Phosphatic Material, John Jefferson Gray, Jr., Rockdale, Tenn. (U. S. No. 1,265,076; May 7, 1918.)

Phosphorus, Copper—Process of Producing Phosphor-copper Compounds, Hyleman Alison Webster, Columbia, Tenn., assignor to John Jefferson Gray, Jr., Rockdale, Tenn. (U. S. No. 1,265,149; May 7, 1918.)

Phosphate, Iron—Process of Producing Ferrophosphorus in Rotary Furnaces, Hyleman Alison Webster, Columbia, Tenn., assignor to John J. Gray, Jr., Rockdale, Tenn. (U. S. No. 1,265,149; May 7, 1918.)

Refractory Material and Process of Making same, Charles B. Stowe, Lakewood, Ohio. (U. S. No. 1,265,545; May 7, 1918.)

Rock-Drill—Thomas E. Sturtevant, Dover, N. J., assignor to McKiernan-Terry Drill Company, Dover, N. J. (U. S. No. 1,268,133; May 7, 1918.)

Steel—Carbonizing Material for Steel Articles, Robert R. Abbott, Cleveland, Ohio, assignor to the Case Hardening Service Co., Cleveland, Ohio. (U. S. No. 1,265,158; May 7, 1918.)

# Editorial Correspondence

## SAN FRANCISCO—June 12

The **Union Construction Co.**, builder of dredges, has entered into a copartnership with the **Union Industrial Works**, to build 10 steel vessels for the U. S. Shipping Board Emergency Fleet. The **Union Construction Co.** is interested in gold and tin placer operations and has built and operated gold dredges in California. The present contract for the construction of ships is to be assigned to the **Union Industrial Works** and operations have started.

**Union Consolidated**, the first of the five northend Comstock mines to be placed on a self-supporting basis of production, since November, 1917, has paid \$70,000 in dividends and cancelled an indebtedness of \$40,000. Comparatively low extraction attracts attention to the high grade of the ores mined. From November, 1917, to June, 1918, extraction and milling totaled 12,644 tons, of a gross value of \$310,778. **Consolidated Virginia** is now a close second to **Union Consolidated**, and **Mexican, Sierra Nevada** and **Ophir** are rapidly becoming self-supporting producers.

**Water for Mining Uses** will not be as abundant this season as last year. The snowfall in some districts was equal to the demands for hydraulic mining as late as the end of May, owing somewhat to the cool weather in that month, which maintained the snow pack in the higher gulches. But in other districts there was an appreciable diminution of water for mining at the end of May. So far the month of June has been of normal temperature for this season, and the indications are that the heat will increase to a degree that will use up most of the available snow before the end of the month. There is no present prospect of the usual summer floods, because there is apparently not a sufficient supply of snow to cause floods. The increased area of power reservoirs in the mountain regions is another cause for the decrease in stream overflow. This will advance the generation of electric energy for power and lighting, but will in proportion decrease the supply of water for placer and hydraulic mining. Irrigation will also demand a large amount of the stored water. The requirements of agriculture and horticulture will no doubt be considered paramount to the requirements of gold mining. The dredging industry may be reduced both in power and water, but it is believed the industry will not suffer to the extent of greatly diminishing the product of the gold dredges. It is generally conceded that the ultimate effect of reduction of gold production temporarily in California may not be disastrous, in that the gold will not be destroyed, but that the agricultural crops that are lost cannot be recovered and great demand for agricultural products at the present time is undeniable. The detriment to the gold industry lies in the fact that the closing down of the mines, if that should be necessary in some cases, will greatly hamper the industry and retard the resumption of gold mining at a time when gold will be in such demand that the cost of mining may be prohibitive. The present cost of gold mining has almost reached the prohibitive stage, and if the lack of water and power further retards the treatment of gold ores, the closing down of important producers may be expected.

## DENVER—June 13

The **New Revenue Bill** to take the place of the present Income Tax and War Excess Profits Tax laws, which is to be considered by Congress in the near future, is of special interest to Western mining operators. The bill will provide a large increase in revenue, possibly to the extent of doubling the taxes now assessed. The Administration recognizes that the present law is unfair in many respects, and presumably every opportunity will be given for a full expression of public opinion at hearings before the Ways and Means Committee of the House of Representatives. The new law will undoubtedly remain in force during the war, and it is important that its provisions shall be so framed as to yield the highest amount of return with the least inequitable burden. The wasting character of the assets of the mining industry and the extreme hazards involved in its operation should have careful consideration,

in order that the new law shall not be so burdensome upon the industry as to interfere with its ability to supply the required amount of minerals for the conduct of war operations. All mine operators who are interested in the effects of the new law should be prepared to attend the hearings of the committee for the purpose of presenting and discussing in detail any concrete examples of inequity of the application of the present law which are known to exist, and make suggestions as to a better method of assessment.

## SALT LAKE CITY—June 14

**Protest Against Increase in Freight Rates**, with the resultant handicap to the metal industry, was telegraphed to Director General McAdoo on June 3 by the mining interests of Utah, following a meeting of the Utah Chapter of the American Mining Congress. The telegram was as follows: "By press reports it is indicated that the Director General has authorized a blanket increase in all freight rates, class and commodity of 25% and a heavy flat increase on base bullion. Some commodities, including low-grade ores and smelter flux, will not stand these large increases; that is, we fear that the increases, irrespective of values or ore and commodities, will result in curtailment of the output of low-grade mines, and the shutting off of products of such mines will seriously hinder the operation of smelting plants by depriving them of indispensable fluxes, and thus reduce the output of metals produced by the smelters. Once the low-grade mines stop shipping, we anticipate that mine labor will obtain employment elsewhere, with the result, in the present labor situation, that a subsequent resumption of operations may not be possible. Do we understand that the order of the Director General provides that carriers are without power to modify the published percentage of increase in rates? Any light you are able to give as to procedure before publication of advanced rates will be appreciated. This communication is addressed to you by unanimous direction of a meeting of Utah metal mine operators held here this afternoon." If the schedule goes into effect, the increases per ton on ores shipped to the Salt Lake Valley smelters will be from 10c. to \$3.037, on ores ranging from \$3.50 to \$300. The new schedule applies 30c. per ton flat increase on iron ores, which will effect certain ores shipped to the smelters for fluxing purposes. On ores from within the state, the highest increase is from Gold Hill (Deep Creek section), on which the rate is raised \$2.125 per ton on a \$40 ore, with corresponding raises on ores of lesser value. The increase in rates on base bullion from Salt Lake Valley to the East is to be \$6.50 per ton, which is an increase of 65% over the former rate, making a freight rate of \$16.50 per ton on base bullion. This increase in all probability will have to be borne by the producer as ore contracts with the smelters expire.

## JEROME, ARIZ.—June 10

To initiate a **Constitutional Amendment** to be known as the **Workman's Compensation Law**, petitions are being circulated throughout the state. This will replace the present inadequate Compensation Act, provide insurance for the employer, and guarantee fair compensation for the injured workman, making it possible for the employe to carry state insurance at no cost to himself and at only actual cost to his employer through the elimination of agents' commissions, insurance company profits, and lawyers and court costs. The amendment was prepared after a two years' study of similar laws in various other states and provides for specific amounts for each and every injury, and allows a maximum of \$8000 and a minimum of \$3000 for any death due to injury, such amount being computed on the earning capacity of the employe at the time the accident occurred. As it is a constitutional amendment, it will require approximately 9000 signatures.

## BUTTE, MONT.—June 13

**United States Manganese Corporation** has taken over the Ophir mill and mine, formerly operated by the Butte-Detroit Co. and expects to treat manganese ore. The

Ophir mine contains manganese in addition to silver ore, but the latter is not to be mined just now. The mill is to be equipped with new machinery adapted to the treatment of manganese.

## TONOPAH, NEV.—June 12

**Holder of Silver Claims** may follow indefinitely in opposite directions a vein where the crest or apex of the anticline is within the claim, is the contention sustained by the Supreme Court in the proceedings brought by the **Jim Butler-Tonopah Mining Co.** to recover the value of ore extracted from beneath the surface of its claims by the **West End Consolidated Mining Co.** In bringing the suit, the **Jim Butler** company denied an apex existed, but contended the vein was in the form of a roll. The lower courts, in part, sustained this contention, but ruled that the crest of this roll constituted an apex, and that the **West End** company had the right to operate the vein in opposite directions on both sides of that point.

## JOPLIN, MO.—June 12

**Joplin District Miners**, by unanimous vote, have agreed to accept 90% of their pay for the remainder of the year in cash and 10% in war savings stamps.

The **New Ways and Means Committee** of the **Mine Operators' Association** of Picher has been announced by President O. F. Brinton. It consists of Temple Chapman, Joplin, chairman; Marshall Draper, Baxter; W. J. Borries, Joplin; W. B. Shackelford, Joplin; and F. N. Bendelari, Joplin. The committee will endeavor to find ways and means to help strengthen local ore markets and assist the mining situation in general.

**Sustaining a Claim for False Representation**, Judge Arba S. Van Valkenburgh has handed down a verdict for \$174,000 damages for Roland R. Conklin, of New York, against the **Porto Rico Mining Co.**, the **Barnett Mining Co.**, J. W. Ground and G. A. Barnett. The sum is the amount paid by Conklin for a mine known as the **Porto Rico No. 1**, situated between Duenweg and Cartersville, Mo. It is a sheet-ground property and is still a producing mine, but Conklin alleged it had been falsely represented to him when he bought it about two years ago, and the Federal judge sustains his claim. Testimony in the case developed that Lee Burch, at that time deputy state mine inspector for this district was employed by Conklin to examine the property. Conklin alleges that he later found that Burch was paid \$2500 for making a favorable report on the property, this money being paid by the defendant in the present action, the original owners of the mine that Burch was hired to examine.

The **American Zinc Institute** was formed at a meeting held in Joplin, on June 6, of mine operators whose output represents 88% of the total production of zinc ores of all grades produced in the Oklahoma, Kansas and Missouri zinc fields, and approximately 35% of the present spelter production of the United States. At this meeting, there was submitted complete zinc data relating to the zinc mining and smelting business of the United States. Correlating the data presented, the following facts relating to the industries, both smelting and mining were established: (1) The zinc industry met satisfactorily the requirements of our Government and the large requirements of our Allies, and the requirements of the trade during the first years of the war, and practically doubled production to meet this demand; (2) After the sudden requirements for war purposes were met and the demand from this source was decreased, there was likewise a marked decrease in consumption by the trade, because those industries using galvanized products were diverted to the manufacturing of more essential war materials; (3) It is estimated that during the life of the war, the controlling consumption factor will show little betterment. Furthermore, the production factor in both spelter and ore can be controlled to exactly meet requirements. In the line with Governmental policies clearly set out in many of the other industries and fairly adminis-

tered by the War Industries Board, the following plans have been laid down: (1) That each industry should strive to secure to the Government its necessary product as well as that of the Allies and the trade, during the life of the war. (2) That consumption and production in any commodity should be equalized as nearly as possible, so that any industry embodying within itself non-essential factors shall release these factors for essential work. Thus each industry will release men, food supplies, transportation and capital for more important and essential Government requirements to assist in the war plans. (3) That in order that our Government and the industries of this country may best lay the plans for future export trade, it is necessary that those industries now suffering because of war and trade conditions shall be maintained as nearly as possible in such a position that they may best take advantage of foreign trade relations at the end of the war. In line with the splendid work which has been done by various industrial organizations, notably the American Iron and Steel Institute, which is so loyally working hand in hand with the Administration through the War Industries Board, the American Zinc Institute has been formed, for the purpose of developing an accredited national zinc organization to immediately bring the zinc industry on a basis which will best meet the Governmental policy and form a medium through which the industry may best serve the Government through the life of the war, and, through experimental work, develop new usages for zinc products. Having in mind all of the foregoing, a meeting will be called in the near future of all the zinc smelting and mining interests of the United States, at St. Louis, at which time the permanent organization will be developed along the lines of the American Iron and Steel Institute for the present and future betterment of the zinc industry of the United States. Announcements of the meeting and notices are in preparation.

#### MOUNTAIN HOME, ARK.—June 12

**Local Ore Buyers in Batesville Manganese field** report an increased production of 500 tons a month over the first months in the year. Five washing plants are now under construction and many more are contemplated, which will greatly increase the production within the next 90 days. Hand jigs of the same type used in cleaning zinc ores are being built and are successfully used in the cleaning of manganese. Prospecting is becoming more general and the area of the field is widening. New strikes are being reported as far up the White River as Guion, 25 miles north of Batesville. Manganese is also reported in Baxter County, east of Mountain Home, and on the south side of the White River, in the same county near Big Flat. Plans are about completed for the erection of an electric furnace, to be situated at Aurora, Mo., 200 miles north of Batesville. The power will be furnished from the hydroelectric plant on White River near Branson, Mo. Among the largest prospectors in the Batesville field at present is the Oliver Iron Mining Co., which has three diamond drills working on a large acreage on the Polk Bayou. New operators are arriving daily. Most of them are coming from the Alabama iron fields, and from the Missouri, Kansas, Oklahoma and Arkansas zinc fields.

#### CLEVELAND, OHIO—June 11

**Efforts to Advance Iron Ore Prices** on July 1 have been the result of the increase in freight rates of 30c. per net ton of iron ore, according to "Iron Age." The matter has been taken up through H. G. Dalton, chairman of the Pig Iron, Ore and Lake Transportation Committee of the American Iron and Steel Institute. The freight advance falls entirely on producers, as the McAdoo order stipulates that the entire rate increase shall be on shipments from the mines to upper Lake ports, and ore prices are delivered prices at Lake Erie docks. This advance increases the delivered cost of ore to the producer 33.6c. per gross ton, and in addition two 10% wage advances have been granted the miners this year. Some ore men declare that to cover these costs and other increased costs of mine operations ore prices should be advanced 75c. per ton. Ore shipments by water during May amounted to 8,792,231 gross tons.

#### HOUGHTON, MICH.—June 12

**Copper Production Increase** at Michigan mines during May was larger than anticipated. Men are gradually returning to the district from other copper camps, from the iron-mining districts and from the Colorado coal fields, to which places they were attracted by offers of high wages a

year ago. All of the northern Michigan copper mines have boosted wages considerably, particularly for tramming, and this fact, together with the providing of better working conditions underground here than in many other districts, is helping to bring in the men so badly needed. Another factor in boosting the copper production is the gradual accustoming of the men to "dry" conditions, for Michigan went into the "dry" column May 1, and many men left at that time. A number of these are returning and all who are here work full shifts. The month of June is showing, in copper production, a better record than the month of May for the same period elapsed, and will likely eclipse production figure for any previous month of the year.

#### WALLACE, IDAHO—June 13

**Coeur d'Alene Labor Shortage** continues to be the most serious problem with which operators have to contend. All mines are short-handed, and the condition is steadily growing more acute as the withdrawal of men for the Army continues. Work on non-productive properties has to a great extent been suspended, and there is a feeling that it will soon be necessary for the Government to order a suspension of mining at all non-productive properties as a means of relieving the labor shortage at mines whose product is necessary for the prosecution of the war. In addition to the men who have been drawn into the military service, many others have been attracted from the mining districts to the Coast by the high wages paid in the shipyards. Many of these have failed to secure employment, being unskilled in that line of work, and it is believed that there will be a considerable movement back to the mines before long by this class, which may afford some relief to the labor situation as it now exists.

#### SPOKANE, WASH.—June 12

**Washington Metal Mine Owners' Association** have sent their president, Judge George Turner, of Spokane, to Washington, to petition the Government to permit the Oregon-Washington R.R. & Navigation Co. to build a 10-mile road up Pine Creek in the Cour d'Alenes. Judge Turner has the endorsement of the railroad officials and will urge that there is a great need of this road, which the railroad company started to build last year, for mining and lumbering operations.

**Agitation for Government Supervision** of smelteries of the United States proceeds, and a crown commission to investigate the smeltery at Trail is being urged. Smelteries were the special order of the day June 6 at a session of the Northwest Mining Association in Spokane. All favored Government supervision during the war. A few favored Government ownership. The situation at the Trail smeltery will be discussed on June 18 at Nelson at a meeting of the Independent Mine Owners' Association, of which Charles F. Caldwell is president. Spokane owners of British Columbia mines will attend.

#### VICTORIA, B. C.—June 8

**Electrical Smelting Methods** are to be investigated as to their applicability to iron ores in the province by Dr. Alfred Stansfield, who has been appointed by Hon. William Sloan, Minister of Mines. All the information available to the Department of Mines, as well as the services of one or more of the provincial resident engineers, will be placed at his disposal. Dr. Stansfield is professor of metallurgy at McGill University and a consulting metallurgist of high standing in Canada.

#### TORONTO—June 15

**Deposits of Nickel and Copper Ore** have been discovered in the upper notch of the Eardley Mountains about seven miles from Breckenridge and three miles from Luskville, Que. The find was made about two months ago by James Lusk, a veteran prospector, but little attention was paid to it until further explorations made recently indicated the extent and richness of the deposits.

**New Oil and Gas Fields** in Dover Township, near Chatham, Ont., have been investigated by Eugene Coste, of Calgary. These fields, situated in the St. Clair flats, came into prominence about a year ago through the discovery of oil while drilling for gas. Oil and gas have been steadily obtained from the well then sunk. Recently a second well has been sunk by the Union Oil & Gas Co., which is 3277 ft. deep and is producing 400 barrels per day. Two other wells are being bored, one of which has attained a depth of 2000 ft. The formation is Trenton limestone, which is a good producer in the West Ohio and Indiana fields, although this is the first time

that oil has been obtained from this formation in Canada. Mr. Coste points out that hitherto oil drilling in the Canadian field has been practically confined to shallow work, but to reach the Trenton formation deep drilling is necessary. It is only recently that the development of the deeper deposits found in the Trenton limestone has been seriously undertaken.

**A New Steel Ship-building Industry** is to be established in Halifax, N. S., by the Halifax Shipbuilders, Ltd., which has been incorporated with a capital of \$6,000,000. Among those interested are James Caruthers, president of Canada Steamship Lines, Ltd.; J. W. Norcross, vice president of the same company, and Roy Wolvin, president of the Montreal Transportation Co. The company will specialize on the construction of 10,000-ton vessels and will lay down three berths, on which construction will be carried on simultaneously. The Canadian government has encouraged the enterprise by awarding the company several contracts at fixed prices for high-class modern steel freighters. It is planned to lay the first keel in about three months—as soon as the yard can be prepared. In the meantime, the company has acquired the Halifax Graving Dock and will extend it and take up the work of repairing a number of disabled ships. As the plant will be under way before ship plates can be produced in Canada, the first operations will have to be carried on with American steel imported under arrangement with the government. The Halifax City Council has granted the company exemption from local taxation.

#### COBALT, ONT.—June 10

**Important New Gold Discovery** is reported in Quebec, south of Lake Abitibi and just east of the Lightning River field, in Ontario. The formation for a width of half a mile and a length of a mile and a half is similar to Porcupine. A schist belt in which the original discovery was made contains numerous quartz stringers. Only a few claims have been staked to date, as the district has not become known, but one of the Cobalt companies has an option on the original discovery, and if the results of the examination now being made are satisfactory the district will receive attention, as there are good shipping facilities.

#### CARACAS, VENEZUELA—May 25

**An American Company** has been granted a concession to build a railway and operate the coal mines of the State of Zulia, in the Guajira Peninsula. A similar concession was granted ten years ago by the Colombian government west of the international boundary, but the difficulties of operating coal mines with depth in the tropics, labor, water troubles during the rainy seasons, heat due to atmospheric pressure and high sulphur content made the venture a failure. The lignite of the tropics may serve so long as fuel oil does not enter the local market.

**The Minister of Fomento** (Secretary of Promotion) has issued a statement as a part of his annual report to the Congress that recommends the creation of a bureau in his department to be known as the Bureau of Mines, which will be of great service if placed in the hands of a technically able man not only to the country but also in attracting foreign capital. In 1917 there were granted nine iron claims, eleven placer gold, three gold vein or reef, one copper-iron, eight copper, one silver-lead and one mica claim. In 1918, up to April 1, six placer gold, three gold reef and five iron claims were entered. It must be noted that a claim under the law embraces about 500 acres of land. There are three objectionable features in the mining law in so far as it applies to foreign prospecting, and the law should be modified if mining is to be stimulated. (1) The owners of land in fee are now allowed to have the first right to enter claims, regardless of who discovers the mines, and their permission must be had in any case or a long legal process that no foreigner will attempt must be followed. This retards or makes it impossible for foreigners to enter claims without paying tribute to the alleged land owners, although the minerals are reserved by the nation. Of course, the owner should be paid damages for any actual inconvenience suffered by him, but the law should be clear as to exactly what this amount should be and who is to determine the damage. (2) Mineral grants are subject to the approval of the Congress, which may or may not ratify the "concession." This is expensive and wholly unnecessary. In addition to this the expense of making the entry is in excess to the fee value of the land, and more than an entry in the United States. (3) The law requires actual assessment work to be done on each separate claim; ten men working steadily for three months out of the year being the year's assessment.

# The Mining News

## ALASKA

ALASKA SHIPMENTS of domestic copper ore, matte, etc., to the United States during May were 13,105 gross tons, having a copper content of 6,069,642 lb. and valued at \$1,412,356.

## ARIZONA

### Cochise County

NEW CORNELIA (Ajo)—May production of copper was 4,404,000 pounds.

SHATTUCK-ARIZONA (Bisbee)—Reports May production of 840,999 lb. copper; 12,021 oz. silver; and 114.60 oz. of gold. For five months of 1918 production was: copper, 4,400,864 lb.; lead, 361,504 lb.; silver, 55,108 oz. and gold, 484.20 ounces.

CALUMET & ARIZONA (Warren)—Smeltery production during May amounted to 7,968,000 lb. of copper, of which 4,768,000 lb. were available for Calumet & Arizona.

### Gila County

INSPIRATION CONSOLIDATED (Miami)—May production was 10,250,000 lb. of copper.

### Maricopa County

SWANSEA MINES (Phoenix)—Are being worked under lease. A 200-ton concentrator is under construction. Flotation experiments have been made.

### Mohave County

LEVIATHAN (Copperville)—Electrifying 50-ton mill.

MISSOURI-MOHAVE (Kingman)—Cut lead-zinc ore carrying gold content.

PIERSON (Kingman)—Wulfenite ore being tested at the Last Chance mill near Wallapai Springs with good results.

ARIZONA MOSSBACK (Oatman)—Machinery being installed in main shaft. To sink to 600 level and explore vein.

GOLD ORE (Oatman)—Developing on 650 level to the east and west.

RECORD LODE (Oatman)—Has installed a new compressor. To sink shaft to 500 level and explore vein.

TOM REED (Oatman)—Winzes to be sunk to determine depth of new orebodies.

### Yavapai County

CALUMET & JEROME (Jerome)—Contract let for diamond drilling. Work to start immediately.

UNITED VERDE EXTENSION (Jerome)—Expected to blow in its new smelting plant June 15.

VERDE COMBINATION (Jerome)—Shaft 300 ft. below 700 level shows schist containing iron pyrites and chalcopyrite. To sink to 1100 level and crosscut to quartz vein.

## ARKANSAS

### Boone County

CONSOLIDATED ZINC (Zinc)—To build 400-ton concentration plant at an estimated cost of \$70,000. Sludge and slime tables, compressors, conveyors, ore cars and tracks will be purchased. W. W. Palmer, Muskogee, Okla., is superintendent.

### Independence County

ALLEN (Batesville)—Machinery for washing plant received. Expect to have same in operation within 60 days. Owned by J. C. Shepherd and associates.

ALNUTT-PURSE (Batesville)—Installing small washing plant five miles north of Batesville.

BILL JIM (Batesville)—Installing 250-ton washing plant to operate within next 60 days.

INDEPENDENCE (Batesville)—Installing washing plant at the Polk-Southard manganese mine. Formerly mined only lump ore, and several thousand tons of rich wash dirt remain on dumps. Two steam shovels in operation.

EUREKA (Cushman)—Washing plant to be operated full time. Building road from mine to shipping point at Cushman.

HANFORD-SHEPHERD (Cushman)—Machinery for washing plant on Arkansas Phosphate Co. lease received.

## CALIFORNIA

### Amador County

HARDENBERG (Jackson)—Dismantling equipment. Hoist motor sold for use in construction on Hetch Hetchy reservoir. Arrangements to dispose of remaining machinery in progress.

PLYMOUTH CONSOLIDATED (Plymouth)—Development on 2600 level shows widening of vein and smaller shoots. W. J. Loring is manager. J. F. Park is superintendent.

### Calaveras County

MANGANESE AND CHROME development on the Carley, Williams and other properties near Murphys contemplated by A. L. Briggs.

### Del Norte County

HYDE CHROME CLAIMS situated in Low Divide district in the Smith River basin, at the head of Copper Creek, have been sold to Portland men. The formation is serpentine of coarse texture and the strike of the veins on which most of the copper mines, formerly worked, are situated, is north and south.

### Santa Barbara County

CHROME DEPOSIT at the head of Happy Canyon, near Ynez, reported to be producing and shipping ore.

### Shasta County

AFTERTHOUGHT (Ingot)—Mine, oil-fotation plant and roasters closed down June 5.

U. S. S. R. & M. (Kennett)—Production at Mammoth smeltery during May amounted to 1,328,000 lb. of copper.

MIDAS (Knob)—Victor Power and Development Co. has improved hoisting plant. Development on upper levels progressing.

BULLY HILL (Winthrop)—Installing ball mills and flotation plant. To have plant and other buildings completed in July. Underground work progressing.

### Tuolumne County

CHROME DEPOSITS on Marsh Flat owned by C. F. Leithold have been leased to Restano and Gandolfo and associates, of Sonora. The same leasers have also taken over under lease the old Quarri ranch, which is said to contain a fine deposit of chrome.

EAGLE-SHAWMUT (Shawmut)—Operation resumed. Flotation plant and 70-stamp mill handling 400 tons daily. Shaft has been deepened to 2243 feet.

FORTUNA (Sonora)—Grading for installation of ball mill to be used in prospecting and development. Concentrator is also contemplated. Good vein of ore has been disclosed, but the operators, Eaton, Hamilton and Caulfield, have decided that a prospecting plant is more essential at present than a larger treatment plant.

## COLORADO

### Chaffee County

ALPINE DISTRICT showing activity and several properties being developed. Silver-lead ore opened last autumn to be worked when snow conditions permit.

PARAMOUNT REDUCTION CO. (St. Elmo)—Milling plant being overhauled. Static plant to be installed in addition to concentration and flotation units already in mill. Ores from Stonewall and Flora Belle mines and old mill tailings at St. Elmo to be treated. At Stonewall mine, steam plant and air compressor to be installed.

### Gilpin County

SACO DE ORO (Apex)—Lateral development work from 215-ft. shaft has opened gold ore. To be equipped with hoisting and compressor plant.

GISH AND KINNEY (Rollinsville)—Equipping of two flotation mills nearly completed.

### Gunnison County

AVOCA-VIRGINIA (Pitkin)—New buildings complete. Developing graphite ore.

ETHIOPIAN (Pitkin)—Tunnel to be driven to cut graphite vein.

IDA MAY (Pitkin)—Reopened last winter. Development work retarded by snow conditions. Several carloads ready for shipment.

MOHAWK (Tin Cup)—To be developed this summer. Frank G. Peck and others, of Portland company, are owners.

OCCIDENT & GREENHORN (Tin Cup)—Tungsten and molybdenum opened in developing claims.

AKRON (Whitepine)—Installing electric power line from Monarch and reconstructing mill. To purchase roaster, magnetic machinery and filter.

### Lake County

COLONEL BOHN (Leadville)—Developing body of manganese ore. Deposit not yet opened to full extent.

IRON SILVER (Leadville)—Operating Marian group in Adelaide Park, and Mikado and Gallagher mines under lease. In latter two zinc sulphide ore being mined.

MILLER GOLD MINING CO. (Leadville)—Extensive development work planned for this year. Compressor plant and machine drills to be installed, and electric power line extended from Mount Champion mine. Gold ore opened in lower tunnel, which is to be extended. Property has 100-ton mill. J. S. Buehler is in charge.

### Ouray County

YELLOW JACKET (Ouray)—Development work during winter has opened promising oreshoots of lead-zinc ore.

BACHELOR (Ouray)—Lessees making regular shipments. Ore sent to Ouray sampler.

JONATHAN (Ouray)—To be reopened by lessees. Adjoins American Nettle in gold-bearing quartzite belt below Ouray.

MAID OF THE MIST (Ouray)—To be reopened by lessees. Other properties in section are being sampled and considerable activity is expected.

MINERAL FARM (Ouray)—Recently reopened by Arps brothers and Murray under lease.

OLD LOUT (Ouray)—To be worked by lessees.

SILVER LINK (Ouray)—Developing. Driving on vein to reach point under oreshoots cut on levels above.

UNCLE SAM (Ouray)—The mine has closed down, as all the miners have responded to the draft call.

### Pitkin County

SMUGGLER LEASING CO. (Aspen)—Opened shoot of silver-lead ore on 17 level. Shaft may be sunk to 18 level.

## MICHIGAN

### Copper District

CALUMET & HECLA (Calumet)—Copper production in May, 12,944,732 lb. Producers were: Ahmeek, 2,516,660 lb.; Allouez, 715,427; C. & H., 6,008,589; Centennial, 213,848; Isle Royale, 1,395,242; La Salle, 201,117; Osceola, 1,485,563; Superior, 140,944; White Pine, 267,342 pounds.

FEDERAL SYNDICATE (Calumet)—Shaft 20 ft. deep with good copper showing.

QUINCY (Hancock)—To install Marcy mill for experimenting.

HOUGHTON COPPER (Houghton)—Second new lode cut believed to be West vein continuing to crosscut for Superior lode.

NEW BALTIC (Houghton)—Drifting north at angle to cross lode on which shaft is situated.

SOUTH LAKE (Houghton)—Closing down temporarily because of difficulty of securing labor and present high cost of production.

MOHAWK (Mohawk)—Operating two out of four stamps at mill.

MASS (Mass City)—To install large compressor, which will complete improvements at surface plant until labor can be secured to erect "B" shafthouse.

**WINONA (Winona)**—Sinking of King Philip No. 1 shaft delayed owing to lack of men.

#### MISSOURI

##### Howell County

**MISSOURI IRON AND STEEL (Brandsville)**—To re-erect blast furnace now being dismantled at Jefferson, Texas.

##### Joplin District

**GRAYSON (Joplin)**—Completing new 250-ton mill on Scotia tract, five miles southwest of Joplin. Old shaft recribbed and enlarged, and new shaft sunk. Company plans drilling. H. H. Hughes is manager.

**MUSKOGEE (Joplin)**—To remodel old mill, and will purchase new sludge tables, conveyors and compressors. Also to purchase 300-ton mill equipment. E. C. Beatty, of Springfield, is manager.

**NORTH AMERICAN (Joplin)**—To erect 250-ton mill at a cost of \$60,000. Elevators, sludge tables, compressors and crushers to be purchased. W. R. Shanklin is in charge.

**REINDEER (Joplin)**—To build 150-ton mill soon. To purchase sludge tables and crushers. O. B. Munson is superintendent.

#### MONTANA

##### Cascade County

**ANACONDA (Great Falls)**—New rolling mill has begun operations. Producing copper rods.

##### Deerlodge County

**ANACONDA (Anaconda)**—Expects to be producing ferromanganese about Sept. 1.

##### Jefferson County

**AMALGAMATED SILVER (Clancey)**—Stopping on 250 and 180 levels.

**ALTA (Corbin)**—Draining old workings preliminary to exploration. Silver-lead ore is claimed to be replaced by copper and iron below 1500 level.

**MOUNT WASHINGTON (Wickes)**—Five teams hauling ore from mine to railroad at Wickes.

##### Lewis and Clark County

**CRUSE CON. (Helena)**—Deepening 180-ft. shaft to 300 level on incline. Work to start immediately.

**HELENA (Helena)**—Mine shipped five carloads to smeltery during May.

**BARNES-KING (Marysville)**—Ore from Shannon and Piegan-Gloster mines handled at Gloster mill.

**BELL BOY (Marysville)**—Shipping milling ore to Bald Butte mill and smelting ore to East Helena smeltery.

**ST. LOUIS (Marysville)**—Stamping and cyaniding ore from Nine Hour lode and also from Blue Bird-Hickey tunnel. Tailings dump near mill also to be worked over.

##### Silver Bow County

**ANACONDA (Butte)**—High Ore mine closed down and installing fireproof shaft. Mountain Con. closed down owing to breakdown of engine, which is to be replaced.

**DAVIS-DALY (Butte)**—Developing 400 level of Hibernia mine. Shaft has been pumped out and hoisting will begin soon.

**NORTH BUTTE (Butte)**—Opening Sarsfield shaft, now down over 700 ft. To crosscut for vein when depth of 900 ft. is reached.

**TUOLUMNE COPPER (Butte)**—Crosscut on 825 level of Butte Main Range has been driven over 300 ft. of the 675 ft. required to reach vein.

#### NEVADA

##### Esmeralda County

**ATLANTA (Goldfield)**—Drift being extended north from 20 ft. above 1900 level to explore footwall.

**BLUE BULL (Goldfield)**—To open ore-shoot on 200 level by raising from 250 level.

**GRANDMA CONSOLIDATED (Goldfield)**—Shaft down over 800 ft. and in quartz.

**GOLDFIELD CONSOLIDATED (Goldfield)**—Treating mill tailings and oxidized ore by cyanidation.

**GREAT BEND (Goldfield)**—Unwatering and repairing shaft preparatory to sinking deeper.

**SILVER PICK (Goldfield)**—Main shaft, 1130 ft. deep, shows vein quartz.

##### Nye County

**TONOPAH DISTRICT** ore production for the week ended June 8 totaled 10,279 tons, of an estimated gross milling return of \$174,743. Producers were: Tonopah Belmont, 2186 tons; Tonopah Mining, 3750; Tonopah Extension, 2568; Jim Butler, 160; West End, 1020; MacNamara, 315; Montana, 144; North Star, 73; and miscellaneous, 45 tons.

**TONOPAH EXTENSION (Tonopah)**—To deepen Victor shaft.

**TONOPAH MINING (Tonopah)**—To follow small veins heretofore unexplored.

**WEST END CONSOLIDATED (Tonopah)**—Timbering of Ohio shaft complete. To prospect 800 level.

#### OKLAHOMA

##### Joplin District

**TRIANGLE (Commerce)**—New shaft repaired. To operate 300-ton mill. Second shaft down 35 ft. John M. Bomford, Miami, is president.

**AURORA (Miami)**—Started construction on 150-ton mill. To purchase sludge and slime tables, crushers, compressors, belts, conveyors, ore cars and track. John W. Hale is superintendent.

**MAXINE (Miami)**—To let contract soon for 400-ton gas-driven mill. Shaft down 191 ft. W. C. Miller, Miami, is superintendent.

**WAXAHACHIE (Oklahoma)**—Started construction of 150-ton mill near Leadville. To purchase sludge and slime tables, crushers and conveyors. J. Hare is general manager.

#### OREGON

##### Baker County

**IRON DYKE (Homestead)**—Sinking three-compartment shaft to extend 260 ft. below level of Snake River.

##### Jackson County

**WHITNEY (Gold Hill)**—Reopening with new shaft at elevation of 1375 ft. Property idle for several years and formerly produced high-grade ore.

**BLUE LEDGE (Medford)**—Shipping 150 tons of copper ore weekly. Medford-Jacksonville R. R. to be extended to the district.

##### Josephine County

**CALIFORNIA CHROME (Waldo)**—Have purchased 24 claims held by George S. Barton. Large tonnage available for immediate shipment by water via Crescent City, California.

#### SOUTH DAKOTA

##### Lawrence County

**DEADWOOD LEAD AND ZINC (Deadwood)**—Plant completed and to start as soon as motors arrive.

**GOLDEN CREST (Deadwood)**—Unwatering workings. Cyanide plant will be placed in operation.

**TROJAN (Deadwood)**—Regular shipments being made to plant from company's lease on Republic mine.

**BISMARCK (Lead)**—In addition to gold-silver ores, good grade tungsten has been recovered and deposits to be further developed.

##### Pennington County

**AMERICAN TIN AND TUNGSTEN (Hill City)**—To resume operations on tin properties.

#### UTAH

##### Juab County

**TINTIC SHIPMENTS** for week ended June 1 were 177 cars.

**CHIEF CONSOLIDATED (Eureka)**—Lessees mining manganese ore from company's Homansville property. To build new loading platforms to facilitate handling of ore.

**GODIVA (Eureka)**—Mining high-grade ore at Knight lease.

**IRON KING (Eureka)**—Shaft down 450 ft. below main tunnel level cut iron and quartz vein.

##### Salt Lake County

**MONTANA-BINGHAM (Bingham)**—Insurgent stockholders to attempt change in management. Property producing little and pledged to heavy salary account.

##### Summit County

**PARK CITY SHIPMENTS** week ended June 1 were 3,376,550 lb. of ore and concentrates.

**DALY WEST (Park City)**—Reported that dump ore is to be run through Daly West mill.

**IGWA COPPER (Park City)**—Hand-capped by surface water.

**PARK-UTAH (Park City)**—Progress made in drifts north and south from main operating tunnel.

**SILVER KING CONSOLIDATED (Park City)**—Machinery from older workings being hauled to California-Comstock in

Thaynes Canyon section. Reported that work in other parts of mine is being abandoned. Spiro tunnel in 6850 ft. of California-Comstock ground.

#### Tooele County

**WESTERN UTAH COPPER (Gold Hill)**—Reported to have been acquired by eastern men.

#### WASHINGTON

##### Spokane County

**IDAHO MICA (Spokane)**—Installed small plant to prepare mica and mica products for the market. Developing property in Latah County, Idaho.

##### Stevens County

**ELECTRIC POINT (Boundary)**—Surveys being made for 10 miles of railroad to be built to Great Northern at cost of \$150,000, if development on 1000 level shows orebodies similar to those above. Depth of 800 feet has been reached, and two ore shoots opened on that level.

**MELROSE (Boundary)**—Five feet of gray copper ore struck at 650 feet.

**NORTHWEST MAGNESITE (Valley)**—Producing 200 tons ferromagnesite daily. Higher grade magnesite recently opened.

#### WISCONSIN

##### Zinc-Lead District

**LUCKY SIX (Linden)**—Operating new 50-ton mill. Kletzsch brothers, of Milwaukee, are principal owners.

**KISTLER-STEPHENS (Platteville)**—Reiley lease proved by drill; to sink shaft, and 75-ton mill on the Alderson tract to be moved to property.

**LITTLE PLATTE (Platteville)**—The Bell mill equipment being moved to James Tracey property, seven miles west of Platteville, formerly operated as the Old Mexico. Three-ft. vein of high-grade disseminated blende crosscut at the 92 level.

**NEW ROSE (Platteville)**—Shipped first car of blende concentrates.

**WILSON (Platteville)**—Being unwatered by Utt-Thorne Company.

#### CANADA

##### British Columbia

**REVELSTOKE INTERNATIONAL MINING CONVENTION** to be held July 8, 9 and 10. William Sloan, minister of Mines; John Hart, Minister of Finance, and J. H. Kig, Minister of Public Works, are to speak.

**LANARCK (Revelstoke)**—Freshet damaged new dam to extent of \$1100.

**LUCKY JIM (Slocan)**—Closed down pending negotiations for new contract with Trail smeltery.

**RAMBLER-CARIBOO (Slocan)**—New orebody opened on 600 level.

##### Ontario

**DOMES EXTENSION (Porcupine)**—Diamond drilling to determine direction of vein system.

**CONIAGAS (Cobalt)**—Treatment of tailings by oil flotation begun. Experiments also being made with old slimes.

**CROWN RESERVE (Cobalt)**—Cut vein of high-grade ore on Walsh claims in Gowganda.

**LA ROSE CONSOLIDATED (Cobalt)**—New vein cut on 415 level of the Violet. Crosscut vein showing cobalt and niccolite on the 330 level.

**KIRKLAND LAKE GOLD (Kirkland Lake)**—Dewatering. Work to be resumed by Beaver, which owns control.

**KIRKLAND-PORPHYRY (Kirkland Lake)**—Vein cut on Orr property at 400 level.

**PORPHYRY GOLD (Kirkland Lake)**—Crosscut ore on the 400 level.

**MURRAY MOGRIDGE (Swastika)**—To continue development of property.

**CASEY-COBALT (Casey Township)**—New 20-stamp mill in full operation.

**VACUUM OIL & GAS (Thamesville)**—To sink well to Trenton formation.

**THACKERAY (Wolfe Lake)**—Trenching and shipping. Vein carrying gold has been found on surface.

#### AFRICA

##### Belgian Congo

**UNION MINIERE DU HAUT KATANGA (Elizabethville)**—Produced in May 5,180,810 lb. copper.

##### CHOSEN

**ORIENTAL CONSOLIDATED (Unsan)**—May cleanings \$134,000.



# The Market Report

## SILVER AND STERLING EXCHANGE

June	Sterling Exchange	Silver		June	Sterling Exchange	Silver	
		New York, Cents	London, Pence			New York, Cents	London, Pence
13	4.7530	99½	48½	17	4.7530	99½	48½
14	4.7500	99½	48½	18	4.7530	99½	48½
15	4.7530	99½	48½	19	4.7530	99½	48½

New York quotations are as reported by Handy & Harman and are in cents per troy ounce of bar silver, 999 fine. London quotations are in pence per troy ounce of sterling silver, 925 fine.

## DAILY PRICES OF METALS IN NEW YORK

June	Copper		Tin		Lead		Zinc
	Electrolytic	Spot	N. Y.	St. L.	N. Y.	St. L.	St. L.
13	*23½	†	7.57½	7.45	7.50		7.50
14	*23½	†	@7.67½	@7.55	@7.60		7.60
15	*23½	†	7½	7½	7.60		7.60
17	*23½	†	@7½	@7.70	@7.70		7.80
18	*23½	†	7.82½	7½	@7.90		7½
19	*23½	†	7.82½	7½	@8		7½

\* Price fixed by agreement between American copper producers and the U. S. Government, according to official statement for publication on Friday, September 21, 1917.

† No market.

The above quotations (except as to copper, the price for which has been fixed by agreement between American copper producers and the U. S. Government, wherein there is no free market) are our appraisal of the average of the major markets based generally on sales as made and reported by producers and agencies, and represent to the best of our judgment the prevailing values of the metals for the deliveries constituting the major markets, reduced to basis of New York, cash, except where St. Louis is the normal basing point.

The quotations for electrolytic copper are for cakes, ingots and wirebars.

We quote electrolytic cathodes at 0.05 to 0.10c. below the price of wirebars, cakes and ingots.

Quotations for spelter are for ordinary Prime Western brands. We quote New York price at 20c. per 100 lb. above St. Louis.

## LONDON

June	Copper		Tin		Lead		Zinc
	Standard	Electrolytic	Spot	3 Mos.	Spot	3 Mos.	Spot
13	110	110	125	329	329	29½	54
14	110	110	125	329	329	29½	54
15							
17	110	110	125	329	329	29½	54
18	110	110	125	329	329	29½	54
19	110	110	125	329	329	29½	54

The above table gives the closing quotations on London Metal Exchange. All prices are in pounds sterling per ton of 2240 lb. For convenience in comparison of London prices, in pounds sterling per 2240 lb., with American prices in cents per pound the following approximate ratios are given, reckoning exchange at \$4.7515 : £29½ = 6.2576c.; £54 = 11.4545c.; £110 = 23.3333c.; £125 = 26.5151c.; £260 = 55.1513c.; £280 = 59.3937c.; £300 = 63.6362c. Variations, £1 = 0.2121205c.

## Metal Markets

### NEW YORK—June 19, 1918

Sharp advances in both lead and zinc were the outstanding features of interest this week.

**Copper**—The demand continued very large, and producers are very much behind in their deliveries. They are badly over-sold for May, i. e. they owe the delivery

of a great deal of copper that ought to have been shipped in May.

**Copper Sheets** are quoted at 31½c. per lb. for hot rolled, and 1c. higher for cold rolled. Copper wire is quoted at 26½c. f.o.b. mill, carload lots.

**Tin**—During the latter part of the week Chinese No. 1 tin, on the spot, was offered at 96c.; Lamb & Flag, at 94c.; Banka, afloat, at 89c.; and Banka for early shipment, at 87c. A parcel of Straits tin that has been offered at \$1.10 remains unsold.

**Lead**—The conditions described in our last report continued in full force and the market rose further on moderate buying. On June 17 the A. S. & R. Co. raised its price to 7.82½c., New York, and 7.75c., St. Louis, all of the other producers did the same, and since that time nobody has been willing to sell for less.

**Zinc**—There was some inquiry from galvanizers, some business was done, and, with further demand in prospect, the market rose sharply.

**Zinc Sheets**—Unchanged at \$15 per 100 lb. less usual trade discounts and extras as per list of Feb. 4.

## Other Metals

**Aluminum**—Price fixed at 33c. per lb. for lots of 50 tons or more, ingot, 98-99% grade. Price established June 1 and continues to Sept. 1.

**Antimony**—The prospective increase in freight rates, the abolition of import rates, etc., have stimulated a further advance in the quotation. Business is rather light. We quote spot at 13½@13¾. Futures are a shade easier. We quote 11½@12c., c.i.f., in bond, on the basis of present freight rate.

**Bismuth**—Metal of the highest purity for pharmaceutical use is quoted at \$3.50 per lb. for wholesale lots—500 lb. and over.

**Cadmium**—This metal is quoted at \$1.50 per lb.

**Nickel**—Market quotation is 40@45c. per pound.

**Quicksilver**—California virgin is strong at \$125. Mexican virgin is quoted around \$116. San Francisco reports, by telegraph \$113.50, steady.

## Gold, Silver and Platinum

**Silver**—Silver remains unchanged at figures which have recently prevailed. Production and consumption are keeping pace with each other. The large coinage of rupees in India calls for large shipments of bullion to that quarter. The exports from San Francisco for the month of May are reported as 42,000,000 ounces.

The melting of silver dollars at the New York Assay Office is going on at the rate of 1,000,000 per week, according to the "New York Tribune."

Mexican dollars at New York: June 13, 77; June 14, 77; June 15, 77; June 17, 77; June 18, 77; June 19, 77.

**Platinum, Palladium and Iridium**—Prices fixed at \$105, \$125 and \$175, respectively.

## Zinc and Lead Ore Markets

**Joplin, Mo., June 15**—Blende, per ton, high, \$76.20; basis 60% zinc, premium, \$75; class B, \$55; prime western, \$45; calamine, per ton, 40% zinc, \$30@35; Average selling price blende, \$45.68; calamine, \$36.14; all zinc ores, \$45.32.

Lead, high, \$90.45; basis 80% Pb, \$88@86; average selling price all grades of lead, \$85.48 per ton.

Shipments the week: Blende, 11,146; calamine, 432, lead, 1396 tons. Value all ores the week, \$644,119.

Last week's drop to \$42.50 found a reaction late last Saturday night in an advance back to \$45, at which basis one company purchased 2700 tons. All other

buyers came to that figure this week. Sellers will dispose only of a portion of their production on this base, expecting that they will receive more a little later, and knowing they must or quit mining.

**Plattsville, Wis., June 15**—Blende, basis 60% zinc, highest price reported paid for premium grade was \$70 per ton; high lead blende product sold down to \$45 per ton; base lead ore, basis 80% lead, \$85 per ton.

One car of zinc ore sold two weeks previous but settled for this week brought \$74.25 per ton, the highest price paid here under the new schedule.

Shipments reported for the week were 2861 tons blende, 708 tons sulphur ore and no galena. For the year to date the totals are 60,564 tons blende, 3013 tons galena, and 25,319 tons sulphur ore. During the week 3514 tons blende were shipped to separating plants.

## Other Ores

**Chrome Ore**—Offered at \$1.50 per unit, f.o.b. shipping point, basis 40%, with variation of 5c., up and down, minimum 38% chromic oxide.

**Manganese Ore**—Unchanged at \$1.35 New York, \$1.33 Pittsburgh, and \$1.18 South Chicago, on basis of ore assaying 48 to 49%.

**Molybdenum Ore**—Offered at \$1.25 per lb. of molybdenum sulphide contained, but doubtful whether that can be realized.

**Pyrites**—Spanish lump is quotable to those who possess a license from the Government at 17c. per unit on the basis of 98. ocean freight, buyer to pay war risk, less 2% and excess freight. Tonnage is extremely difficult to obtain. Domestic pyrite is selling at prices ranging from 25 to 30c. per unit, f.o.b. mine. Unchanged.

**Tungsten Ore**—The market remains the same as last week with prices ranging from \$19 to \$24 per unit. High-grade ores free from impurities are quoted at from \$23.50 to \$24 per unit; low-grade ores containing impurities are quoted at \$19 to \$20 on the basis of 60% or over.

## Iron Trade Review

### NEW YORK—June 19

The War Industries Board and the iron and steel manufacturers' committee will take up at Washington, on Friday, according to the "Iron Age," the price schedule for the period beginning July 1. A preliminary meeting of iron and steel manufacturers has been called for Wednesday, June 19, at the Waldorf-Astoria, New York, to consider what advances, if any, should be asked for by producers.

Costs in the next quarter will be higher, the freight advances adding from \$1 to \$1.50, to pig-iron cost. Already Lake iron-ore producers and various blast furnace companies have made up their case for higher prices, and more sharply than ever the diverging interests of large and small producers stand out.

No sign is given as to the Government's position in Friday's meeting except the dubious intimation that the War Industries Board has no suggestion in advance of hearing from the steel trade.

### PITTSBURGH—June 18

Steel producers and merchant furnacemen testify to the increasing smoothness with which the Government machinery is working. There has been vast improvement in the last few months, and though everything is not yet in perfect working order, the war machine is regarded as at least 90% efficient in its numerous points of contact with the iron and steel industry, and such difficulties as remain are being rapidly removed. Red tape has been largely removed, and, where it remains, it is allowed to take its own course, material being produced and shipped without waiting for the red tape to catch up. The producers seem to be well satisfied with the Government's methods of handling the business, and the Government authorities seem to be equally well satisfied with the industry.

With perhaps trifling exceptions, no material remains, either merchant pig iron or steel products, after direct and indirect Government business is taken care of and the wants of consumers on the preference list, prescribed June 6, are met. This, however, is not surprising when it is considered that some interests estimate that the preference list—that of more essential commercial uses—represents 90% of the total commercial demand. If there were any material left at this time it would not be permissible to ship it to customers not entitled to preference. Provision is made for such shipment, upon written permission of the Director of Steel Supply, but this system is to be put in operation only after the promised revision of the preference list is issued, and it is not known when that will be.

Production is about the same as formerly in both pig iron and steel. The Carnegie Steel Co. is operating 55 of its 59 blast furnaces and is producing ingots at 85 to 90% of full capacity. A Clairton furnace, that was scheduled for blowing in a couple of days ago has not yet been started.

The Institute's steel ingot report for May shows production of 3,256,965 gross tons by 29 companies which in 1916 made 83.14% of the total. This indicates a rate for the whole industry of 42,300,000 tons per annum, against a rate in April of 43,650,000 tons. An increase had been expected, particularly as the rate of pig-iron production had increased by about 1%. Shortage of scrap probably affected ingot production in May, as did the several spells of extremely hot weather.

Production of rails in 1917 is reported by the Institute at 2,944,161 gross tons, 90,000 tons increase over 1916 and the largest output since 1913. The output is larger than was estimated in some quarters. Deducting exports and the unusually small tonnage that was used for laying new track, it appears that the railroads were well supplied with rails for replacement.

**Pig Iron**—All shipments of pig iron are under direct or indirect control of the Government. First there are direct orders; then come the allocations, which grow more numerous each week; next come shipments to consumers whose "purposes" are on the preference list, the distribution being left to the judgment of producers, and finally would come shipments to customers accorded no preference, but there is none left now for that category. The market remains quotable at the set limits: Bessemer, \$35.20; basic, \$32; No. 2 foundry, \$33; malleable, \$33.50; forge, \$32, f.o.b. furnace, freight from the Valleys to Pittsburgh being \$1.10. The new rate, effective June 25, will probably be \$1.40.

**Steel**—There is absolutely no steel available to ordinary buyers, some preference being required to get any material, even discard steel. Even off-heats, which result in the manufacture of shell steel, cannot be rolled unless for a preference purpose. Set prices remain at \$47.50 for billets, \$51 for sheet bars and small billets, \$50 for slabs and \$57 for rods.

**Ferroalloys**

**Ferromanganese**—Occasional sales of 70% are being made at \$250, delivered, which price is well maintained. There has been occasional shading of the \$4 per unit extra for higher manganese contents. Spiegeleisen remains quotable at \$70, furnace, while there are rumors of higher prices for small prompt lots.

**Coke**

**Connellsville**—Conditions show no change, with about 340,000 tons a week being shipped from the Connellsville and Lower Connellsville regions, as for about two months past. Byproduct coke production is marked for considerable increases as new ovens are completed in the next few months. The market remains at the set limits, \$6 for furnace and \$7 for foundry.

**Iron Ore**

In the conference on iron and steel prices generally to be held June 21 between the War Industries Board and the producers, the producers will urge that existing prices be continued after June 30, except that the ore producers will ask that price at Lake Erie dock be advanced by reason of the freight advance effective June 25, which will increase the freights from mine to upper Lake dock by about 35c. a ton, the prescribed advance in Order No. 28, the general order, being 30c. a net ton.

**STOCK QUOTATIONS**

Table with columns for N. Y. EXCH. and BOSTON EXCH. listing various stocks and their prices as of June 18.

Table with columns for N. Y. CURB listing various commodities and their prices as of June 18.

Table with columns for BOSTON CURB listing various commodities and their prices as of June 18.

Table with columns for SALT LAKE listing various commodities and their prices as of June 14.

Table with columns for SAN FRAN. listing various commodities and their prices as of June 17.

Table with columns for TORONTO listing various commodities and their prices as of June 18.

**STOCK QUOTATIONS—Continued**

Table with columns for COLO. SPRINGS, LONDON, and Apr. 15 listing various stocks and their prices.

**MONTHLY AVERAGE PRICES OF METALS**

Table showing monthly average prices for Silver and Copper in New York and London from 1916 to 1918.

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

Table showing monthly average prices for Tin in New York and London from 1917 to 1918.

Table showing monthly average prices for Lead in New York, St. Louis, and London from 1917 to 1918.

Table showing monthly average prices for Spelter in New York, St. Louis, and London from 1917 to 1918.

Table showing monthly average prices for Pig Iron, Bessemer, Basic, and No. 2 Foundry from 1917 to 1918.

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

Table showing monthly average prices for Pig Iron, Bessemer, Basic, and No. 2 Foundry from 1917 to 1918.