

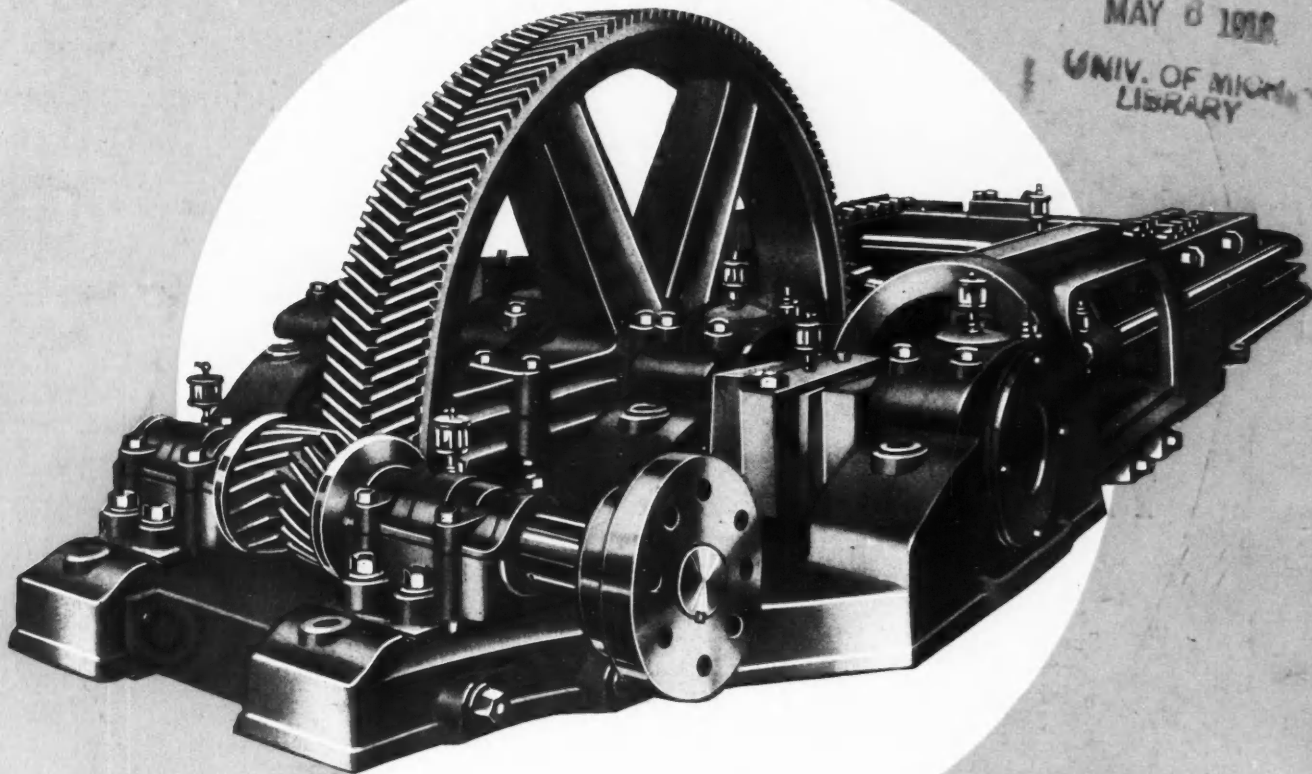
# Engineering and Mining Journal

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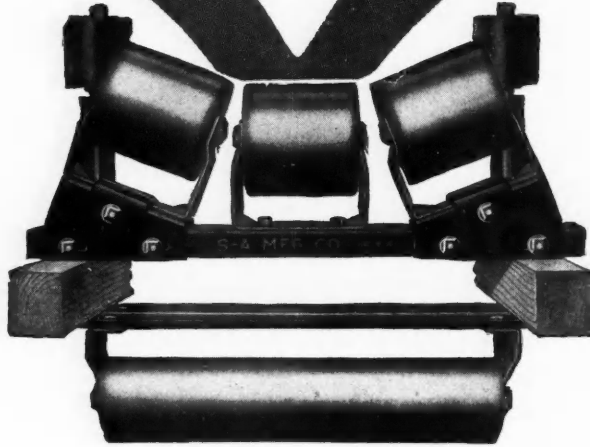
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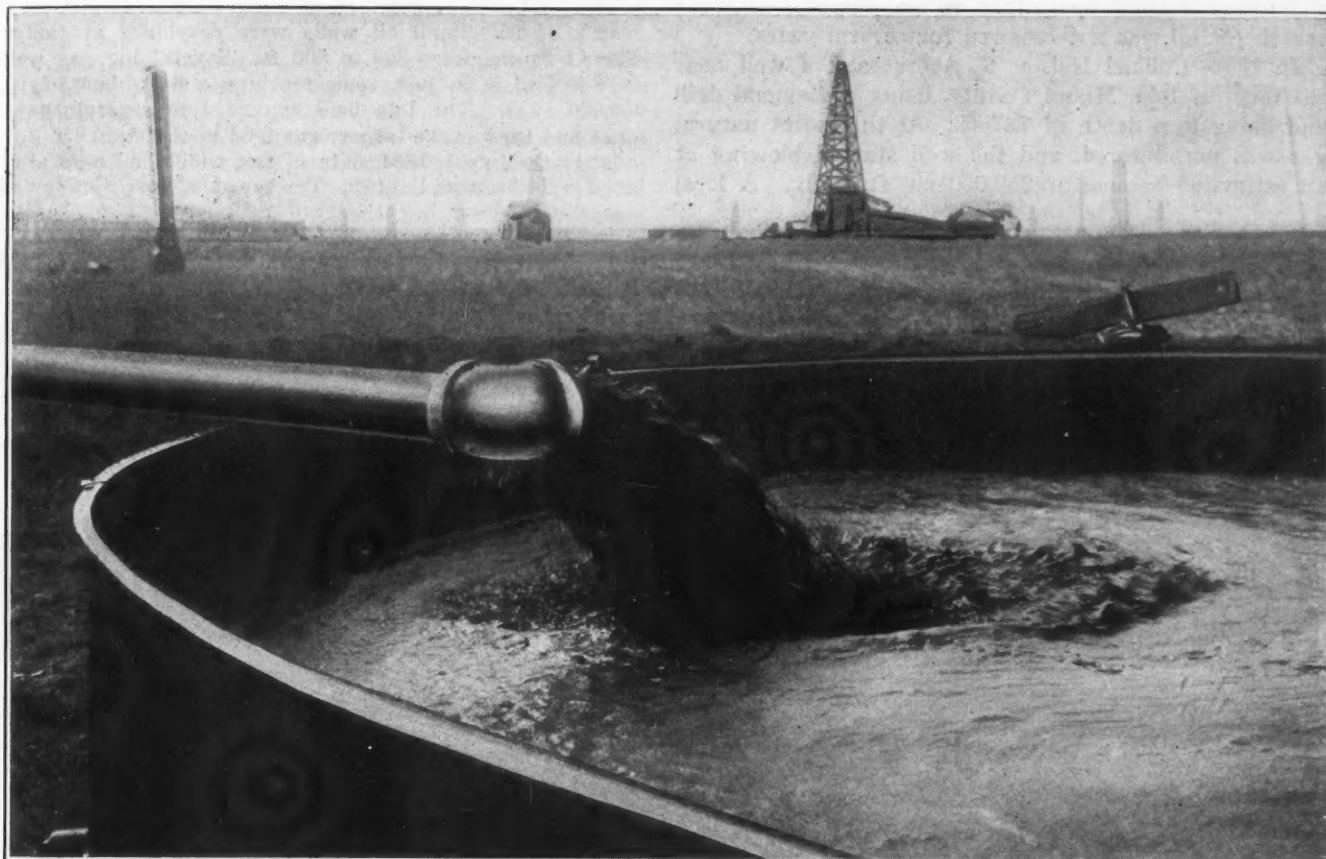
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SHUMWAY OIL WELL NO. 5, NEAR EL DORADO, KANSAS

## The Petroleum Industry in Kansas

BY W. A. WHITAKER,\* CLARENCE ESTES, AND F. W. CAMPBELL

*The petroleum production of Kansas reached an estimated total of 32,450,000 bbl. in 1917, thus placing Kansas among the most important petroleum-producing states. The article is a summary*

*of the history of the development of petroleum, production statistics, the drilling record, costs of drilling, geology and general conditions, and the physical and chemical properties of Kansas oils.*

**K**ANSAS is now in the midst of its second stage of petroleum production. It is somewhat arbitrary to attempt to name with accuracy the limits of the first stage of production, though it may suffice here to fix its terminus with the year 1913, since it was in 1914 that drilling explorations for a new gas supply opened up an entirely new area which was destined to increase greatly the petroleum output of the state. As might have been expected, gas production has proceeded with oil production; consequently, the history

of the development of these two products will be summarized here together.<sup>1,2</sup>

In the pioneer days, the presence of tar or oil springs had attracted attention and had been the cause of much discussion among the settlers of the '50s. There were many legends existant at the time concerning the use of these tars and oils by the Indians of the region. The first actual drilling for oil was started in June, 1860,

<sup>1</sup>Digested from McElwaine, "Early Wildcatting in Kansas," "Oil and Gas News," Vol. I, No. 4-11, 1917.

<sup>2</sup>Haworth, Vol. IX, University Geological Survey of Kansas.

<sup>3</sup>Annual reports of the U. S. Geological Survey, and other sources.

\*Director, Division of State Chemical Research, University of Kansas, Lawrence, Kansas.



by Dr. G. W. Brown and associates, of Lawrence, who put down a four-inch hole. The location was in Miami County, S. 2, T. 17, R. 24, and the depth of the hole was 100 ft., the full length of the boring apparatus used. This well was non-productive. Eight miles south another well was drilled, which also proved to be a failure. A third well, located in S. 15, T. 17, R. 23, was sunk to a depth of 275 ft., but the only reward was a thin coating of oil on salt water. The impending Civil War caused operations to be stopped, and the search for oil was not renewed for several years.

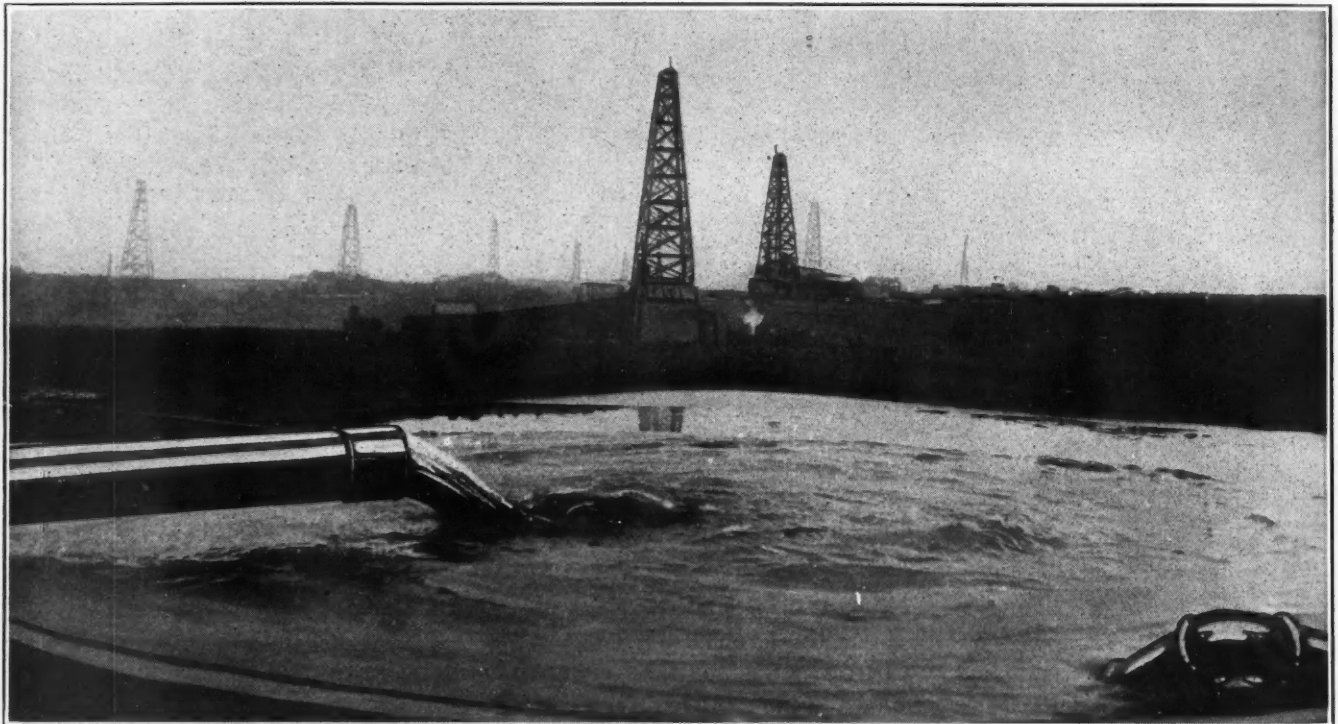
In 1873, Colonel Nelson F. Acers sank a well near the town of Iola, Miami County, using a diamond drill and going to a depth of 737 ft. At this point natural gas was encountered, and the well started blowing at an estimated volume of 250,000 cu. ft. daily. A local

drilled the first oil well in southern Kansas on the town site of Neodesha, Wilson County. The oil was found at 800 ft. and production began at 50 bbl. The same firm, enlarged to Brown, McBride & Bloom, drilled in a "gasser" near Coffeyville, Montgomery County, which had an initial flow of 5,000,000 cu.ft. per day. This was the first big gas well in the Mid-Continent Field. This firm also struck gas at Independence, Montgomery County.

1893—McBride & Bloom obtained oil at Independence at 1180 ft. A flow of 3,000,000 cu.ft. of gas per day was struck at Iola at 840 ft. Guffey & Gayley drilled a score or more of wells in the Neodesha district which were small producers.

1893-'94-'95—Small oil wells were developed at Coffeyville at depths from 300 to 800 ft. Several big gas wells were drilled in at Iola, some reaching a daily flow of 10,000,000 cu.ft. The Iola field expanded to several square miles and became the largest gas field in the state.

1894—On July 1, 1894, natural gas, which had been piped into Neodesha, was lighted. The towns of Iola, Coffeyville,



TRAPSHOOTERS' OIL WELL NO. 2, EL DORADO, KANSAS

company drilled three wells in the same region about this time and obtained good flows of gas. Soon, however, salt water was encountered, and the gas was not utilized. In 1883, near Paola, Miami County, a company headed by J. W. Werner drilled several wells to about 300 ft. and obtained gas. A company to supply the town of Paola with natural gas was organized in 1884. One year later, a well located about eight miles from Paola began an initial daily flow of 10 bbl. of oil from a depth of 350 ft. This was probably the first oil well of any consequence in the state.

#### CHRONOLOGY OF DEVELOPMENT

The developments from 1885 down through the following 30 years may be summarized chronologically as follows:

1887—The firm of McBride & Bloom drilled a few shallow wells, which were small producers, two miles from Paola, near John Brown's Mound. Several gas wells were brought in near Osawatomie, Miami County, by W. M. Mills, and the town was piped for gas at that time.

1892—McBride & Bloom, associated with W. M. Mills,

and Cherryvale began to burn gas in the early '90s. Gas was discovered near Humboldt, Allen County, and the town was lighted by gas in 1897.

1900—Oil was produced from the Chanute pool, Neosho County.

1901—Oil was discovered at Peru, Chautauqua County.

1902-'03—A prolific field was opened in Chautauqua County, the sands having a thickness of 48 to 60 ft. and being located at depths of 1100 to 1200 ft. Oil and gas were discovered at Erie, Neosho County. The Humboldt oil field was opened. A field at North Bolton, Montgomery County, was opened. A big well was brought in north of Chanute, with an initial daily flow of 500 bbl. Several big wells were drilled in soon afterward in the same field.

1904—In Montgomery County, the Tyro, Caney and Wayside fields were developed. Paola, Miami County, the original gas field, became a good oil producer.

1905—The Rantoul field, Franklin County, was opened.

1906—Oil development continued near Paola, Osawatomie and Rantoul; also in the Hoffman field, Chautauqua County. Extensive gas developments were carried on south of Independence, Montgomery County.

1907—A gas field was developed southwest of Chanute and another east of Fredonia. Other new gas fields were southeast of Humboldt, in northeast Chautauqua County, and near Cottonwood Falls.



1908—Practically all field development occurred in Oklahoma.

1909—Declining production; new wells, 69, were located, mostly in Chautauqua, Neosho, and Allen counties.

1910—Active development in Allen, Chautauqua, Neosho, Montgomery, and Wilson counties, owing to an increase in price of oil. New oil wells, 85.

1911—Development continued in the same districts as in year previous. New wells, 172.

1912—Continued development in same counties as in previous two years. A great increase, 536, in producing wells.

1913—Greatly increased activity in drilling, led by Montgomery County, with 867 wells; Chautauqua, second, with 442 wells; and Neosho, third, with 316. A total of 2016 wells were drilled in the state, of which number 1422 produced oil, and about 300 produced gas.

1914—An increase of more than 30 per cent. in output over 1913. Montgomery County again led in activity, followed by Chautauqua (Elgin pool). Butler and Cowley entered, for the first time, the list of oil-producing counties. A small well was completed at Piper, in Wyandotte County. New oil wells numbered 1753.

1915—Characterized by the development of the Augusta field, in Butler County, and the discovery of El Dorado field, in the same county. New producing wells to the number of 610 were completed.

PRODUCTION DURING FIRST STAGE

The state production, Table I, shows the expanding growth of the oil industry and the zenith of the first

TABLE I. KANSAS OIL PRODUCTION AND MID-CONTINENT PRICE AVERAGES DURING FIRST STAGE (a)

Year	Barrels	Price	Year	Barrels	Price
1889	500	\$5.00	1902	322,023	\$0.76
1890	1,200	7.00	1903	1,018,199	1.50
1891	1,400	6.96	1904	4,250,779	.95
1892	5,080	1.08	1905	3,750,250	.55
1893	18,000	1.00	1906	3,627,375	.45
1894	40,000	1.02	1907	2,125,275	.41
1895	44,300	.61	1908	2,473,107	.39
1896	113,571	.46	1909	1,032,117	.37
1897	90,000	.49	1910	1,112,313	.39
1898	88,000	.50	1911	2,907,150	.48
1899	85,215	.71	1912	2,182,042	.69
1900	91,294	1.03	1913	2,171,659	.95
1901	169,197	.79	.....	.....	.....

(a) From reports of the U. S. Geological Survey.

stage, which was reached in 1904. The principal producing fields were centered around the towns of Paola, Iola, Cherryvale, Sedan, Chanute, Coffeyville, Humboldt, Tyro, Caney, Peru, Independence, Bolton and Wayside.

TABLE II. KANSAS PRODUCTION, 1914-1917

Year	Barrels	Price
1914	3,850,000	\$0.80
1915	4,115,800	.74
1916	11,530,487	1.25
1917	(a) 32,450,000	1.85

(a) Estimated.

Prior to 1904, the Prairie Oil and Gas Co. had three tank farms in Kansas, one each at Caney, Neodesha and Humboldt. The Standard Oil Co.'s refinery at Neodesha was in operation and that at Sugar Creek, Missouri, was in course of construction. In addition, there were four independent refineries, one each at Paola, Cherryvale, Niotaze and Longton.

By mid-summer of 1904, however, petroleum had been discovered in great quantities in Oklahoma, in which state the Bartlesville, Copan, Hogshooter and Glen Pool fields were in the lead. The unexpectedly large production so lowered the prices of crude oil that the industry in Kansas was badly crippled. In addition, operation was further hindered by unfavorable legislation, so that by 1910 the production of Kansas had diminished considerably.

The oil development which brought about the present boom in Kansas production was the discovery of oil south of Augusta, in Butler County, in 1914. The sand

was first struck at 2500 ft., the well being in an abandoned church-yard. Five successful wells were drilled in the Augusta field by the end of 1914. By December, 1915, the number was increased to 12, one of which, No. 4, E. C. Varner, located in S. 17, T. 28, R. 4 E, had an initial production of 1500 bbls. natural flow.<sup>4</sup> In October, 1915, a 100-bbl well was brought in on the Stapleton farm, S. 29, T. 25, R. 5 E, at El Dorado. The sand was found at 660 ft. and was proved by several

TABLE III. DRILLING RECORD BY COUNTIES (a)

County	Year	Wells Completed	Character		
			Oil	Gas	Dry
Allen	1917	236	227	3	6
	1916	326	314	6	6
	1915	67	49	14	4
	1914	193	175	8	10
Butler	1917	179	156	8	15
	1916	1184	1015	21	148
	1915	1009	846	36	127
	1914	23	17	5	1
Chautauqua	1917	366	279	34	53
	1916	510	439	20	51
	1915	166	114	25	27
	1914	396	328	30	38
Franklin	1917	457	326	55	76
	1916	225	175	13	37
	1915	167	118	22	27
	1914	252	235	3	14
Miami	1917	121	77	35	9
	1916	229	168	32	29
	1915	58	53	1	4
	1914	325	218	30	77
Montgomery	1917	275	217	2	56
	1916	56	35	6	15
	1915	188	132	13	43
	1914	443	383	20	40
Neosho	1917	864	780	36	48
	1916	382	200	131	51
	1915	929	716	138	75
	1914	877	599	173	102
Wilson	1917	396	203	137	56
	1916	323	288	10	25
	1915	252	236	6	10
	1914	149	96	43	10
Miscellaneous	1917	266	224	23	19
	1916	314	253	30	31
	1915	205	60	21	24
	1914	68	63	3	2
Miscellaneous	1917	25	10	13	2
	1916	60	28	13	20
	1915	148	41	58	49
	1914	236	112	23	101
Miscellaneous	1917	84	37	4	43
	1916	134	42	72	20
	1915	33	46	49	38
	1914	53	12	26	15

(a) Digested from U. S. Geological Survey Reports, "Oil and Gas Journal, 1917, and "Oil, Paint and Drug Reporter," 1917.

offset wells. This sand, however, was mudded off in the pioneer well and drilling continued. About the middle of December, a lower sand was penetrated at 2460 ft., and the well began producing at 120 bbl. per day. At the end of the year 1915, nine producing oil wells had been completed in the El Dorado field, all of which, with the one exception noted, were producing from shallow sands found at depth of 540 to 660 feet.

Productive wells had also been brought in at Potwin,

TABLE IV. DRILLING COSTS IN PETROLEUM PRODUCTION (a)

Labor Cost:	Cost Before the War	Cost in 1917
Oil drillers, wage per day.....	\$5.00- \$7.00	\$7.00- \$10.00
Contractors, charge per ft.....	.60- 1.00	1.25- 3.75
Wages of lease-bosses, per month.....	90.00-100.00	125.00- 150.00
Wages of foremen, per month.....	150.00	175.00- 250.00
Cost to drill and equip:		
Shallowest mid-continent well.....		2,500.00
Cushing, El Dorado or Blackwell field.....		25,000.00-35,000.00
		(and in some cases as much as \$40,000.00)

(a) "Oil and Gas Journal," Tulsa, Okla., Vol. XVI, No. 19, 1917.

in northwest Butler County; at Douglas, in the southern part of the county, and at Towanda, in the western part. Standard rigs were used in drilling, and the deep wells were pumped from the beam. For the shallow producers, pump-jacks were used. In November, 1915, Duffield and Dunaway brought in a 15-bbl. wild-cat well on the J. H. Wingert farm, in Miami County, S. 9, T. 17, R. 22 E. This location, seven miles north-

<sup>4</sup>Northrup, "Mineral Resources of the United States," Part II, 1915.

west of the town-lot pool at Paola, stimulated development in the locality as well as in the Rantoul district, in Franklin County.

DEVELOPMENTS AT TOWANDA

One of the most important developments in the state was that at Towanda, between El Dorado and Augusta, where the Trapshooters' Oil Co. brought in a well, June 1, 1917, in S. 11, T. 26, R. 4 E, which started flowing at 10,000 bbl. daily. It was followed by an offset well drilled by the Carter Oil Co., which started flowing at 7,000 bbl. daily. These two wells are among the largest producers in the state. Several other wells drilled in this locality were large producers. Much wildcat drilling has been done in the last year, and several smaller fields have been opened up. Wellsville, in northern Franklin County; Eureka, in Greenwood County, and Winfield, in Cowley County, are among the new oil towns. The production at Winfield is widely scattered. Table II gives the oil production of Kansas for 1914 to 1917, and Table III the drilling record by counties. Table IV gives the drilling costs and Table V a comparison of equipment costs, oil casing, pipe lines, etc., for 1915 and 1917.

GEOLOGY AND GENERAL CONDITIONS

The oil and gas of Kansas come from the coal measures of the upper Carboniferous, Pennsylvanian, the sands being located in the Cherokee and overlying shales. The Cherokee shales, so named from their outcrops in Cherokee County, are underlaid by the Mississippian

TABLE V. ADVANCES IN COST OF PETROLEUM EQUIPMENT (a)

Item	1915	1917
Casing, 15 1/2 in., 70 lb.	3.21	5.34
Casing, 10 in., 32 lb.	1.01	1.99
Casing, 8 in., 28 lb.	0.86 1/2	1.75
Casing, 6 in., 24 lb.	0.69 1/2	1.45
Casing, 5 1/2 in., 17 lb.	0.48 1/2	1.02
Oil line pipe, 2 in.	0.11 1/2	0.22
Engines, 30 hp.	355.00	512.00
Boilers, 40 hp.	655.00	1,435.00
Wire rope, 1/2 in., 29 lb.	14.85	29.00
Cost of building standard rig.	1,275.00	2,065.00
Wooden tanks, 250 bbl.	45.00	175.00
Steel tanks, 55,000 bbl.	11,000.00	55,000.00
Cost of drilling per foot in Augusta and El Dorado field.	1.25	2.50

(a) "Oil and Gas Journal," Tulsa, Okla., Vol. XVI, No. 17, 1917.

series (limestone), below which, in these fields, oil or gas has not yet been found. The Mississippian limestone outcrops in the extreme southeastern corner of Cherokee County and dips from the Ozark area on all sides. The dip along the southern border of the state is about 25 ft. per mile, while on a line between Galena

TABLE VI. KANSAS PETROLEUMS

Lab. No.	Sp. Gr.	Viscosity 20 Degrees C.	Flash Degrees C.	Fire Degrees C.
1	0.8190	1.46	7	8
6	0.8381	1.54	12	17
11	0.8585	4.05	7	17
15	0.8671	3.19	8	23
18	0.8782	3.39	11	14
22	0.9027	16.31	9	16

Properties of crude oil determined in 1917: B.t.u., max., 19880; min., 19250. Sulphur, per cent. by wt.: max., 0.42; min., 0.08. Unsaturated hydrocarbons, per cent. by vol.: max., 32; min., 8. Paraffins, per cent. by wt.: max., 2.61; min., 1.06.

and Kansas City it is about 1.5 ft. per mile. The shale beds all outcrop at the southeastern corner of the state, accounting for the barrenness of Cherokee and Crawford counties, since the oil and gas have been lost by evaporation caused by the erosion of protective covering. The general trend of all structures in Kansas is almost due north and south, with low gentle domes in the southern part. In northeastern Kansas the trend of structures is northeast and southwest.

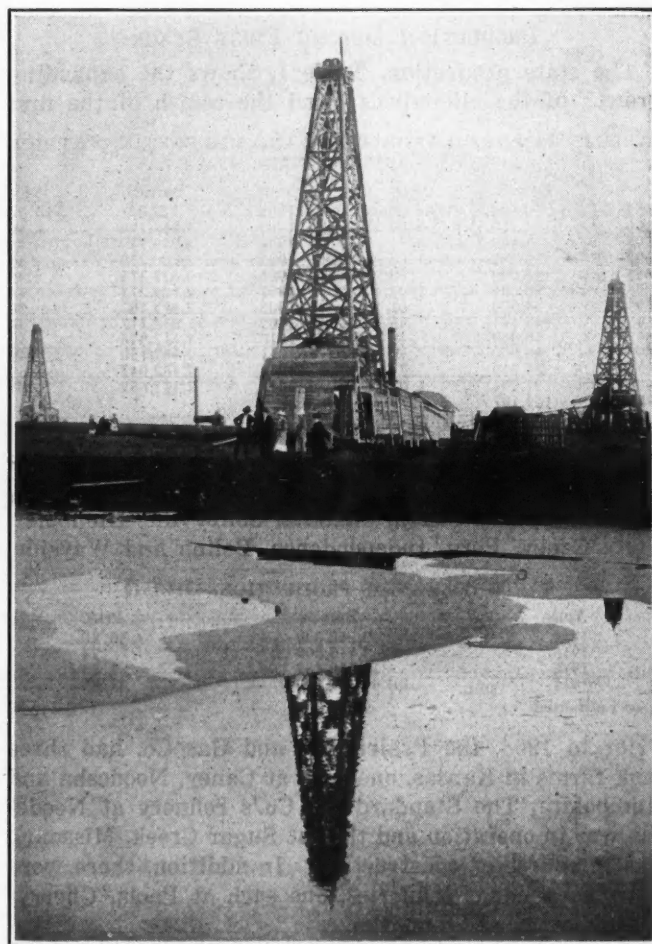
In the following table the structure in various Kansas oil fields is given:<sup>5</sup>

STRUCTURE OF KANSAS OIL FIELDS

Field	Domes or Anticlines
Augusta (Butler Co.)	Five minor domes on two anticlines.
Beaumont (Greenwood Co.)	Dome.
Dexter (Cowley Co.)	Dome on anticline.
El Dorado (Butler Co.)	Domes on anticline.
Paola (Miami Co.)	Domes.
Virgil (Greenwood Co.)	Anticline.
Winfield (Cowley Co.)	Dome.

The deformation or height of the El Dorado fold is 110 ft. Oil is found on the top and 80 ft. down from the top. The syncline, however, carries water. A recent article says:

The El Dorado and Augusta pools are now only four miles apart. The extension to the south of the El Dorado pool strengthens the theory that the two pools will eventually connect. From the northern well in the El Dorado district to the southern well in the Augusta deep-sand district is 24 miles. The El Dorado end of the Butler County field not only is producing about three times as much oil as the Augusta district, but is steadily adding greatly to its productive acreage. There are approximately 36,560 acres of productive territory within the limits of the various Butler County pools as now outlined. This acreage is



POOL OF OIL AT CARTER, ON THE ORBAN, NEAR EL DORADO, KANSAS

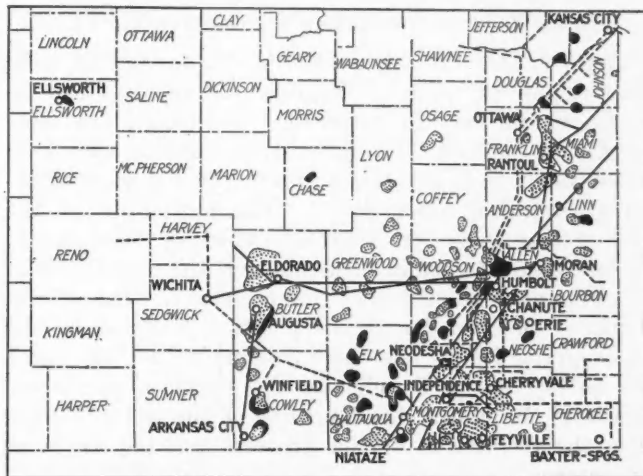
divided as follows: El Dorado and extension, 25,980 acres; West Augusta pool, 1480 acres; South Augusta pool, 8000 acres; Douglas pool, 600 acres; Smock pool, 250 acres; Potwin pool, 250 acres.

The importance of El Dorado's acreage can be appreciated more by the fact that the producing and known to be productive acreage of Wyoming is approximately 20,000 acres, and that the total area of the Cushing deep sands is less than 25,000 acres.<sup>6</sup>

<sup>5</sup>Hager. "Oil and Gas News," Vol. I, No. 13, 1917.  
<sup>6</sup>"Kansas City Star," Dec. 16, 1917.



At Peru and Sedan domes are evident, though gas occurs high in the domes and oil wells down the flanks, leading some to think that the oil comes from the synclines. The accumulation in all of the shallow fields of Kansas is influenced by structure. The depth to which it is necessary to drill in order to reach the productive beds depends on the distance and direction of the location from the outcrops. In the Mound Valley, Cherryvale, Humboldt, Chanute, Iola, West Paola, Rantoul and Wellsville fields, the main sands are found at 600 to 750 ft. In Paola and the immediate vicinity, the productive sand is found at 350 to 400 ft. From the Humboldt field north, the sands are markedly lenticular and the fields are "spotted." In the Sedan and Wayside



MAP OF OIL AND GAS FIELDS OF KANSAS

fields, the depths of the sands are 1000 to 1100 ft. In the El Dorado field, there are shallow sands at 540 to 660 ft. and also deeper sands below 2400 feet.

Previous investigations which have included the analytical characteristics of certain of the Kansas petroleum have been carried out by Bailey,<sup>7</sup> Bartow and McCollum,<sup>8</sup> Richardson,<sup>9</sup> Bushong,<sup>10</sup> Day,<sup>11</sup> of the United States Geological Survey, and others. The development of new fields and renewed activity in the older areas, resulting in the greatly increased production referred to in the foregoing, suggested the appropriateness of determining the physical and chemical properties of some of these petroleum. The samples examined include several from the new Butler County fields as well as a few from the older fields. The principal results<sup>12</sup> are summarized in Tables VI and VII.

TABLE VII. RESULTS OF FRACTIONATION

	Per Cent. by Vol.	Per Cent. by Wt.	Sp.Gr. 15 Degrees C.	Ref. Index 25 Degrees C.	Flash Temp. Degrees C.	Fire Temp. Degrees C.
To 150° C.:						
Maximum.....	23.9	20.8	0.7249	1.4008	..	3
Minimum.....	6.5	5.5	0.7518	1.4108	0	0
150-200° C.:						
Maximum.....	16.0	15.2	0.7641	1.4280	30	40
Minimum.....	5.2	4.4	0.7764	1.4298	24	28

<sup>7</sup>"Mineral Resources of Kansas," 1897.  
<sup>8</sup>"Kansas Petroleum," Transactions of the Kansas Academy of Science, 1903.  
<sup>9</sup>"The Petroleum of North America," Journal of the Franklin Institute, CLXII, 57, 81. 1906.  
<sup>10</sup>"The Chemical Composition of Petroleum," University Geological Survey, IX, 253. 1908.  
<sup>11</sup>"Petroleum," Mineral Resources of the United States, Part II, 1190. 1913.  
<sup>12</sup>To be included in a forthcoming bulletin on the "Oil and Gas Resources of Kansas," which will be issued jointly by the University Geological Survey and the Division of State Chemical Research.

TABLE VII—(Continued)

200-250° C.:						
Maximum.....	16.8	16.3	0.8071	1.4446	75	78
Minimum.....	6.7	5.9	0.8103	1.4581	..	..
250-300° C.:						
Maximum.....	18.2	18.0	0.8433	1.4629	85	100
Minimum.....	7.6	6.9	0.8342	1.4715	..	..

Per cent. by weight: Water, trace to 7.2%; greater number of samples less than 1%. Residue: max., 66.9%; min., 37.1%. Loss on distillation: max., 3.7%; min., 0.1%. Nitrogen ranged from 0.08 to 0.09%, asphaltene from 0.61 to 1.99% and formolite from 12.6 to 25.3% by weight.

Following the completion of analyses and tabulations, a sample from the famous Trapsshooters' well, Butler County, was received and examined. Its characteristics are given below in Table VIII.

TABLE VIII. TRAPSHOOTERS' CRUDE

Sp.Gr. 15° C.	Baumé 59° F.	Began to Distil 153° F.	Residue and Loss	Water
0.8516.....	34.4	153° F.	70.2	None

FRACTIONATION

Temperature	Per Cent. by Vol.	Per Cent. by Wt.	S.Gr. 15° C.	Baumé 59° F.
t to 150° C.				
t to 302° F.	6.0	5.1	0.7243	63.0
150-200° C.	13.5	12.0	0.7476	54.8
302-392° F.				
200-250° C.	13.5	12.7	0.7959	45.9
392-482° F.				

REFINERIES IN KANSAS

There were 30 refineries in operation during 1917 and eight building or projected. Of the refineries in operation, 17 are of 1000 or greater barrels capacity of crude oil per day. The plants of greater capacity than 2000 bbl. per day are: Standard Oil Co., of Kansas, (9000) Neodesha; Milliken Refining Co., (6000) Arkansas City; White Eagle Refining Co., (5000) Augusta; National Refining Co., (4600), Coffeyville; Sinclair Refining Co., (4500) Argentine; Wichita Oil and Refining Co., (4000) Wichita; Empire Refineries (Sarco), (3500) Independence; Evars-Thwing Refining Co., (3000) Wichita; Kansas City Refining Co., (2700) Kansas City; Sinclair Refining Co., (2200), Chanute. The numbers in brackets represent the daily capacity of the plants.

The refineries reported as using special processes are: Rosedale Refining Co., Kansas City, (Cross process); O. K. Refining Co., Niotaze, (Henson and Burton process); Kansas City Refining Co., Kansas City, (Guebel process); Augusta Refining Co., Augusta, (Landis process); Great Western Refining Co., Erie, (Anderson process); Milliken Refining Co., Arkansas City, (Jenkins process); Uncle Sam Oil Co., Cherryvale, (Anderson process); Wright Producing and Refining Co., Cherryvale, (Carey process).

New Zealand Bonus for Phosphate

The New Zealand government, says *Commerce Reports*, has offered a bonus of £1000 for the discovery on government land, and £500 on other lands, of deposits of marketable phosphate, including guano, under the following conditions:

Providing that no fertilizer containing material from the deposit, or from any deposit in the neighborhood, has been placed upon the market previous to the date of the offer; that the raw material is reasonably accessible and can be worked at a profit; that a committee appointed by the Minister of Agriculture make a satisfactory report on the deposit; that the fertilizer made from the phosphate can be disposed of at a price which will allow of its being sold at a profit, and that the composition of the phosphate averages not less than 50% of phosphate of lime.

The bonus shall be paid as follows: One-fifth on favorable report by committee, one-fifth on delivery of the first 200 long tons; the remaining three-fifths by equal payments on delivery of each additional 150 tons.



# The Work of the Petroleum Geologist

BY GEORGE E. BURTON\*

*Competent geologists have developed an important field of usefulness in the direction of the economical development of oil and gas areas. The risk of useless drilling has been reduced to a minimum by the careful preliminary examination of the structural geological conditions. A résumé of the methods used is presented, and the limitations that restrict their application are defined.*

THE success of the petroleum geologist in finding oil pools in the Southwest has been so marked that most companies require geological reports before they will undertake the exploration of new areas. Likewise the promoter of stock companies and questionable enterprises cannot accomplish his purpose without the use of geological reports. There has grown up in consequence a demand not only for experts in petroleum geology, but also for so-called geologists, real or fictitious, as the promoters may demand. Investors who understand the work of the geologist and know just what training is required before he becomes competent in his profession are not in any way misled by reports of the incompetent geologist working for a promoter whose chief aim is to sell stock.

## AMERICAN INVESTORS SOMETIMES CARELESS AS TO FACTS

It is probably a fact, however, that some Americans invest in enterprises they know little about. I have in mind a mining engineer who understands mining and what constitutes a good investment in mining stock, but who nevertheless put his savings into Cuban land on which he hopes to raise citrus fruits. It is because the general investor in oil-promotion schemes knows so little about what the petroleum geologist can do that the report of the unscrupulous "gets by." I recall an experience of a friend in the Southwest who is a good petroleum geologist. He was sent out by his company to inspect a farm and make a lease with the farmer, giving him whatever bonus he thought advisable at the time of the examination. The geologist gave the land a thorough examination, had concluded that it was worth a bonus of \$4 per acre, and was on the point of making this offer when the farmer asked with some concern, "Where are your instruments?" "My instruments! Oh, yes, I almost forgot my instruments!" The geologist then took from his buggy two thermos bottles, stood them up on the ground about fifty feet apart, lay down behind one of them and sighted over its top at the top of the other. After remaining in this position several minutes he arose shaking his head and said, "I am very sorry. The result of my observation is very disappointing. Your land is worth a bonus of only \$2 per acre." The farmer accepted the offer.

It is the idea that there is something mysterious about the work of the petroleum geologist that makes it possible for the faker to succeed. I have heard of one of these who, when he goes out to make examinations, does

all his work in a buggy. He sits in silence with eyes fixed on the ground just ahead of the horses. On one occasion, after driving along the road for a few miles in this mysterious and rigid position, he suddenly shouted, "Stop!" The driver pulled the team up with a jerk. "There it is," said the faker: "There it is. I see a large oil pool, down 1500 ft. in the ground. The horses' front feet are just on the edge of it." On the strength of his wonderful vision the company drilled a well to a depth of 2000 ft. without striking oil or gas.

## USE OF MYSTERIOUS TERMS TO DECEIVE UNWARY

There is also the faker who uses a number of technical geological terms to impress and mystify the intended victims of the promoter. Following are some expressions selected at random from reports appearing under the name of geologists in promoters' prospectuses: "Stratigraphical advantage"; "The author is of the opinion that these owe their cross-bedded character to the presence of certain elements and their methods of crystallizing and defining themselves"; "The hieroglyphic T used to denote the position occupied by the out-cropping ledges has the following value: the short line on top of the T indicates the strike or the lesser degree of the uplift; the long line of the letter T indicates the inclination or the greatest uplifted angle of the outcrop."

Promoters are not the only class who use the faker. Sometimes persons who really seek the truth, and who want competent advice concerning the possibility of oil and gas in the area in which they are interested, fall in with fakers, who nearly always give a favorable report. A great deal of money has been expended upon dry holes by men who could ill afford to lose it, upon the advice of inexperienced and unqualified "geologists."

Because of these conditions in the practice of petroleum geology it may be of interest and value to discuss as briefly as possible what the work of the genuine petroleum geologist is.

## SCIENTIFIC AND ECONOMIC GEOLOGISTS

Geologists may in a broad way be divided into two groups, scientific geologists and economic geologists. The former apply themselves to scientific work. Experts of this group determine the general and detail principles of the science of geology. In some instances their work is not practical at the time in which they live and work. They are usually ahead of the times. Pay for this kind of work is usually small, because it is a natural characteristic of the public to ask: "Does it pay?" and to lend most encouragement to the work that does pay. However, this kind of investigation is provided for in part at least by our universities, state geological surveys, the U. S. Geological Survey and the Bureau of Mines. Some of the large mining companies and oil companies also have departments in which research work pertaining to their problems is carried on.

The economic geologist applies scientific geological principles to the work he has to do, whether it be the location and development of orebodies, clay deposits, certain structural materials, underground water, or

\*Assistant director, Oklahoma Geological Survey, Norman, Oklahoma.

oil pools. At present there is a great demand in the Southwest for petroleum geologists. Nearly all the economic geologists and many geologists who would otherwise be engaged in doing scientific work are kept busy looking for new oil pools and recommending locations for drill holes in areas occupied by old pools.

#### SURFACE WORK AND UNDERGROUND CONDITIONS

The work of the petroleum geologist is divided into two kinds: (1) Surface exploration work. (2) A study of underground conditions. The study of underground conditions is made possible by well-logs. The more accurate these logs are, the more accurate the observation and conclusions of the petroleum geologist. Some of the problems he is interested in and attempting to explain are: "Does the chemical content of ground water in any way indicate the proximity of oil and gas?" and "Was the structure in which oil and gas occur formed previous to the accumulation, or did the pressure of oil, gas and underground water cause the structure?" The former is of economic importance because it affords a guide to drilling. The latter is of moment because a structure formed in this way would become more pronounced with depth to a certain point, and a mild fold at the surface might develop into an important structure with depth; also, there might be a good structure at depth, but no indications of it apparent at the surface. This phase of the petroleum geologist's work is new, and, as an aid in intensive development, is important.

Experience has shown that there are three favorable factors for the accumulation of oil and gas: (1) Favorable structure, such as anticline, dome, etc. (2) A satisfactory open sand. (3) The right height on the structure with reference to the level of salt water. These factors should be found in combination. Of the three, only the first can be determined in advance of drilling, and even that favorable structure may be present in places where there are no surface indications to aid in discovering it.

#### STRUCTURAL AND TOPOGRAPHIC INDICATIONS

At present, however, the major work of the petroleum geologist is in discovering and mapping favorable structure. His method of procedure is to examine the surface indications in the probable oil and gas areas. Surface indications consist of the angle of inclination of outcropping strata, and sometimes the topography of the given area. Topographical indications are as a rule not safe guides, because, although originally an anticlinal fold may have caused characteristic elevation of the area immediately above it, the agents of weathering and erosion may have changed its appearance, so that the surface immediately above may be occupied by a stream valley or other depression. However, in the Gulf Coastal Plain area the topography in most cases is conformable with the saline domes in which the oil and gas are found. The domes have been formed so recently and are at such slight elevation above sea level that erosion and weathering have had little effect upon them.

The dip of the strata is the main source of information with reference to the position of the favorable structure in which oil and gas might have accumulated. The strata which the geologist studies in the areas of the Southwest consist of sandstone, shale, limestone,

and various combinations of similar formations. Of these strata, limestones give the most reliable information leading to the discovery of the various structures. Limestones were formed in the deep sea and were deposited in a horizontal position. The inclination from the horizontal of any particular stratum of limestone will measure the degree of structural disturbance, not only of that particular stratum but of those associated with it.

Shales were laid down practically level in the sea, though not so far off shore as the limestone. The true dip of the beds can be determined from shale, if extensive outcrops are found. Uncontaminated shale, however, is so soft that weathering soon produces a residual soil which covers the surface and makes the outcrops of shale difficult to find. In areas of this kind dip angles are usually found in the beds of streams. False dips are likely to occur in such places, being produced by the swelling of the shale in contact with or near the water in the streams. Calcareous shales give reliable information as to the underground structure. Such shales outcrop extensively, especially in stream beds and valleys. As they do not swell, false dips are not to be expected, as in the case of the softer shales.

#### CHARACTERISTICS OF SANDSTONE FORMATION

Sandstones are for the most part near-shore deposits and give no reliable indications of the underground structure. Every change in the wind, every variation in the tidal wave, and every change in the stage of water in the streams caused variations in the deposition of the sand near shore. Sandstone deposited under conditions of this nature is usually cross-bedded. Dip and strike readings taken on the bedding planes vary widely, and for this reason are unreliable. There are, however, certain sandstones—shaly sandstones and calcareous sandstones—that are reliable.

Judging from surface conditions in probable oil and gas territory, the geologist's report would deal with areas of two general types: (1) An area containing no outcrops, or unreliable outcrops. (2) An area containing outcrops from which the underground structure may be determined. His report on an area of the first type is very simple. He cannot condemn such an area; neither can he recommend specific locations for drilling. He can, however, work out the underground structure for an area of the second type, and will recommend or condemn it, in accordance with his judgment that there are favorable or unfavorable conditions for the accumulation of oil and gas.

#### DETAILS OF DETERMINING STRUCTURE

The first work of the petroleum geologist in any area is of a preliminary nature. He searches the area for outcrops, and if these are reliable he next determines whether there are any indications of structure that might be favorable for an accumulation of oil or gas. Usually a Brunton compass, a Lock level and an aneroid barometer are all the instruments he needs for the preliminary examination. If the preliminary examination discovers favorable indications of a promising fold, the petroleum geologist maps the fold in detail. For this work he uses the plane table and telescopic alidade, with which he runs a line of levels on a reliable stratum that may be more or less continuous over the area under



examination and which can be readily recognized and identified in different parts of the area. This stratum he calls a "key" rock. Conditions are ideal where this stratum can be traced without interruption in a horizontal direction.

Sometimes the stratum is covered in a large part of the area and it is of course impossible to take readings on it. The petroleum geologist, however, is frequently able to map the position of his "key" rock in places where it is covered, by resorting to the use of a section of the strata outcropping in the area under examination. This section indicates in sequence the outcropping strata and the thickness of each. If, then, the "key" rock should be covered at any particular point, by taking the reading on either a stratum above or a stratum below the "key" rock its position can be determined by adding or subtracting, as the case may be, the interval between that stratum and the "key" rock. After the levels on the "key" rock have been mapped, lines at regular intervals, connecting points of equal elevation, are drawn. The position and relation of these lines to each other show the location and character of the fold.

#### PROVED STRUCTURES IN OIL AND GAS AREAS

It is of value to the land owner, to the lease holder, and to the investor to know whether the land in which he is interested lies in an area where there are either no outcrops or unreliable outcrops, or whether it lies in an area where the outcrops are such that the underground structure can be determined from the surface. Since experience has shown that in nearly every case production in the Southwest is associated with anticlinal structure or some modified phase of it, a proved structure in probable oil and gas territory is very valuable, even before a test well has been completed. In areas where reliable outcrops are found, the competent petroleum geologist can readily classify them as valuable or worthless for oil and gas purposes.

In areas of no outcrop or unreliable outcrops in probable oil and gas territory, the geologist can recommend that drilling is an uncertain undertaking and that the odds are decidedly against encountering oil or gas. The only method for exploring such areas is by drilling deep test wells, located on someone's "hunch" or because the "surface looks like it does in the Healdton field," or "because it ought to be good for oil, as it is good for nothing else." This method of exploration is expensive because such a small per cent. of wells drilled encounter oil or gas. If scientific could be substituted for the "at random" methods success could be attained at less expense. At no great depth within probable oil and gas territory of this nature there is present, no doubt, reliable stratum which has considerable horizontal extent and which could be recognized from core samples. It seems to me that the logical way to explore these areas is to drill to such a stratum with a core drill and work out the structure before a location for a deep test is made.

There is a large and important field for the petroleum geologist. His work is removing the field of petroleum explorations from the hands of the gambler to those of the scientist, and falls into the same class as that of any other engineer, and there is no mystery about what he does and can do. His skill is acquired by education and experience.

## Cowdray Would Drill for Oil in Great Britain

The announcement that Lord Cowdray plans to spend \$2,500,000 in drilling for oil in England is verified by a letter from him to the *Westminster Gazette*, reading in part as follows:

"Extensive studies carried out by my scientific staff during the last three and a half years lead me to the conclusion that, notwithstanding the long-established opinion to the contrary, the possibilities of securing a commercial production of oil in Great Britain are of a distinctly promising nature, and we have, from time to time, advised the Admiralty to this effect.

"Experience in America has shown that the policy of uncontrolled working, and that on small areas, is a national blunder. Moreover, this method of working has produced wild speculation, and has resulted in the most deplorable waste. According to American scientific estimates, there is only oil in sight in that great continent for another 29 years. This situation is causing serious disquietude to the Government of the United States.

"This is the position which the United Kingdom will have to face if unorganized and uncontrolled drilling be permitted.

"In June last I was approached by the Admiralty with a view to immediate drilling as a war measure. At that time my firm were negotiating with certain landlords with a view to arranging leases. It must be remembered that, dependent on the nature of the strata, a well will drain oil for a distance varying from a few yards to a few miles. As we were not in control of anything approaching the areas requisite to obviate the evils of the small-block system, my reply to the Admiralty was that I recommended a system of national drilling licenses as the only sound policy for the nation. . . . No one can say for certain whether the United Kingdom will produce oil or not. This only the drill can prove. My American expert advisers (whose opinion I value) tell me that they think that oil will be found in commercial quantities. . . . My ambition is to see this industry born and reared, so that the nation may benefit to the full, not only from a new source of great possible wealth, but from the conservation of a factor vital to its maintenance as a great ocean power.

"With this object we have made alternative offers to the government, subject to the passing of the necessary act to safeguard the industry, offers which are still open:

"(A) For the period of the war to place at the disposal of the government, free of all cost, the services of my firm and geologic staff, for the purposes of exploration and development.

"(B) If the government does not wish to risk public money on what must be deemed a speculative enterprise, we are prepared to drill, at our own risk and expense as licensees, subject to certain areas reserved to us.

"This offer committed my firm to a probable expenditure of £500,000."

Price of Copper Sulphate in Great Britain was fixed at £48 per ton maximum for delivery in January and February, 1918, £50 for March and April delivery, and £52 for May and August. The order was issued on Feb. 15, effective Feb. 16, and included bluestone and blue vitriol.



# The Standardization of Directors' Reports for Mining Companies

BY T. O. McGRATH\*

*Directors' reports should consist of the manager's and treasurer's statements, and should be concise, clear and uniform in general scope for all mining companies. They should set forth simply the essential segregations of production, development, ore reserves and gross costs, distinguishing clearly between metals sold and metals delivered. From gross earnings should be deducted depletion and depreciation charges, income and war taxes. Extra dividends are declared out of a reserve fund for depletion and depreciation.*

THE War Tax Law will require a more universally standardized form of report from treasurers to stockholders than heretofore has been the practice, and directors and managers of metal-producing companies will have to make at least one published report yearly to their stockholders. In reading and analyzing current reports from the different mining companies, one is impressed with the lack of uniformity in the presentation of operation results; and to this fact may be attributed the false impressions of profits made in the mining business apparently entertained by the majority of members in law-making bodies.

## COMPANY REPORTS OFTEN OF LITTLE VALUE

Some annual reports are clear, concise and complete as to the fundamentals of operation and production results for the year, while others are meager in facts but complete as to unimportant details. Many reports show that there was not a clear idea in the minds of the directors as to what constitutes an intelligent report. As an instance in point, some yearly reports devote more than half their space to details such as the character and assay value of each ore stringer and body of ore found in each drift, crosscut and raise, but state nothing as to the actual tonnage developed during the year and remaining available in the mine. All the details of production are often given, but nothing is said as to what was received for the production, or what proportion of the production was sold and delivered and what is being carried at inventory prices. Again, an average price may be given for copper sold, but no information as to whether or not it is the net or gross price, whether for copper delivered or for yearly sales contracted, or whether it is the price obtained by dividing the total of the copper sales account by the pounds of copper produced. Other reports contain all the necessary facts, but give them in such dealed and elaborate form as to be confusing to the average stockholder.

Therefore, the question that naturally arises is: What is a yearly report, and what is the purpose of such a report? The logical answers are as follows:

A yearly report of a board of directors to the stock-

holders of a company should be an account of the management by the directors of the stockholders' property. The purpose of such a report is to show:

1. The condition of the business of the company at the close of the year.
2. The results of operations for the year in profit and loss, and in dividends paid or assessments levied.
3. The setting forth of necessary details and fundamentals of operations in such manner as to permit any intelligent stockholder to acquaint himself with the expense and cost, production and earnings, etc., of his property; to enable him to make an intelligent comparison of the year's results with those of other properties of like nature and to allow him to judge correctly the future possibilities of his investment.

In making a report to the stockholders, the board usually submits a statement by the president, presenting: First, the report of the manager covering the details of operations for the year; second, the report of the treasurer, or other official, stating the total costs and earnings for the period and calling attention to the income account as showing the results of the year's operations; and, last, the balance sheet, showing the condition of the business at the end of the period. While this is the reverse of the natural order, it is the accepted order generally recognized.

Most companies, in their yearly reports, give a balance sheet that shows the true condition of the business at the time specified, with the possible exception, in the case of the vein mines, of the property account and the surplus account, which are generally excessive because of failure to make proper charges for depletion of ore reserves. However, according to the requirements of the War Tax Law this probably will be remedied. Also, most companies show a true income statement, but with the objection usually that it shows net earnings only, instead of the net profit. The reason for this is that deductions are seldom made for depletion of ore reserves and depreciation of equipment. Therefore the disbursements as dividends appear as dividend earnings, when the fact is that a certain percentage of such dividends is in reality invested capital returned to the stockholders. This, also, should be remedied under the provisions of the War Tax Law.

## LACK OF UNIFORMITY IN PRESENTING COSTS

Many producing companies show some kind of a cost, some only a mine production cost, others the operating cost, but few indeed show the total production cost. When it comes to giving full, complete and intelligent facts from operations, showing expense, costs, production, sales, etc., that can be of use to the stockholder, there is either such a scarcity of real information or such a confusion of details that the average stockholder is unable to arrive at a correct or intelligent conclusion as to the merits or demerits of his investment.

The forms submitted herewith are presented as suggestions as to the facts which should be given in a

\*Auditor, Shattuck-Arizona Copper Co., Bisbee, Ariz.

report to stockholders. The information specified should be detailed in the general manager's report and the treasurer's report, and these are the important parts of the yearly statement to stockholders. The income account and the balance sheet are shown in order to give continuity and uniformity to the yearly report, and to indicate the income, dividends, and the statement of the condition of the business, as required by the War

TABLE I. GENERAL MANAGER'S STATEMENT

Account:	Production of Ores			
	Copper Ores		Special Ores	
	Wet	Dry	Wet	Dry
Ore from stopes.....	173,321	158,886	10,613	10,162
Ore from development.....	8,824	8,146	928	865
Ore from dumps, etc.....	1,393	1,225		
Total ore mined.....	183,538	168,257	11,541	11,027
Total ore shipped.....	183,627	168,331	11,636	11,116
Total ore smelted.....	183,968	168,643	10,531	10,069
Per cent. moisture content.....		8.33		4.4

Account:	Production and Recovery of Metals		Per Dry Ton
	Total	Per Dry Ton	
Copper, lb.....	18,161,763	107.69	
Gold, oz.....	4,721	0.028	
Silver, oz.....	314,918	1.867	
Lead, lb.....	3,413,445	339.000	

Department:	Operating Expense and Costs		
	Amount	Per Dry Ton	Per Lb. Copper Produced
Development.....	\$188,729.47	\$1.116	\$0.01039
Ore extraction.....	763,740.83	4.518	.04205
Ore transportation.....	60,552.75	.351	.00334
Smelting.....	589,641.36	3.496	.03247
Operating overhead.....	109,523.04	.649	.00603
Totals.....	\$1,712,187.45	\$10.130	\$0.09428
Bullion freight.....	98,454.44		.00400
Refining and selling.....	244,462.95		.01488
Gross totals.....	\$2,055,104.84		\$0.11316
Operating credits.....	472,065.56	2.744	.02600
Net totals.....	\$1,583,039.28	\$7.386	\$0.08716

Tax Law. The income account should include nothing but fundamentals; otherwise it will become confusing. The details of the totals shown in the income account, necessary for clearness, should be included in the president's report, the general manager's report, or the treasurer's report.

FORM OF GENERAL MANAGER'S REPORT

To John Doe, President,  
X. Y. Z. Mining Co.,  
New York City.

Dear Sir—In reporting results of operations of the X. Y. Z. Mining Co., for the year ended Dec. 31, 1917, I submit statements of the production of ores, the production and recovery of metals, and the operating expense and costs, as shown in the accompanying statement in Table I.

Analysis of Production: There was stoped during the year 74,879 wet tons more than in the previous year. This resulted in an increase of production of all metals recovered. The output per man-shift stoping was 3.03 wet tons, which is about the same as obtained in the previous year. Therefore, since no improvement in methods has been introduced, the increase in production was not due to greater efficiency, but to more men on production.

There was an increase of 74,052 dry tons of copper ore smelted, making the copper production 7,007,552 lb. more than in the previous year. The average recovery of copper per dry ton smelted decreased approximately 10 lb. This was the result, principally, of mining lower-grade ore, which was made profitable by the higher market price for copper metal. The production of gold and silver per dry ton smelted was less than obtained in 1916 for the same reasons (details).

Analysis of Expense and Costs: There were increases in each of the departmental expense and cost accounts except for that of operating overhead. This was due to an increase of approximately 45% in the amount of development work done, and an increase of 25% for the year in wages and salaries (details).

The operating credits consist of gold and silver extracted from copper ores, \$299,489.62; net lead ore returns from the smeltery of \$163,270.28, and sundry operating profits, etc., \$9,305.66.

Development: The total footage of development work done during the year was as follows: (details).

The average advance per man-shift on development work was 1.14 ft., or approximately the same as last year. Therefore the increase in development work was due to more men thereon. The total development to date is 112,062 feet.

There was developed during the year new ore as follows: (details). The total new tonnage developed is estimated to be 150,000 wet tons, as follows: (details).

Repairs and Replacements: There was charged to operations during the year \$20,267 for necessary replacements to operating equipment, and \$25,375 for necessary repairs, of which the principal items are as follows: (details).

Construction and Equipment: New construction for the year amounted to \$45,202, of which the principal items were: (details).

I take pleasure in expressing my appreciation of, etc.,  
Yours respectfully,

General Manager.

TREASURER'S REPORT

To John Doe, President,  
X. Y. Z. Mining Co.,  
New York City.

Dear Sir—In making report for the year ended Dec. 31, 1917, I submit statements of the production expense and costs, sales and deliveries of metals, and the details of operating income, as set forth in the accompanying statement shown in Table II.

The increase in administrative expense and taxes was due to the war tax, which amounts to 4.83c. per lb. of copper produced. The depreciation charge is based upon the estimated life of the property, or upon the life of the equipment itself when of less time. The depletion charge is based upon the estimated net value of the ore in place as of Mar. 1, 1913, which gives a charge of \$2.50 per dry ton of ore treated. The administrative credits are composed of interest on bank deposits and dividends and interest on securities owned. All copper produced was sold. The average gross price received for all copper sales made during the year was 27.18c. per lb. The average gross price received for refined copper delivered in 1917 was 23.18c. per pound.

I submit herewith a statement of the income account as in Table III, showing the results of the year's operations and the balance sheet, Table IV, showing the condition of the business on Dec. 31, 1917.

Out of the 1917 profits there was paid regular dividends No. 14 to 17, inclusive, amounting to \$612,500. Also there were capital returned dividends, Extra No. 2 to 5 inclusive, paid out of depletion and depreciation reserves amounting to \$1,050,000. Extra No. 5 of this amount was paid out of 1917 capital returned, and the remainder was paid from reserves set aside from 1916 earnings. (Details.)

Respectfully,

Treasurer.

The publication of simple, intelligent, complete and uniform reports by the different mining companies

TABLE II. TREASURER'S EXPENSE STATEMENT

Account:	Production Expense and Cost Per Pound of Copper Produced	
	Amount	Per Lb. Copper Produced
Operation.....	\$2,055,104.84	\$0.11316
Administration and taxes.....	908,606.07	.05003
Depreciation of equipment.....	34,936.25	.00192
Depletion of mines.....	446,780.00	.02460
Gross production.....	\$3,445,427.16	\$0.18971
Production credits:		
Operation.....	\$472,065.56	
Administration.....	9,286.70	
Net production.....	\$2,964,074.90	\$0.16321

Account:	Sales and Deliveries of Metals			
	Sales	Deliveries		
	Amount	Av. Price Per Unit	Amount	Av. Price Per Unit
Copper, lb.....	19,515,600	27.177c.	17,308,670	23.18c.
Silver, oz.....	314,918	65.117c.		
Gold, oz.....	4,721	\$20		

Details of Operating Income	
Copper sales deliveries.....	\$3,175,943.25
Ore, bullion and suspense sales.....	1,503,628.12
Gold and silver sales, net.....	299,489.62
Lead ore sales, net.....	163,270.28
Refunds, discounts, etc.....	9,305.66
	\$5,151,636.93

would tend to do away with that mystery and uncertainty regarding the mining business that exists in the



minds of many members of law-making bodies and of the general public. It would help, also, to correct the erroneous belief in the minds of workmen that all mining companies make exorbitant profits, and would be a great benefit to the company managements and stock-

holders in giving clear, concise and reliable facts concerning operation results as compared with all other companies of like nature.

TABLE III. TREASURER'S INCOME STATEMENT  
Income Account Year 1917

Operating income.....	\$5,151,636.93	
Administrative income.....	9,286.70	
Gross income.....		\$5,160,923.63
Operating expense.....	2,055,104.84	
Administrative expense not including taxes.....	31,806.07	
Total expense.....		2,086,910.91
Gross earnings.....		\$3,074,012.72
Depletion of mines.....	446,780.00	
Depreciation of equipment.....	34,936.25	
Capital returned.....		481,716.25
Net earnings.....		\$2,592,296.47
Income and war taxes.....		876,800.00
Net profit.....		\$1,715,496.47
Dividends paid.....	1,662,500.99	
Capital returned dividends.....	1,050,000.00	
		612,500.00
Surplus for year.....		\$1,102,996.47
Surplus Dec. 31, 1916.....		20,827.21
Earned surplus Dec. 31, 1917.....		\$1,123,823.68

The suggestions and illustrations made are not intended to be sufficiently complete to cover all the different methods and conditions of metal mining, but are simple outlines which may create and stimulate interest in the important matter of making more simple, intelligent and uniform the reports of operating results.

The requirements of the Income Tax Law make it necessary to show what portion of dividends were paid from profits and what from capital returned, and from what year's earnings. The balance sheet must show the actual reserves set aside from earnings for capital returned, instead of showing the net depreciated value of property and equipment, in order that the amount of earned surplus being used in the business may be apparent. Also, it is provided that in the case of mining companies which had acquired their mine property prior to Mar. 1, 1913, the depletion factor shall be based upon the fair market value of mineral in place as of Mar. 1, 1913, instead of at cost, and the property account shall be written up or down to the value so ascertained.

It is also provided that no capital returned dividends will be deemed to have been paid from depletion reserves unless the surplus and undivided profits are unimpaired by such distribution, and unless the books, records, published statements, etc., of the corporation clearly indicate a corresponding reduction of the capital assets resulting from such payment.

Therefore, in the case of mining companies which had acquired their mine property prior to Mar. 1, 1913, it will be necessary that they determine the fair market value of their ore reserves of that date, and if in excess of the original property account on the books, to write up the property account for the additional value. Apparently, the law is sufficiently broad to allow the using of the original property account cost in case the ore reserves as of Mar. 1, 1913, are less than the book value of the property account.

When capital returned dividends have been paid from depletion reserves during the year, in order to show that such distributions were not paid from surplus or undivided profits, the capital dividends will have to be shown on the balance sheet as a deduction from the depletion reserves set aside for a depletion of mining property; and, after the books are closed and before the balance sheet is made up, it will be necessary to decrease the property account an amount equal to the amount of the capital dividends declared during the year, and this credit to the property account must be shown on the balance sheet as a deduction from the total amount.

The above suggestion and illustrations, especially those relative to the general manager's and the treasurer's reports, are not supposed to be sufficiently complete to cover all the different modes of metal mining, but are simple outlines which it is hoped may create and stimulate interest in this important matter of making simple, intelligent and complete reports of operating results.

INCOMPLETE REPORTS CREATE CONFUSION

There can be no doubt whatever that one of the main causes of labor troubles and inefficiency among miners in recent years has been the practice of publishing operating costs only, letting the general public believe it to be the total production cost; also by showing

TABLE IV. BALANCE SHEET DEC. 31, 1917

Assets		
Cash.....		\$984,110.83
Bills receivable and accrued interest.....	\$59,298.01	
Accounts receivable and accrued interest.....	2,628.93	
		61,926.94
Due for copper shipped.....	\$351,903.30	
Due for gold and silver.....	17,387.69	
Sold copper in transit.....	1,300,268.75	
Unsold copper in transit.....	1,870.30	
Ores on hand at cost.....	3,289.07	
		1,699,719.11
Supplies as inventoried.....		81,839.44
Mine property.....	\$3,022,500.00	
Mine property increase by appraisal as of Mar. 1, 1913.....	3,000,000.00	
	\$6,022,500.00	
Depletion reserve distributed.....	1,050,000.00	
	\$4,972,500.00	
Mine equipment.....	232,812.95	
General office equipment.....	677.10	
		5,205,990.05
Depletion reserve distributed.....		1,050,000.00
		\$9,083,586.37
Liabilities		
Current accounts payable.....	\$135,942.53	
Refining and selling expense not due.....	83,807.38	
		\$219,749.91
Reserve for taxes.....	\$901,466.16	
Reserve for accidents.....	43,025.40	
Suspense.....	2,355.26	
		946,846.82
Reserve for depreciation.....	192,733.46	
Reserve for depletion.....	\$1,150,432.50	
Capital returned dividends.....	1,050,000.00	
	\$100,432.96	
		293,165.96
Value of ore reserves above cost, March 1, 1913.....		3,000,000.00
Capital and Surplus:		
Capital stock issued.....		3,500,000.00
Earned surplus.....		1,123,823.68
		\$9,083,586.37

the earnings without any deduction for depletion and allowing the people at large to consider such as total profits. Such reports have been indisputable evidence

If you can't go to the front yourself, put your name on your money and send it. A Liberty Bond does it.



## The United States Tariff Commission and the Metal Industries

American steel, copper, lead, zinc, antimony, tungsten, and aluminum are furnishing the sinews of war for the Allies in Europe, and an expanded American industry stands ready to carry our products into new channels of foreign trade after the war. The changes that have occurred in our national industries under the war impetus are being watched abroad for their possible effect on international competition, and it is realized that in some cases they will permanently alter the trade routes of the world.

The United States Tariff Commission is systematically gathering information on the various industries of the country, with a view to presenting it in well-digested form for the guidance of Congress in the reconstruction period following the war. The commission is receiving valuable assistance from manufacturers, merchants, and consumers, and it desires that this coöperation be further extended and strengthened. Engineering societies, Government bureaus, and labor organizations are consulted as the work progresses. The American Institute of Mining Engineers is coöperating to good purpose in the appointment of two advisory committees, one on ferrous and the other on non-ferrous metals. The members of the two committees will be engineers and metallurgists of the Institute prominent in the various major-metal industries, contact with the commission being through Guy C. Riddell, consulting engineer, of New York, who has recently been appointed metallurgical expert to the commission. Dr. Grinnell Jones, formerly Harvard professor of industrial chemistry, is in immediate charge of the chemical investigations of the commission.

The Tariff Commission has invited persons and companies having direct knowledge of facts of economic significance concerning the industries of the country to submit statements. Among matters of interest to the mining and metallurgical industries on which the commission desires full information are the following:

1. The erection of new plants in the United States, or increase in capacity of existing plants, for the manufacture of products or metals formerly available in limited amount, or obtained largely by importation. Industries illustrating this class are tin, antimony, and tungsten. The proposed production of ferromanganese at the new plant of the Anaconda Copper Mining Co. in Montana, is an example of such a plant.

2. The future of industries in which productive capacity has been greatly expanded to meet direct war demand. How can plants erected to meet the war emergencies be made permanent, or utilized in other directions when war demands disappear? For example, munitions, ferroalloys and zinc plants.

3. Any general or significant differences in the prevailing methods of manufacture, in the United States and abroad, of steel and metal commodities.

4. Vital differences in the organization or conduct of the industry in the United States and abroad.

5. What is looked for in the way of competition after the war? For example, the effect of the development of extremely cheap electric power for the Australian zinc industry in Tasmania, coolie labor in the Chinese antimony industry, and increased efficiency of the British steel industry.

6. Use of new materials, or substitutes, for industrial purposes; for example, bakelite as structural material for aeroplane propellers, new nickel-zirconium high-speed tool alloy, "Cooperite"; possibilities of relief in manganese raw material situation by the wider substitution of spiegel for ferro, in which the Colorado Fuel and Iron Co. has been notably successful.

7. The development or discovery in the United States or abroad of new or improved machinery and processes which are likely to influence the conditions of inter-industry in Tasmania, coolie labor in the Chinese antimony, selective flotation, manufacture of nickel steel direct from magnetic Sudbury ores, Hall-Bartlett zinc-burning method of smelting zinc-lead ores.

8. Industries which have been seriously hampered in their normal operations by difficulty in securing materials formerly imported. For example, shortage of manganese ore and chromite for steel manufacture. If in any case such difficulties have been met by the introduction of substitutes, is it expected that there will be a return to the old materials and methods when foreign supplies again become available, or will the changes be permanent?

9. Any permanent Government hindrance in the United States or abroad in manufacture or commerce, such as foreign export duties or embargoes. Example: Greatly increased export duties on manganese ore by certain of the Brazilian states.

10. Significant changes in the conditions of international competition caused by the availability to American manufacturers of enemy patents. Certain German metal processes are examples.

It is hoped that the mining, smelting, and manufacturing interests will present their statement of facts and their recommendations to the Tariff Commission, rather than attempt to press views and claims upon Congress without opportunity for previous consideration. The commission constitutes a sort of clearing house for discussion and the gathering of information, and welcomes contributions from all quarters. Its prime object is an important attainment of facts, prepared systematically and in advance for the new commercial era that is coming in American industry. The commission will publish only general statements or summaries which will not reveal the operations or plans of individual companies.

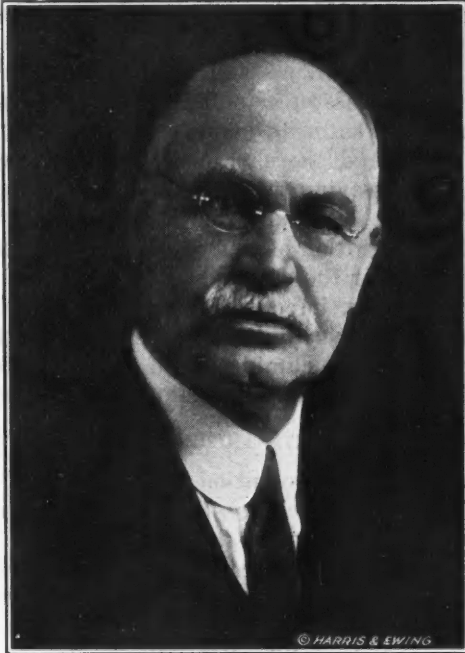
## Bituminous Schists in Uruguay

Dr. Graham Clark, a Director of the Chemical Industrial Institute, and other Uruguayan government officials, have just completed a course of experiments at Melo, says *Commerce Reports*. The experiments were made with bituminous schist, which exists in great quantities in the Department of Cerro Largo. It is hoped that schist may become a substitute for fuel oil in operating the government's electric plants. The experiments show 9500 calories per cubic meter, against 10,000 obtained in fuel oil. The oil obtained from bituminous schist has been tried with good results in semi-Diesel engines.

Conscription limits the age of the fighting man to 31 years, but there is no age limit for buying Liberty Bonds.

# United States Tariff Commission

## Its Chairman and Some of His Colleagues



DR. FRANK W. TAUSSIG, CHAIRMAN



DR. THOMAS W. PAGE, VICE-CHAIRMAN



G. C. RIDDELL, METALLURGICAL EXPERT



EDWARD P. COSTIGAN, MEMBER

# Development of Community Interest

By CHARLES F. WILLIS\*

*Development of the workman's interest in the community as a good place to live in will cut down the labor turnover and lessen the number of accidents and strikes, as well as increase efficiency and production. Certain companies in Arizona are adopting various means to this end, such as paying a bonus for tenure of service and establishing old-age pensions and insurance funds.*

**T**HE development of community interest is a phase of welfare work into which the metal mines of the West have gone but little. The time has come, however, when it is beginning to be regarded as one of the most influential means of reducing labor turnover, stabilizing mining communities, and preventing strikes, as well as of securing good legislation.

Developing such interest means arousing interest in the community other than the job. The interest may lie in the owning of a home, or in anything which would cause a financial loss to the workman were he to leave the camp or were the company that employs him to shut down.

The increasing cost of labor turnover, the present condition of unrest and other factors have drawn attention to the need of a remedy. High wages and general prosperity make this an opportune time for creating community interest and habits of thrift, both of which the miner must have before he will take a financial interest in the locality where he is employed.

## NECESSITY OF PROMOTING COMMUNITY INTEREST

In a state such as Arizona, where all mining companies are paying a standard rate of wages, the man with no ties has nothing to prevent him from moving as often as he pleases. With the shortage of labor, this has greatly increased. The loss thus caused the companies warrants the expenditure by them of a considerable sum to develop an interest that will check it.

It is not difficult to imagine the possibilities for better laws and more stable conditions where the shifting, irresponsible vote is reduced to a minimum. In many mining communities where the number of taxpayers is but a small percentage of the voters it is perfectly possible to have laws passed which are distinctly injurious to the taxpayers. A legislature controlled by those who pay no taxes usually has little regard for the money which it spends. Good government would be a direct result of the development of community interest. Employee and employer are on common ground when both are taxpayers in the same community.

## BONUS GRANTED FOR TENURE OF SERVICE

There are various ways of enlarging this interest. One is to grant a reward for tenure of service. The mines of the Warren district, in Arizona, have recently announced the distribution of \$287,000 as a bonus for continuity of service and as a direct reward for faith-

fulness. The Copper Queen branch of the Phelps Dodge Corporation, the Calumet & Arizona Mining Co. and the Shattuck-Arizona company on New Year's day paid \$100 to every underground employee or mechanic who had been constantly in their employ for one year, and \$50 each to those who had been with them six months. They also paid \$60 to every surface man in their service for one year and \$30 where the service was six months.

A precedent has thus been set, and it is believed to be but the beginning of an elaborate plan of similar payments. Were this an established custom, a man who has been at work for 10 months would think twice before quitting and thereby losing the \$100 which he would gain by staying two months longer; likewise with the other men. Naturally the labor turnover would be reduced. Recognition of tenure of service would not be as effective under the old method of hiring and "firing" by the shift boss, but with a central employment bureau, which is gradually being put into all of the mines of Arizona, and the elimination of discharge for petty, personal grievances, it should be productive of results.

## EFFICIENCY MERITS INCREASE COMPENSATION

Unquestionably recognition of tenure of service makes for greater efficiency, for which additional compensation should be paid. It has been argued that the ideal way of paying is according to individual merit, which, in days of scientific mining, is perfectly measurable. Such a method of payment, however, would contain so many factors difficult for the workman to figure that it would be unsatisfactory, and so would cause suspicion. Average efficiency, it is believed, is the only thing that can satisfactorily be taken into consideration.

From the company's viewpoint, there would be a saving in the cost of hiring and breaking in new men. There would be increased efficiency and production, fewer accidents, with an attendant decrease in compensation paid, and a smaller likelihood of strikes. From the point of view of the workman, there would be a definite financial reward and a share in the additional profits caused by lessened turnover. The question of compensation for continuity of service is well worth consideration by mining companies. It has proved successful in other lines of business, and ought to be in the mining industry as well.

## CO-OPERATIVE STORE A CENTER OF INTEREST

Another method of producing community interest lies in the operation of a coöperative company store. The company store, taken as a whole, has a bad name among workmen. Mine operators recognize that the mines themselves should pay the dividends rather than the store. Loss by the store would affect but little the total dividends of any of the large mining corporations.

At the New Cornelia plant at Ajo, Ariz., a real co-operative store is operated by the company, which charges 6% for the money invested and returns the profits to the employees in proportion to the purchases of each. Recently a dividend of 15% was declared. No employee who has traded for less than three months is

\*Director, Arizona State Bureau of Mines.



entitled to a dividend, and dividends are made returnable once a year. This encourages trade at the company store, thereby reducing the percentage of overhead expense and increasing the rate of turnover of the stock. The employee always has a bonus coming to him, which he loses by quitting. Thus the company store acts similarly to a bonus for tenure of service.

#### PENSIONS AND INSURANCE ADOPTED BY COPPER QUEEN

Among the common complaints of workmen we hear: "They pay us \$5.25 a day, whether we are 21 years old or 41; whether we have been working for them 15 minutes or 20 years, and just as soon as we get too old we are laid on the shelf, with no means of making a living, and younger men are put in our places." This feeling has led the Copper Queen branch of the Phelps Dodge Corporation to put in a system of old-age pensions, in combination with life and accident insurance. Thus is furnished something to which the man can look forward; it gives him a feeling of security to know that he will be taken care of after he has served his period of usefulness. The benefits of the Copper Queen system apply only to employees who have been 15 years or longer in the service of the company, and they are divided into the following classes:

(A) All employees who, in the opinion of the company, have become physically or mentally disqualified and who may be retired at the option of the company.

(B) All employees who shall have attained the age of 70 years and who must be retired from active service.

#### MAXIMUM PENSION IS \$1000 PER YEAR

The benefits of this system do not apply to any employee who, in accordance with any state workmen's compensation or insurance act, is receiving such compensation or insurance for injuries received while in the employ of the company. The amount of the annual pension to be allowed any retiring employee who has served 15 years or more is 2% of his average annual salary or wages for the three years of active service immediately preceding his retirement, multiplied by the number of years of his service. The maximum annual amount paid to the pensioner is not in any case to exceed 60% of his annual salary or wages, nor is any one pension over \$1000. This is another matter which makes for an interest outside of that in the position itself—a distinct, definite loss in case of quitting.

The Shattuck-Arizona Copper Co., of the same district, also has a method of compensating wage-earners for service and for the protection of service men. For the term of service of six months to one year there is an insurance of \$500, with a payment of \$50 per month for loss of time by accident and no payment for loss of time by sickness. From one year up, the principal of the policy is \$1000, with a payment of \$50 per month for loss of time by accident and \$50 per month for loss of time by sickness. All men who have worked for the company for more than six months are considered as service men and are not subject to immediate discharge, except for refusal or failure to do their work, or upon the third breach of rules, or the third minor offense in 90 days. Any service man who believes that he has been unfairly discharged has the right to present his written complaint to the general manager, who decides whether or not he shall be reinstated. The

principal of the policy for which all the service men are insured increases at the rate of 1 per cent. per month for five years.

Probably the best plan in developing community interest is through a real building and loan association, one not for making money, but for the sole purpose of encouraging men to own their own homes by loaning the money to them at a low rate of interest. It was particularly noticeable in the recent Arizona labor troubles that the home owners figured largely among the men who continued in employment. There is no source of community interest more effective than home owning, and it is worth the expenditure necessary to develop it.

In the case of a community where there are several large mines, the operators could well afford to engage a man whose sole duty would be to encourage and develop this interest. In the changed industrial and economic conditions of today, the great concentration of capital and the massing of thousands of the employed have brought about new problems. In the old times master and man lived together; there was a daily point of contact, a continuous personal touch. Today all is changed—the employer in many cases is as much an absentee as are the landlords of some of the worst tenements in slumdom.

#### EMPLOYER TODAY OUT OF TOUCH WITH EMPLOYEES

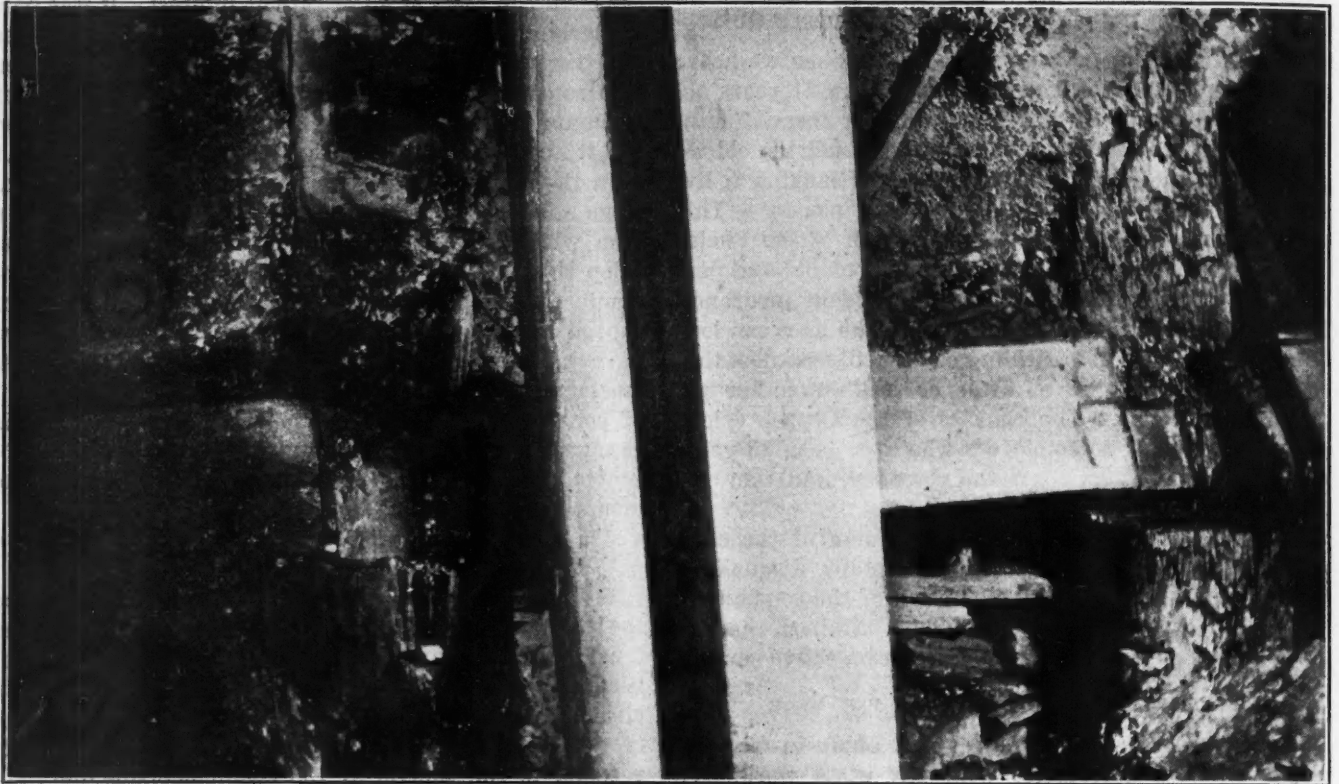
It is an industrial condition that naturally followed the organization of great capital into syndicates and trusts. With an army of thousands of employees, it became necessary, for the best administration and efficiency, that they be grouped into subdivisions, in charge of responsible leaders, in order that this machine should respond to the control of the commander-in-chief. In other words, the day has passed when the employer is able to individualize those who work for him.

As is recognized, the personal touch between employer and employee has largely been lost, and it is not desirable, even if it were possible, to return to the earlier days. But for successful conduct of business today, a point of contact must be established. From a wide observation in this and other countries, it has been found that the business man strives for the highest efficiency in the making, selling and advertising part of his business, but the labor end, the human part of it, is taking care of itself, or is left to the professional caretaker, who is not in the employ of the firm, nor always in "business for himself." However, American industrialists are beginning to realize that regard for labor is a large factor in industrial peace and contentment.

The social economist foresaw this tendency, and knew that the industrialist must establish a connection between himself, his immediate staff, and the rank and file of his industrial army, if commercial peace and prosperity were to characterize his establishment. Every man of affairs earnestly desired this.

The idea of the social secretary was brought to the United States in 1900, and the new profession is to be recommended in all industries. The problem which confronts the social secretary is how to improve the conditions of life and labor for the individual, not only in the factory, mine and workshop, but in his home, and all other relations in which he meets his fellows. The problem is one which seems to be well worthy of considerable thought and study.

## Safe and Unsafe Practices in Mines



**THE MINER WHO OVERLOOKS A BET**

The picture shows a portion of a drift that was being driven through an old stope where it was necessary to blast out some of the old timbers. The miner had spit his fuse, left the place, and, after hearing several shots, went back; but when within ten feet of the face, the shot went off, and he was injured. Reproduced from a bulletin issued by the Mining Section of the National Safety Council, Chicago, Illinois.

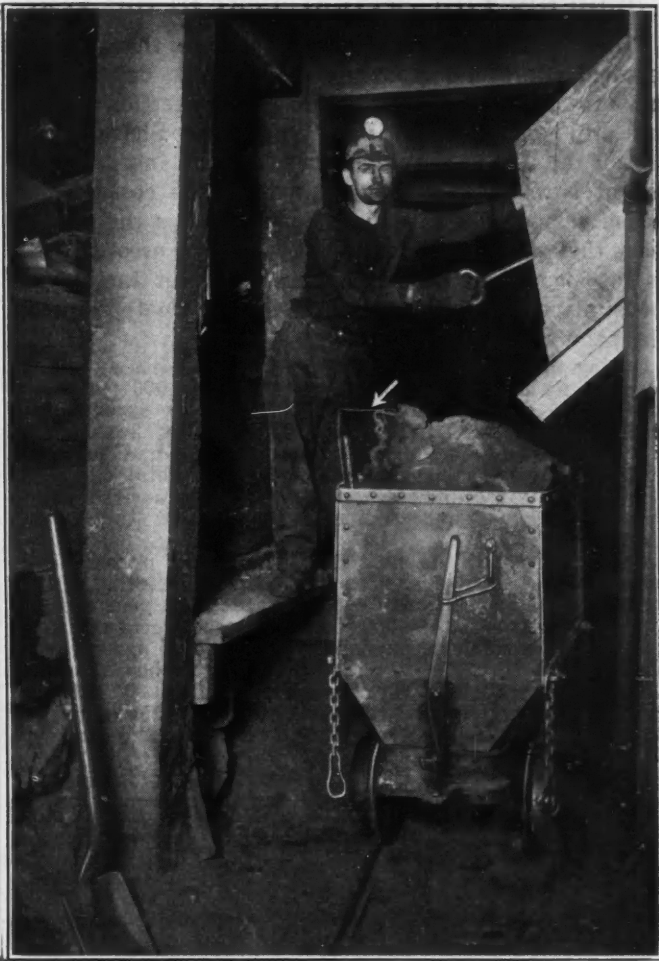


A miner working in this drift attempted to deepen an old drill hole containing powder from a previous blast.



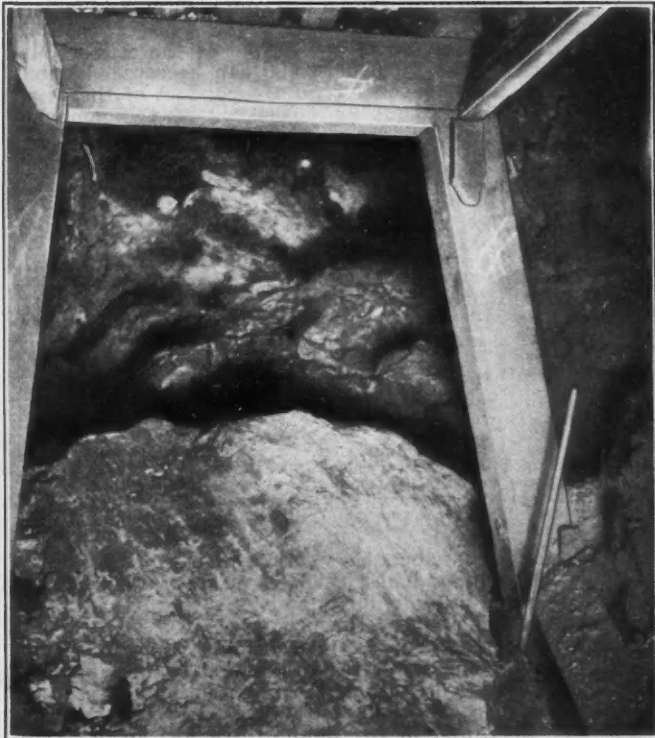
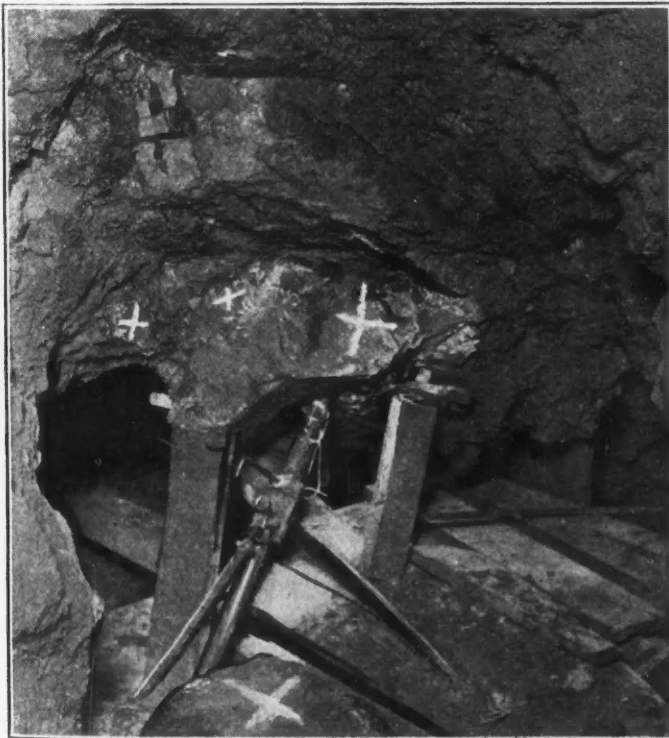
Boulder that became loose and fell from the back of a set after the miner had dressed down the face.





**USE OF A STEEL LOADING BOARD PREVENTS INJURY TO THE CHUTEMAN**

Photograph on the left shows a loader drawing ore from a chute. A chunk of ore has slid over the top of the load and struck him. Had he been provided with the steel board shown in the photograph on the right, the injury would have been avoided.



The boulder in the foreground fell from above, striking a miner who was drilling, and injuring him. He should have removed the slab before drilling or put up a small stull.

The pile of dirt in this drift came from a run and struck a mucker who was cleaning out after a blast. The back should have been examined and protected.

## Financing Our Second Year in the War

"How much ought I to contribute in the way of personal effort and from my resources to do my full share toward winning the war?" This question is discussed in a pamphlet, entitled "What Is My Share of the Cost of the War?" recently issued by the Bankers Trust Co., of New York. After estimating the cost of the second year of the war, the company figures the proper share that should be borne by each family, according to its income. Individuals, of course, without family responsibilities, should contribute proportionately more. The pamphlet says:

During this first year of the war the expenditures of the Government have amounted to over \$9,500,000,000—or more than 14 times the average expenditures of the seven years previous to the war. The advances which we have made to our Allies for the purchase of materials and supplies have accounted for nearly one-half of our total expenditures. Of the receipts, about 86% has been derived from the sale of bonds and certificates, and about 14% from taxation.

The expenses of the next 12 months will probably be considerably larger than for the last 12 months. Congress voted appropriations for the current fiscal year ending June 30 next of \$18,750,000,000, but the Government has not found it possible to expend this amount of money, and we doubt whether such a large amount can be expended in the coming 12 months. We believe that it is safe to estimate the total expenditure for the next 12 months at about \$15,000,000,000. Therefore, to raise this amount is the task which we are facing.

It is difficult to tell at the present moment just what amount of money will be obtained from taxation. If we assume that customs and excise taxes and other indirect forms of taxation produce \$1,500,000,000, we have about \$13,500,000,000 to raise from the proceeds of bond sales and income taxes.

### PROPORTION OF ANNUAL SAVINGS THAT MAY BE MADE AVAILABLE FOR GOVERNMENT

Those who have made a scientific study of such matters believe that the savings of the nation available for reinvestment in various forms now amount to about \$18,000,000,000 a year. However, not all of this amount can be made available to the Government. After making allowance for savings which must be permitted to remain invested in the form of increased working capital, and which must be used to provide for capital expenditures essential to the health and welfare of the people of the country, it is thought that about \$10,000,000,000 can be counted upon as available to the Government for the conduct of the war. It is estimated that about \$2,750,000,000 of this amount

### SHARE OF YEARLY INCOMES CONTRIBUTABLE IN TAXES AND BOND PURCHASES

Family Income Group	Per Cent. Contributable by Each Family	Amount Contributable by Each Family
\$780— 910	9.60	\$82
1,041— 1,170	10.30	113
1,431— 1,560	11.70	175
1,951— 2,080	13.50	270
2,471— 2,600	15.40	393
3,001— 4,000	18.80	658
5,001— 6,000	25.80	1,419
7,001— 8,000	32.80	2,460
10,001— 15,000	42.00	5,250
25,001— 30,000	48.00	13,200
50,001— 60,000	59.10	32,500
100,001—150,000	69.10	85,000

To use the table, multiply your income by the per cent. contributable in the second column. The result is the total amount you should contribute during a year. Deduct the amount which you pay in taxes—the remainder is the amount of Liberty Bonds which you should buy from income during a year.

can be directly contributed by corporations, and about \$7,250,000,000 by individuals; this leaves about \$3,500,000,000 to be provided by individuals and by corporations from future savings and financed through the banks.

The problem before us is to equitably apportion the burden of the \$7,250,000,000 to be provided by individuals. After a careful study of this problem, in the light of statistical information obtained from the income tax payments of 1915 and 1916, and in the light of studies which have been made by economists of the manner in which incomes are distributed, we have prepared a table [reproduced in part] which, we believe, indicates with a close approxima-

tion to accuracy how much of a given income any one of us should contribute to the expenses of the Government, in order to carry his fair share of the financial burden of the war.

### CALCULATIONS IN TABLE BASED ON FAMILY INCOMES

The calculations in the table are based on family incomes. This seems fair, because most of us live in families and perform think and act in terms of family income and outgo. It goes without saying, however, that an individual without family responsibilities can contribute proportionately more from a given income than the head of a family can contribute, or than a given family group having the same income can contribute.

Then, again, it should be borne in mind that the calculations are based on living conditions as they are found in one of our great Eastern cities, where rents are high and nearly all articles of food are necessarily enhanced in price by heavy transportation and distribution charges. Therefore, if the reader is a resident of one of the smaller cities or of a rural community favorably located to obtain the necessaries of life at a lower cost, he will find that he can without doubt make considerably larger savings out of a given income than the table would indicate.

And, finally, it should be borne in mind that this is a table of averages. Necessarily, the amounts given as contributable will not fit the exact amount which each family group should contribute, but on the average the proportionate amount must be contributed if the necessities of the Government are to be met.

### EQUALIZATION OF INEQUALITIES OF TAX BURDEN

It is possible in connection with the purchasing of United States bonds to even up the inequalities in the tax burden. An investor in municipal bonds who pays no income tax, or an investor holding stocks and who therefore is lightly taxed, can buy proportionately more bonds than the professional man or man of business who pays a heavy tax. No fair-minded person would desire to take advantage of these inequalities in taxation in order to evade responsibility for meeting his share of the war burden. Therefore, in using the table to determine the amount of bonds which one should buy, the total burden as shown by the table should be taken as a basis, and after deducting from this the amount paid to the Government in taxes the balance should be invested in Liberty Loan bonds.

In no better way can there be brought home to one the magnitude of the burden of this war, and what it means, than to consider conscientiously what constitutes one's fair share of the burden. It is no use blinking the facts of the case. We may as well face them now, and, if we have not already done so, prepare to adjust our affairs so that we can take up the burden—not for this year alone, but perhaps for next year, and then for other years to follow.

It is obvious that business and methods of living heretofore customary cannot go on "as usual." We hope we may be forgiven for again emphasizing the fact—which has been so thoroughly discussed of late in the public press—that, in the last analysis, what the Government needs is not money, but goods and services. Therefore, to the extent that each one of us curtails his wants, and thus releases industrial operatives and goods for war work, he is to that degree giving the greatest assistance to the Government. In this way, also, individual expenditure is automatically decreased, with a corresponding increase in the money available to the Government.

### PURCHASE OF GOVERNMENT BONDS AND BANK ADVANCES

In connection with purchases of Government bonds, it will be necessary to lean upon the banks for advances of two forms. The calculations in our table [reproduced only in part] are based upon yearly incomes. However, we are conscious of the fact that such incomes are not, as a rule, received in one sum, or at regular intervals. Therefore, in many cases it may be necessary to temporarily arrange with banking institutions for advances to cover subscriptions. These advances should be repaid promptly, as income is received, with a view to liquidating them as rapidly as possible.

There will be another form of advances which those having considerable invested resources may find it a duty to arrange for. As indicated above, after utilizing the current annual savings of the nation, it would appear that some \$3,500,000,000 must be obtained by mortgaging future savings, or, in other words, by using one's credit. Such advances will have to be carried over into some future year. The constant effort, however, should be to burden the banks as little as possible with loans for long periods, as their



assets should be kept liquid for the current needs of the Government and of business.

The response to previous loans has shown great loyalty and enthusiasm, but we are settling down now to the long grind, and entering a time when sober calculation is the part of wisdom. The first reaction to a study of the table is that the charge against incomes is too heavy to be borne. Further study and reflection bring one to the definite conclusion that, on the average, something like this must be done if the Government is to be provided with the means to push the war to an early and successful termination. In the words of President Cleveland, "It is a condition and not a theory which confronts us." Shall we not have the courage to do our share?

### Foreign Trade in Copper

Exports of copper from the United States in January and February, 1918, are reported by the Department of Commerce as follows:

	Jan. Lb.	Feb. Lb.	Jan.-Feb. Lb.
Ore and concentrates, etc., contents..	360,822	183,670	544,492
Unrefined, in bars, pigs, etc.....	4,434,271	1,431,009	5,865,280
Refined, bars, etc.....	81,098,209	59,032,853	140,132,062
Old and scrap.....	5,790	.....	5,790
Plates and sheets.....	4,808,921	783,397	5,592,318
Pipes and tubes.....	662,508	237,030	899,538
Wire, except insulated.....	478,278	1,834,948	2,313,226
Composition metal, copper chief value.....	3,303	2,884	6,187
Totals.....	91,852,102	63,506,791	155,358,893

The weight of ore exported in January was 4852 long tons, and of concentrates, matte and regulus, 240 long tons. In February 1998 long tons of ore and 147 tons of concentrates, etc., were exported.

Imports of copper in January and February were:

	Jan. Lb.	Feb. Lb.	Jan.-Feb. Lb.
Ore and concentrates, contents.....	9,208,603	13,720,881	22,929,484
Matte and regulus, etc.....	79,550	1,275,562	1,355,112
Unrefined, in bars, pigs, etc.....	34,513,165	41,016,225	75,529,390
Refined, in bars, etc.....	.....	6,385,748	6,385,748
Old, etc., for remanufacture.....	161,704	82,249	243,953
Composition metal, copper chief value.....	28,010	56	28,066
Totals.....	43,991,032	62,480,721	106,471,753

Ore imported in January and February amounted to 19,343 and 31,398 long tons, respectively; concentrates, 11,828 and 13,138; matte and regulus, 303 and 1676 long tons.

### Platinum Occurrence in Sudbury Ores

The report of the Royal Ontario Nickel Commission states that although the presence of gold and silver and metals of the platinum group in practically all nickeliferous pyrrhotites throughout the world has long been known, their importance in connection with the Ontario nickel industry is even now practically unrecognized, except by those who recover and sell them. The nickel-copper ores of Sudbury are capable of producing much more palladium than the whole of the present world supply, together with a very large proportion of platinum, iridium and other metals of the platinum group. The quantity of palladium present is much in excess of the platinum. Apart from the Mond Nickel Co.'s method, the processes most likely to recover these metals are the electrolytic methods of refining.

Of the platinum group, including platinum, palladium, iridium, rhodium, ruthenium and osmium, palladium occurs in the largest proportions (in the nickeliferous pyrrhotites), then platinum, iridium and rhodium in the order named. Although ruthenium and osmium are present, there are no records of the recovery of either, the report states, and it is probable that the

bulk of the osmium would be lost by volatilization during the smelting to matte. The first metal of the platinum group to be discovered at Sudbury was platinum, found in the mineral sperrylite, essentially an arsenide of platinum, containing up to 50% and over of platinum and 0.5 to 0.75% rhodium, with only a trace of palladium. Sperrylite, therefore, curiously does not account for the palladium found in the Sudbury matte, although that metal occurs in greater quantity than any other member of the platinum group in the Sudbury ores, and in fact in all pyritic nickel ores throughout the world.

Although it is not possible to state exactly the actual quantity of the platinum metals present in the ores, the quantity recovered can be ascertained from the assay of the matte, provided the number of tons of ore smelted per ton of matte is known. In the year ending Dec. 31, 1916, the total ore smelted at Sudbury amounted to 1,521,689 tons, with a production of 80,010 tons of matte. One company, which produced 63,567 tons of the total given above, states that the average content of precious metals per ton of matte for the three years ending 1915 was as follows: Gold, 0.050 oz. troy; silver, 1.75 oz.; platinum, 0.10 oz., and palladium, 0.15 ounces.

### Gas Wells Frequently Unprofitable From Overdrilling

Overdrilling is strikingly evident in the Cleveland gas field of Ohio, where it has led to considerable unprofitable operation, according to the U. S. Geological Survey. One of the most important problems confronting the gas-producing industry is that of determining the smallest number of wells capable of removing most economically all the gas under a given tract of land. So many complex factors enter into this problem that few systematic attempts have been made to solve it, and gas operators have in general been content to accept rough estimates of the number of wells that should be drilled per unit of area. In some localities it is held that only one well should be drilled to each 800 acres; in others it is customary to drill a well in each 20 or 40 acres. With present knowledge the number to be drilled must be to some extent a matter of opinion, and it is very doubtful whether any limit can be fixed that will be applicable to all fields.

Those who are familiar with the gas industry have long realized that a closely drilled field is short lived and that in most pools the later wells are less likely to be profitable than the early ones. Few operators, however, have attempted to determine the reasons for these conditions, and most of the business men and others who are occasionally induced to take a "flyer" in gas producing seem to be ignorant of their existence. Hence, in many eastern gas fields there are more wells than are necessary or profitable, and in some fields the wells are crowded so closely that many of them have never produced enough gas to pay for themselves.

The geologic study of the Cleveland field indicates that in most fields the wells that are brought in after the general pressure has declined to one-half of its original amount are unprofitable, and that in many fields this point may be reached when the pressure has declined only one-half.

## The Assayer and Chemist

### Rapid Determination of Tungsten

BY FREDERICK W. FOOTE\* AND RASTUS S. RANSOM, JR.†

The analysis of tungsten in the presence of pyrite is difficult, and from 6 to 10 days are required to make a determination. The following is the method of F. Jean, as modified and used by Dr. Gaston Fiorentino, an Italian chemist in Portugal. It requires only a day and a half to two days and is excellent for high-grade ores and concentrates, but is not satisfactory for low-grade ores or mill tailings:

Weigh out one gram of finely pulverized ore and place in a porcelain crucible with 1.2 grams of a mixture of equal parts of calcium carbonate and sodium chloride. Mix well, leaving a small portion of the NaCl and CaCO<sub>3</sub> unmixed on the bottom of the crucible. Heat gently over a Bunsen burner, with the crucible closed for a few minutes, then increase the flame gradually so that the full heat is obtained in 10 minutes. Do not fuse the mixture. If the ore contains much pyrite, bring the bottom of the crucible to a red heat until fumes are given off; then apply full heat.

Cool, transfer to a 250 c.c. porcelain evaporating dish, break up lumps, digest with 40 c.c. HCl and heat over a water bath, stirring often, for 45 minutes. Heat the crucible in which the fluxing was done in HCl, wash three times with dilute HCl and add this to the main solution. Add 15 c.c. HNO<sub>3</sub> to the solution, cover with a watch glass and heat for 15 minutes. Remove the watch glass and continue evaporation, stirring often, until about 15 c.c. of the solution is left. Add 100 to 125 c.c. of boiling water and allow the solution to stand for two to three hours until the precipitate settles and the solution is clear. Decant and wash the precipitate three times with a 2% solution of HCl and twice with a 2% solution of HNO<sub>3</sub>, decanting each time as closely as possible. Dry the precipitate remaining in the evaporating dish, then bake with the filter paper at 100° C. until all traces of acid are removed. To the dry precipitate add a little NH<sub>4</sub>NO<sub>3</sub>, a little NH<sub>3</sub> and water. Stir until all WO<sub>3</sub> is in solution. Let stand until the precipitate settles, then filter on the same filter paper into a weighed dish. Wash with a 1% solution NH<sub>4</sub>NO<sub>3</sub> and a few drops of NH<sub>3</sub>. Evaporate to dryness on a water bath and heat in a free flame, raising the heat gradually until the precipitate becomes yellow; cool and weigh as WO<sub>3</sub>.

If the ore is not rich and contains much silica, filter into an evaporating dish and evaporate to dryness on a water bath; continue the heat for 30 minutes, thus making the silica practically insoluble. Take up with water, filter on a small filter paper into a weighed dish, wash with hot water and evaporate again on a water bath. When only a few drops remain, remove the dish

from the water bath and rotate so that the precipitate will form on the sides and not all in the bottom. Continue evaporation to dryness, remove and heat on a piece of asbestos until the precipitate no longer smells of ammonia. Continue the heat in a free flame, increasing it gradually until the precipitate becomes yellow; cool and weigh as WO<sub>3</sub>. If a platinum crucible is used, before the final heating add a little H<sub>2</sub>SO<sub>4</sub> (1-2) and several drops of HFl. Evaporate the HFl, add a little dilute HNO<sub>3</sub> and evaporate to dryness. Heat until yellow and weigh as WO<sub>3</sub> (this is to remove the last traces of silica).

For low-grade ores take two grams of ore instead of one and mix with 2.2 grams of CaCO<sub>3</sub> and NaCl. Heat with a full flame for 20 minutes. In the acid solution, after having removed the watch glass, evaporate to dryness; take up with a little HCl and evaporate a second time. From this point on the procedure is the same.

This method is excellent for high-grade ores and concentrates in the presence of iron, but is not satisfactory for low-grade ores, tails, etc. Experiments have been made with pure acids and commercial acids on a mixture known to contain 2% WO<sub>3</sub>. With pure acids the results were 1.99%, 1.75% and 1.86%. With commercial acids the results were 0.71%, 0.95% and 0.72%. This emphasizes the necessity of using pure acids.

### Molybdenum Content of Ores and Concentrates\*

The following method of determining molybdenum in ores and concentrates has been described by H. C. Mabee, chemist of the Department of Mines, Ottawa. Mr. Mabee reports that this method has been in satisfactory use for the last two years in the work of the department: Place from 0.5 to 1 gram of the sample in a quartz or platinum crucible of 50 c.c. capacity, add 2 to 3 c.c. fuming nitric acid, heat gently and evaporate just to dryness. Add 30 grams fused acid potassium sulphate and fuse. Leach out the fusion in hot water, heat to complete solution, precipitate the iron with ammonium hydroxide, settle, filter and wash with hot water. The precipitate should be examined for retained molybdenum and if necessary reprecipitate. To the ammoniacal filtrate add 50 c.c., 1:1 sulphuric acid. Pass through a special reductor made of ½-in. glass tubing 24 in. long, drawn out at the lower end and connected by rubber tubing with a 3-in. funnel at the upper end. The reductor is filled with amalgamated zinc the size that will lie on a 10-mesh sieve. The lower end passes through a two-hole stopper and about quarter way to the bottom of a 1-liter gas bottle. By means of a piece of bent glass tubing passing through the second hole of the stopper, connection is made with a suction pump. Before making a reduction, wash out the tube with hot 1:1 sul-

\*Mining engineer, 80 Broadway, New York.

†Metallurgical engineer, James Ore Concentrator Co., Newark, New Jersey.

\*Canadian engineer, Jan. 3, 1918.



phuric acid solution. Place 20 c.c. of a 15% ferric alum solution (made slightly acid with sulphuric acid) together with 20 c.c. "titrating mixture" in the gas bottle into which the reduced solution is passed. Wash out the reductor at least four times with the hot dilute sulphuric acid, filling the funnel each time. Titrate warm with standard potassium permanganate standardized against c.p. molybdic acid (Baker's 99.9%) following the same procedure as in the case of an ore.

### Tricks in Filtration

Filtration difficulties encountered in some of the most common determinations may be overcome, according to George H. Brothier, in *Journ. Ind. and Eng. Chem.* for February, 1918, by the use of certain "tricks of the trade," which he describes as follows:

In filtering barium sulphate, the sulphate solution should be about 200 c.c. in volume and weakly acid with hydrochloric acid (1 c.c. 1.2 sp.gr. to a neutral solution). It should be heated to a temperature just below boiling,<sup>1</sup> and about half of the solution of barium chloride necessary for excess added drop by drop, stirring well meanwhile, and allowed to digest for about five minutes. The remainder of the precipitant is then added (not necessarily so slowly, though the solution should be stirred during the addition) and it is allowed to digest 10 or 15 minutes longer. It is then ready for filtration.

A precipitate formed in this way will be crystalline and will be readily retained by a paper of moderately close texture. I have satisfactorily used Whatman 40, C. S. & S. 589 "White Ribbon" and Munktell's O instead of the slower Whatman 42, C. S. & S. 589 "Blue Ribbon" or Munktell's OO. In this way time may be saved in the filtration, as well as in the much shorter period of digestion.

In the case of calcium oxalate, heat the solution of calcium salt to just below boiling. Add excess ammonium oxalate solution, then just enough hydrochloric acid (sp. gr. 1.2) to dissolve the precipitate. Add ammonium hydroxide solution drop by drop until distinctly ammoniacal, then run in a good excess. Digest at a temperature just below boiling for about half an hour. Filter while hot and wash precipitate with hot water.

The important part in this determination is the acid oxalate solution from which calcium oxalate is precipitated by the addition of ammonia. The formation of calcium hydroxide is in this way prevented and a crystalline precipitate of the oxalate insured. The method works out the same if the original calcium solution is made acid, the ammonium oxalate (or oxalic acid) added, then the ammonium hydroxide solution, as above. The objection to this procedure is, of course, the absence of an indicator to prevent the addition of an unnecessary excess of acid. For volumetric lime determinations, where an ashless paper is an unnecessary extravagance, Whatman 3 and 30 or Munktell 100 will be found satisfactory if the precipitation is done by this method.

The principal difficulty with the precipitation of ammonium phosphomolybdate is the adherence of many analysts to the old rule, namely, heat the phosphate solution to about 70° C., precipitate and digest at no

higher temperature. If this procedure is followed, digestion for several days is necessary to secure a filterable precipitate, and even then success is uncertain. I have found the method of Woy with modifications, as given in Treadwell-Hall's "Quantitative Analysis" (1915), p. 437, to be satisfactory. The essential point of this method is precipitation and digestion at a temperature just below boiling. The phosphate solution should be made distinctly alkaline with ammonium hydroxide, then nitric acid added to slight excess. This is a convenient way to insure the presence of ammonium nitrate in the solution and prevents the addition of too great an excess of nitric acid. It should be heated to boiling, then, while stirring, add the ammonium molybdate solution drop by drop from a pipette. Digest on a hot plate at a temperature just below boiling until the supernatant liquid is clear and colorless (usually about 15 minutes). Decant, wash and filter as usual. Occasionally when the precipitant is added, no precipitate immediately forms, but instead the solution becomes colored yellow. Digestion, as described above, will bring about complete precipitation and conversion of the yellow solution to colorless, but in such cases more than 15 minutes' digestion is usually required. The precipitate thrown down in this way is coarse enough to be retained by quite open-textured papers, such as Whatman 1 and 31, C. S. & S. 595, or Munktell's OB.

In filtering magnesium ammonium phosphate, I again think that the difficulty lies in the use of old methods which called for the addition of magnesia mixture to an ammoniacal solution of the phosphate in the cold. The method of B. Schmitz, as outlined in Treadwell-Hall (*Loc. cit.*), p. 434, gives much more satisfactory results. The phosphate solution is treated with excess magnesia mixture solution, hydrochloric acid added just to dissolve the precipitate and it is heated to boiling. Ammonium hydroxide solution is added slowly until a crystalline precipitate forms. If the precipitate is not crystalline, it should be redissolved by the addition of hydrochloric acid and reprecipitated with ammonia. When a distinctly crystalline precipitate has formed, the solution is made ammoniacal, it is removed from the hot plate and allowed to cool. When cold, add a volume of ammonia (sp. gr. 0.9) equivalent to about one-fifth the volume of the solution, and at the end of about ten minutes it is ready to filter.

### Corrosion of Electrode Supports

A device to prevent the corrosion of the supports of rotating electrodes is proposed by Enrique Hauser, Madrid (described by H. S. Paine in *Chemical Abstracts*). It consists of a light glass cup which is fitted over the lower extremity of the rotating shaft at the point where the latter engages the electrode. The lower portion of the cup is tapered to form a narrow mouth, in which a cork is inserted. The straight wire shank of the electrode is passed through this cork to its point of attachment with the rotating shaft, thereby furnishing support for the cup. The upper edge of the cup encircles the shaft and is flared inwardly so as to prevent the projection by centrifugal force of any liquid which may find its way into the cup. In this manner the rotating shaft is protected from corrosion by spray and contamination of the electrolyte is prevented.

<sup>1</sup>"Just below boiling" gives all the advantages of precipitation and digestion in hot solution and eliminates the risk of superheating and loss through frothing or bumping.

# Events and Economics of the War

After a lull in the fighting, the Germans reopened their offensive with attacks southeast of Amiens and against the ridge positions in the north; Villers Bretonneux, at first lost by the British, was later recovered, and the Germans were completely checked along the Avre; Mont Kemmel, however, was taken; heavy attacks against the Ypres salient have so far been repelled, with great loss to the enemy. Demands by Germany upon Holland, greatly embarrassing to the Dutch, have produced a grave crisis, it is reported, between the two countries. An embargo on the export of tin, quinine and kapok was ordered by Holland, effective Apr. 22; it was later reported that licensing and not prohibition of exports was contemplated, which, however, has not been verified. Occupation by Germans of Simferopol, in the Crimea, is reported. In England Lord Northcliffe resigned as director of propaganda in enemy countries and severed his connection with the British mission to the United States. The Bonnet Rouge trial opened in Paris.

In this country, John D. Ryan, president of the Anaconda Copper Mining Co., was appointed director of the Aircraft Production Board. The price of raw wool was fixed by the Government on the basis of that prevailing on July 30 last. The Silver bill was signed on Apr. 23 by the President, who also named the War Finance Corporation Board. The Overman bill passed the Senate on Apr. 29. The Mineral-Control bill passed the House on Apr. 30.

## Ryan Heads Aircraft Board

John D. Ryan, president of the Anaconda Copper Mining Co., has accepted the directorship of aircraft production for the Army. A reorganization of the Aviation Section of the Signal Corps has also been effected, of which the principal elements are as follows:

General Squier, as Chief Signal Officer, will devote his attention to the administration of signals; a Division of Military Aeronautics is created, under the direction of Brig. Gen. William L. Kenly. The Aircraft Board, created by act of Congress, remains an advisory body, as it has been in the past, with Mr. Ryan as its chairman. This arrangement is made with the entire concurrence of Howard Coffin, who remains a member of the Advisory Commission of the Council of National Defense.

The Division of Military Aeronautics will have control of the training of aviators and the military use of aircraft. The exact division of function in the matter of designing and engineering will be worked out as experience determines between the Division of Military Aeronautics and the Division of Production. No change is involved in the personnel in the present Equipment Division of the Signal Corps, of which W. C. Potter is chief, and which will continue under his direction. Complete severance of the Signal Corps and the air service has been forecast.

## War-Loan Statistics

The first Liberty loan had 4,500,000 individual subscribers; the second, 9,600,000. The most successful German war loan—the sixth, after two years of war—had 6,768,082 subscribers. About 10% of the population in both cases bought bonds. Twenty million subscribers to the Third Liberty loan will nearly double Germany's best achievement, and the resulting wide distribution of bonds will cause less financial displacements and provide better assurance that the bonds will not be placed upon the market.

Germany's public debt on Oct. 1, 1913, was \$1,165,000,000. In December, 1917, it was estimated to be \$25,408,000,000. The public debt of the United States Mar. 31, 1917, was \$1,208,000,000 and on Jan. 31, 1918, was \$7,758,000,000.

The total wealth of the German empire, according to Dr. Karl Helfferich, former minister of finance, is 310,000,000,000 marks. (A German mark equals at par exchange 23.8c.). This is approximately \$80,000,000,000. The wealth of the United States is estimated at \$250,000,000,000. Dr. Helfferich's statistics credit France with 287,000,000,000 francs, or nearly \$60,000,000,000. He credits England with approximately \$60,000,000,000. Great Britain's national debt at the beginning of the war was \$3,458,000,000 and in February, 1918, its total was \$27,636,000,000.

The French national debt in July, 1914, was \$6,598,000,000 and on Dec. 31, 1917, was \$22,227,000,000. Italy owed in June, 1914, \$2,792,000,000, and in December, 1917, \$6,676,000,000. The debt of Austria-Hungary in 1914 was \$3,985,000,000 and in December, 1917, amounted to \$19,018,000,000.

The per capita debt of Germany at the end of 1917 was \$379, while that of the United States in January, 1918, was \$75. For the United States to obtain the same degree of indebtedness which Germany has attained, according to population, would require borrowing to the extent of approximately \$40,000,000,000, or more than five times the debt of the country last January.

## Dutch Place Embargo on Tin

Holland has placed an embargo on the exportation from the Dutch East Indies of tin, tin ore, cinchona bark, quinine, quinine salts, and kapok, all of which are needed in large quantities by the United States for war purposes. Official notification of the embargo, effective Apr. 22, was received on Apr. 26.

The embargo on tin and tin ore will prove especially embarrassing to the United States. Supplies needed for munitions and food preservation were expected to come from the Dutch East Indies, as the British are taking the entire output of the Straits Settlements. About 16,000 tons of tin were bought by the United States last



year from the Dutch East Indies, and the amount probably would have been increased this year.

Cinchona bark, quinine, and quinine salts are needed for medicinal purposes by the Army. Kapok is a vegetable product, used in making hammock mattresses for the Navy.

The *Sun* printed a Washington dispatch on Apr. 28 saying that the Dutch legation denied that any embargo had been placed; that simply an order requiring licensing of exports had been issued.

## Trade Conditions in Germany Studied By Commerce Department

The primary object of a report recently issued by the Department of Commerce is to throw light on Germany's preparedness for trade after the war. It is stated that obstacles have not melted away so readily before German efficiency as many have supposed, that there has been serious bungling in high places, profiteering, gross mismanagement, and intense dissatisfaction among the working classes. Stocks of materials have been used up, substitutes have failed to satisfy, equipment has deteriorated and some industries have profited greatly by the war at the expense of efficiency for peace times. The report continues:

"Most of the measures [German] for reëntering foreign trade are still in the stage of discussion, only a few having received legislative sanction. Many industries have been syndicated or consolidated; an imperial ministry of economic affairs has been created; subsidies have been voted to rehabilitate the merchant marine; steps have been taken to promote the exportation of German goods under the guise of neutral products.

"The loss of capital during the war, the lack of ship space, and the difficulty in obtaining foreign credits and means of payment for the imports of raw materials and foodstuffs are regarded in Germany as the principal obstacles to a speedy rebuilding of the foreign trade. The low exchange value of the mark will enforce economy in importation and the state will be obliged to interfere 'not because it has become socialistic but because it will have no other choice.'

"In spite of all the obstacles that will confront the Germans, however, it will be well to bear in mind the fact, as pointed out by the eminent Italian lawyer, Eucardio Momigliano, that there is need of preparing for defense in order that German business may not continue its old methods of quiet penetration in one country after another. People everywhere are now awake to the German methods, but the mistake must not be made of underestimating the recuperative power of the Germans and of overestimating the effects of the burden of billions resting on Germany as a result of the war. There is danger that even in defeat this economic reality of 70,000,000 Germans in the middle of Europe is going to continue to dream the dreams of middle Europe, followed by the dreams of middle Africa and also the dreams of a German world.

"Apart from questions of Governmental policy, there is a clear duty resting on American business men individually to keep their eyes open to German competition in whatever form it may come. The American Govern-

ment, in concert with the governments of the other great nations, will see to it that Germany, as a government, shall henceforth operate in the open. American business men, like business men in the other great countries, must likewise see to it that all operations of German trade enterprises shall take place in the open and bear a clear indication of having been 'made in Germany.'"

## Inspiration Fosters War Gardens

The Inspiration Consolidated Copper Co., of Arizona, has given an excellent example to other great corporations in fostering the Victory garden among its employees:

"At present there are over 500 war gardens planted in this district, and by the end of the month there will be 800," writes J. R. Sandige, agricultural expert with the company in Gila County. The Inspiration company cleared, fenced, harrowed, ditched, and leveled 75 acres of soil, divided into eighth-acre tracts, and furnished the seed and water to any employees who would undertake to raise the crops. All the gardener is expected to furnish is hoe and "pep." Instructions are furnished by Mr. Sandige and his assistants.

A Victory garden market has been established in connection with this work, and this year a community canning and drying plant will be installed, with the water and fuel furnished free. What this company is doing other corporations could do, and there is still time to act.

## Must Pay Federal Taxes When Due

Secretary McAdoo authorizes the following statement:

The agitation in favor of legislation to authorize the payment of income and excess-profits taxes in deferred installments is doing much harm. The War Revenue Act, which became a law Oct. 3, 1917, authorized payment to be made in installments in advance, and authorized the Secretary of the Treasury to issue Treasury certificates of indebtedness acceptable in payment of these taxes. The Treasury Department adjusted its plans to this law. Taxpayers have to a very large extent done likewise.

Treasury certificates of indebtedness to the amount of nearly \$2,000,000,000, maturing in June, have been issued and sold, at least three-fourths of which have, it is believed, been purchased by taxpayers and banks in preparation for these tax payments. The minimum amount of the third Liberty Loan and the dates for payment of installments upon bond subscriptions were fixed by the Treasury Department with careful regard to the requirement of the law for the payment of the income and excess-profits taxes in June or sooner. Seventy-five per cent. of the required installment payments on subscriptions was deferred until July 18 and Aug. 15, after the tax payment.

The receipts from the Liberty Loan in May, after allowing for a liberal amount on account of optional payment in full, are not likely to be more than sufficient to meet the excess of current disbursements over receipts for that month, together with the \$1,000,000,000 of Treasury certificates of indebtedness which mature in May. Judging from the returns filed to date, the amount of the income and excess-profits taxes payable in June will not exceed the amount of the Government's current deficiency for the month plus the \$2,000,000,000 Treasury certificates then maturing.

To permit the deferred payment of the income and excess profits taxes would necessitate the issue in June of Treasury certificates to a prohibitive amount; and the Treasury Department cannot, therefore, recommend to Congress the amendment of the existing law, which requires the prompt payment of these taxes in June.

The Treasury cannot finance the requirements of the war if only Treasury obligations are to have definite maturities. The June tax payments can be made, I am certain, without embarrassment or serious inconvenience to taxpayers, and that they should be paid promptly when due is of the utmost importance to the country.

We should make up our minds to pay these taxes when due and get the business behind us. To defer them until the fall, when another Liberty Loan will have to be issued, will add new complications to the situation. I earnestly hope, therefore, that further agitation may cease and that every one will cooperate in the patriotic determination to do his duty in the payment of taxes at the time that duty ought to be performed.

### McAdoo Orders 30,000 Freight Cars

Orders for 30,000 box and coal cars, to cost in the aggregate between \$80,000,000 and \$90,000,000, were placed on Apr. 26 by Director General McAdoo with the American Car and Foundry Co., at fixed prices which will represent about 5% profit. Two styles of each kind of cars were ordered. All will have steel bases and frames, but will contain a maximum of wood, to save steel for the nation's shipbuilding program. They will be completed within six months and be put into service for fall and winter hauling. This is the first order for rolling stock placed by the Railroad Administration. It probably will be followed by contracts for the construction of about 1000 locomotives. The ordering has been delayed by disputes over price, the original bids of the builders providing for 10% or more profit.

### Schwab Has a Real Man's Job

Including the 200,000 shipworkers now employed in American yards and the 250,000 more to be at work before the end of the year, Charles M. Schwab will have 450,000 working under him. He will be directly responsible for an expenditure of almost \$2,000,000,000 and possibly more, for out of the \$2,084,000,000 appropriated by Congress for ship construction, only \$353,247,000 was expended up to Mar. 1, 1918. On that date, 378 requisitioned steel ships originally begun for private owners but commandeered by the Government were still on the ways. Schwab will have to finish these, together with 715 more steel ships, aggregating 5,166,400 tons under contract but hardly begun, and 490 wooden vessels. Schwab is in supreme control of 151 shipbuilding plants, 85 of which are engaged on wooden construction and 66 on building steel ships.

### Melting of Silver Dollars Begun

The signing of the Pittman Silver bill by the President on Apr. 23, providing for melting down 350,000,000 silver dollars, was promptly followed in New York by removal to the Assay Office of part of the 90,000,000 dollars stored in the Sub-Treasury. The work was retarded by shortage of labor. The present program calls for handling only \$25,000,000 of the total. To convert all of this silver into bars, it is expected, will take the local assay office six weeks or more. Its capacity for the work is estimated to be about \$600,000 per day. At the Philadelphia and Denver mints, the work will be heavier, as they will have more coin to handle. Efforts are being directed to performing the operation

as cheaply as possible. It is said that recent experience of the Philadelphia and San Francisco mints shows that it costs about \$8625 to convert \$1,000,000 of silver bullion into coin. The reverse will undoubtedly be less expensive.

### British Munitions Output Increased

Frederick G. Kellaway, Parliamentary secretary to the British Minister of Munitions, says that the tanks lost in the Picardy battle have been replaced with superior models, the ammunition used has been more than made good and gaps in men have been filled. Great Britain is as strong or stronger in the air. The production of light guns in January and February, he asserts, increased 30% over the same period last year, medium guns increasing 57% and heavy guns 38%. The gain in machine guns was 96%; shells, 83%; tanks, 59%; airplanes, 223%, and airplane engines, 245%. The weekly production of airplanes in the first two months of this year equalled the average monthly production in 1915. As many machine guns are now produced weekly as were made in five months of 1915.

### Anthracite Industry Employs Women

Hard pressed for labor, the anthracite industry will employ women where possible, it is announced. The Lehigh Coal and Navigation Co. has just introduced female help at its colliery at Nesquehoning, Penn. The girls are engaged in various capacities, from clerks and time-keepers to the more trying tasks of weigh-scale- and switch-tenders. They wear uniforms furnished by the company. When it is considered that the gain of 3098 mine-workers since September may be depleted in a day, and more expert miners, machinists and miner's laborers taken away by the Government and sent to France, the employment of female help may become necessary.

### Exceptions to Import Restrictions

In the announcement made by the War Trade Board in issuing its list No. 2 of restricted imports, it is specified that licenses for molybdenum will be granted only for shipments coming from Canada or Mexico. Licenses for the following articles will be granted only for shipments coming overland or by lake from Canada, or coming overland from Mexico: Borax, cement for building purposes, chloride of lime, sodium cyanide, ferromanganese and spiegeleisen, lead, magnesite and stone. It is intended that list No. 2 is to be interpreted in accordance with the tariff classification as given in the tariff act of 1913 and amendments thereto. The latter will be followed uniformly in constructions of the list.

The War Department announced on Apr. 24 that nitrate plant No. 3, composed of two units, would be located at Toledo, Ohio, and Elizabethtown, Ohio. The two half units will equal in capacity the full unit now under construction at Sheffield, Alabama.

**Remember the Comfort Fund of the 27th Engineers.**



## Industrial News from Washington

BY PAUL WOOTON, SPECIAL CORRESPONDENT

### Greater Use of Domestic Ores Imperative

Patriotism requires that the mining and metallurgical industries do everything reasonably possible to make increased use of domestic ores. This is the opinion of C. K. Leith and J. E. Spurr, of the Committee on Mineral Imports and Exports of the U. S. Shipping Board. They authorize the following résumé of the situation:

The shipping situation requires immediate important changes in mining and allied industries. The precise nature of these changes and the agencies and methods through which they will be accomplished are not yet formulated, but there are certain fundamental facts which should be clearly understood.

The acute ship shortage has forced a drastic cut in imports of a considerable number of minerals essential to war industries. Among the more important embargoes of these are manganese, chromite, pyrite and graphite. Some are already in effect. Others will soon follow.

Ships released in this way, or their equivalents, have gone directly into military use, and with a still greater military program planned and probable further decrease in total ship tonnage, for a time at least, there is little possibility of early reinstatement of ships for mineral imports.

The deficiencies in supply thus caused must be made up from domestic sources. Reduction of imports has been based on careful estimates of the possibilities of domestic production. Estimates have been liberal, and there is not much danger of overproduction. Every ton mined here will save a ton of material that otherwise would have to be imported.

The increased use of local ores will require many changes in practice and probably also reduction of less essential uses. Those changes must be accomplished, regardless of cost or difficulties, for the alternative of bringing in supplementary supplies from abroad no longer exists.

Government coöperation will be necessary along several lines. Already attention is being directed to various phases of the problem by the War Industries Board, the War Trade Board, the Shipping Board, the Department of the Interior, the Railway and Coal administrations, and the Treasury Department. There is pending in Congress a bill to concentrate control over the mineral industries most affected by ship embargoes. While the situation is being actively followed up, there is likely to be a delay of at least several months before it is well in hand.

If private interests wait until every detail is settled before taking steps to meet the situation, there is danger of vital damage to essential war industries. Patriotism requires that the mining and metal industries do everything reasonably possible to get projects started at once. The necessary Government coöperation may be slow and halting, and mistakes are not unlikely, but as the shipping situation allows no alternative, it is a reasonably safe assumption that the absolutely necessary things will be done in time. In view of these facts, far-sighted management of the mineral industry will not base its calculations for the immediate future on the practice of last year.

### Little Chance of Increasing Quicksilver Output

No increase in the production of quicksilver in 1918 is expected by F. L. Ransome, of the U. S. Geological Survey, who has just returned from a visit to practically every producing property and important prospect in the West. Very few of the prospects have promise of becoming large mines, Mr. Ransome believes. In addition, some of the producing mines are near the end of their resources.

In 1917, the production was nearly 36,000 flasks. As it is probable that this output can be approximated in 1918, the war needs of the country can be supplied from domestic sources, but it is believed that some curtailment will be necessary in other uses. The principal war use of quicksilver is for fulminating purposes. The quicksilver which goes into anti-barnacle paint for ships' bottoms is also regarded as a war use.

As the cost of producing quicksilver averages between \$60 and \$70 a flask, it is apparent that a considerable margin of profit exists at present prices. It had been hoped that such a price as now prevails would be sufficient inducement to bring about the opening of a number of quicksilver properties that are closed at present. It seems, however, that the difficulties in the way of operating these mines are such as to preclude their reopening under present conditions. That the burden of supplying the metal to the Government at \$105 a flask may not fall entirely on domestic producers, Pope Yeatman, head of the raw materials division of the War Industries Board, has secured an agreement from the importers of quicksilver to contribute their proportion of the Government's requirements.

### Mineral Imports Committee Discusses Minerals Administration

In the issue of the *Journal* of Apr. 13, a letter written to the Senate Committee on Mines and Mining by J. E. Spurr, of the Committee on Mineral Imports and Exports, was referred to and quoted in part. The statement was made that the Committee on Mineral Imports and Exports favors the passing of the powers of the Mineral-Control bill to the War Industries Board.

A careful analysis of the letter will show that the matter of the powers of the bill passing to the War Industries Board was simply a statement of probability and not at all an expression of preference. The letter was written originally for the Mining and Metallurgical Society of America in response to a request from its secretary. Later the same material was forwarded to the House and Senate committees.

### Potash Lands Opened

Eight square miles of the potash brine zone at Searles Lake, California, are now open to application for leases. This tract is exclusive of the lands already patented. Public surveys of the Searles Lake area recently were completed and the township plats will be ready soon.

Senator Henderson, of Nevada, chairman of the Committee on Mines and Mining, has made a study of the Mineral-Control bill. Hearings on the bill before his committee have already begun.

## Be a Booster for the Comfort Fund

Getting down to fine points, it's a matter of boosting the mining regiment; backing them up so that they won't have to back up. Its all very well for you and me, pardner, who get our needs day by day, for we haven't tried to do without them, but how about the chaps—our mining fellows—who are going to be "up against it" for a smoke or any of the other comforts that keep one's courage up? We've simply got to loosen up at this proposition and see that the 27th get all that is coming to them.

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Total ..... \$12,929.00

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*.

## An American Peace

There can be no peace with honor or safety to ourselves or to posterity except a just peace, and there can and will be no other peace. Work for peace accomplishes nothing but the hampering of our effort, the delay of the real peace, and a greater toll of death of America's fighting men. Our duty is to war for a just and righteous peace; to work or speak for any other peace is aid and comfort to Germany—injury and disloyalty to our boys in France.

A Liberty Bond is an old-age insurance policy, fully paid and non-assessable.



## Minerals Separation North American Corporation

An interesting insight into the relations of the Minerals Separation American Syndicate, the Minerals Separation North American Corporation, the firm of Beer, Sondheimer & Co. and the Minerals Separation, Ltd., was given in the House of Lords, English Parliament, on Mar. 13, 1918. The account of the meeting, taken from *The Times*, London, follows:

Lord Sydenham asked two questions concerning a German firm: (1) Whether the American branch of Messrs. Beer, Sondheimer & Co., of Frankfort, was blacklisted and subsequently released; and (2) what conditions were imposed when this branch of the German firm was permitted to act for a time as agents of Minerals Separation American Syndicate.

Lord Hylton, who replied, said the information which the government had was to the effect that Messrs. Beer, Sondheimer & Co., of New York, were included in the statutory list, generally called, he thought, the blacklist in the United States, in July, 1916, and remained on that list until it was withdrawn on the entry of the United States into the war. It is perfectly true the Minerals Separation American Syndicate (1913) (Ltd.), which is a British registered company, entered into an agreement in the month of September, 1913, with Messrs. Beer, Sondheimer & Co., under which the firm were appointed the sole agents of the syndicate for the transaction of all commercial affairs of the syndicate in the United States of America, Canada, Mexico, Cuba, and the Philippine Islands. Messrs. Beer, Sondheimer & Co. have their principal office at Frankfort, and have a branch in America carried on by Messrs. Benno Elkan and Otto Frohnknecht, who were resident and domiciled in New York City. In October, 1914, the syndicate applied to the Committee on Trading with the Enemy for leave to enter into an agreement with Benno Elkan and Otto Frohnknecht, under which the syndicate appointed them as the American branch of Beer, Sondheimer & Co., its sole and exclusive agents for the transaction of the commercial affairs of the syndicate in the places already mentioned, and Elkan and Frohnknecht undertook not to pay or cause to be paid any money, etc., arising from or in connection with their trade relationship with the syndicate to Beer, Sondheimer & Co., of Frankfort, or any person resident in Germany or Austria, or to any one for the use of such person during the war, and to defer until after the war any commission or remuneration payable to them. At that time Beer, Sondheimer & Co., of New York, were not blacklisted, and no authority was required by the syndicate to enable them to enter into the proposed contract. They were informed by the committee that there was no objection to their doing so.

In June, 1916, the syndicate approached the Treasury again. In view of their difficulties in America, they had been advised to form an American corporation to acquire from the syndicate the United States patents and the patents for Canada, Mexico, etc., and all their assets and other rights, but they were prejudiced by the agency agreement entered into with Benno Elkan and Otto Frohnknecht, the American corporation which was proposed being unwilling to submit to the obligation to deal with them. The syndicate, therefore, proposed to invite Elkan and Frohnknecht to cancel the agreement in return for a certain number of fully-paid shares in the company and an option to subscribe at par for further shares. The shares in question were ultimately to be converted into shares in the American corporation, and no benefit was to accrue in respect of them for five years. The substitution of a moderate shareholding interest in the company—£17,500 out of £200,000—appeared to be preferable to the control resulting from the exclusive agency under the agreement of 1914, and, after reference to the Board of Trade, the syndicate's proposal was sanctioned, subject, of course, to the approval of the Capital Issues Committee of the issue of shares if a new issue was involved. Meanwhile the syndicate received from America the agreement entered into there for the formation of an American corporation for the acquisition of its undertaking and assets, as finally settled. This agreement necessitated a modification of the proposed agreement with Elkan and Frohnknecht, putting an end to their exclusive agency. The shares which they were to receive as consideration for cancellation were to be placed at their disposal at the end of the war instead

of at the end of five years, and Elkan and Frohnknecht were to be the general agents in the countries which I have mentioned, although not the exclusive agents, of the American company. On the other hand, they released to the British company the money to which they were entitled in respect of commission, which was stated to amount to from £16,000 to £20,000. The company stated that it was absolutely essential to continue this provision as to the agency, Elkan and Frohnknecht absolutely refusing to assent to its cancellation, and they pointed out that a leading American counsel had advised, in America, that the American branch of Beer, Sondheimer & Co. had no authority to enter into the new agreement or give the guarantee as to no-enemy benefit, and that the original agency agreement of 1913 was still in existence and could be enforced against the syndicate in the American courts. Meanwhile the name of Beer, Sondheimer & Co., of New York, had been added to the statutory list. In all the circumstances the Treasury came to the conclusion that it was advisable in the national interest to authorize the company to enter into the agreement of Aug. 4, 1916, with Elkan and Frohnknecht, even though their right to be appointed agents remained, rather than to leave the company under their liability of the 1913 and 1914 agreements to employ them as sole and exclusive agents, and sanction was accordingly given so far as the acts and proclamations relating to trading with the enemy were concerned. The Capital Issues Committee subsequently recommended the issue of fresh shares, out of which *inter alia* the shares to which Elkan and Frohnknecht were entitled were allotted to them.

## April Mining Dividends

Dividends paid in April, 1918, by 30 United States mining and metallurgical companies making public returns amounted to \$7,276,001, as compared with \$11,567,138 paid by 44 companies in April, 1917.

Canadian, Mexican and Central American mining companies paid \$903,506 in April, 1918, and \$1,290,937 in April, 1917.

United States Mining and Metallurgical Companies		Situation	Per Share	Total
Ahmeek, c.	Mich.		\$2.00	400,000
Am. Smelters, pfd. A.			1.50	243,846
Am. Smelters, pfd. B.			1.25	149,885
Allouez, c.	Mich.		1.50	150,000
Arizona Commercial, c.	Ariz.		.50	132,500
Bingham Mines, c.	Utah		.50	75,000
Caledonia, ls.	Ida.		.03	78,150
Cresson Cons., g.	Colo.		.10	122,000
Daly, ls.	Utah		.10	15,000
Golden Cycle, g.	Colo.		.03	45,000
Grand Central, ls.	Utah		.05	25,000
Homestake, g.	S. D.		.50	125,580
Inspiration, c.	Ariz.		2.00	2,363,934
Iron Blossom, s.l.	Utah		.02½	25,000
Iron Cap, c.	Ariz.		.25	36,203
Isle Royale, c.	Mich.		.50	75,000
Judge Min. & Smelt., s.l.s.	Utah		.12½	60,000
New Idria, q.	Calif.		.50	50,000
North Butte, c.	Mont.		.25	107,500
Oscoda, c.	Mich.		2.00	192,300
Pacific	Utah		.01	4,000
Portland, g.s.	Colo.		.03	90,000
Shattuck Arizona, c.	Ariz.		.50	175,000
Silver King Con., s.l.	Utah		.10	700,000
Tonopah Belmont, g.s.	Nev.		.12½	187,504
Tonopah Min., s.	Nev.		.07½	75,000
United Eastern, g.	Ariz.		.05	68,150
Union Con., g.s.	Nev.		.05	10,000
U. S. Smelting, com.	U. S.-Mex.		1.25	438,894
U. S. Smelting, pfd.	U. S.-Mex.		.87½	425,555
United Verde, c.	Ariz.		1.50	450,000
Wolverine, c.	Mich.		3.00	180,000

Canadian, Mexican and Central American Companies		Situation	Per Share	Total
Cons. Min. & Sm. Co., c.s.	B. C.		.62½	261,936
Howe Sound, c.	B. C.-Mex.		.05	99,208
La Rose, s.	Ont.		.05	74,931
McKinley-Darragh-Savage, s.	Ont.		.03	67,431
Nipissing, s.	Ont.		.25	300,000
N. Y. & Hond. Rosario.	C. A.		.50	100,000

The totals for the first four months of 1918 are as follows, the 1917 figures being given in parentheses: United States mining and metallurgical companies, \$54,537,525 (\$74,324,100); holding companies \$743,433 (\$2,731,217); Canadian, Mexican, Central and South American companies, \$5,581,281 (\$7,584,028).

## Ceylon vs. Alabama Graphite

An article appearing in the *Journal* of Mar. 2, under the heading of "Graphite Situation Easier," contained the statement, made by George A. Sharpe, president of the Alabama Graphite Producers' Association, that "the War Trade Board acted unwisely when it permitted the importation of large quantities of graphite from Madagascar and Ceylon, thereby taking out of other service much-needed ships, when large supplies of Alabama graphite were prevented from reaching domestic markets, by reason of railroad embargoes."

I believe that the Government and all users of crucibles should know, what the manufacturers of crucibles are already aware of, that without Ceylon plumbago (a regular supply of which can be depended upon when there are no embargoes), which is the very heart of the munition trade, covering steel, brass, rubber and even powder itself, no economy can be practiced in the production of munitions. The use of domestic graphites alone, even though a steady supply could be reasonably depended upon, could not produce economical crucibles, but, on the contrary, would be wasteful of graphite, clay, crucibles, fuel, labor, metals and railroad and other transportation facilities. The embargoes now prevailing on foreign graphite will reduce the stocks of graphite in this country to a danger point, but it is to be hoped that the shipments from Ceylon, after the embargo is raised, will arrive in this country early enough this fall so that the crucible manufacturers' stock of graphite will be replenished. The prices that have prevailed the last year or two have been known as war prices, and any one starting a graphite-mining proposition certainly ought to have realized that, as soon as the demand slackened, prices would, of necessity, have a tendency downward. The price now is more than double what it was before the war, so if the producers cannot get along now they will certainly have a much harder time after the war ceases.

The Joseph Dixon Crucible Co. probably has three times as much money invested in mining and producing graphite as any other single company, and therefore is as anxious to have profitable prices maintained as any other graphite-mining company, but, like others, is compelled to sell at prices which not only net a fair profit, but to a large extent are regulated by the supply and demand of graphite. It has been clearly and definitely demonstrated at a meeting held in Washington where Government officials were present, that because of the physical structure of American graphite, not more than 15 to 25% can be used to produce a satisfactory crucible, and the American product has to be used in connection with Ceylon graphite.

To insure a regular supply of graphite from Alabama, the Joseph Dixon Crucible Co., over a year ago, loaned \$200,000 to two graphite companies in that state. These companies were to ship four carloads of No. 1 graphite per month, at the then prevailing price, but have sadly fallen down on their contract. Had the Dixon company depended entirely on the Alabama graphite producers for material for the manufacture of crucibles desired by the Government, it would have been compelled to shut down the plant on numerous occasions, owing to the fact that the Alabama people did not make delivery in accordance with the terms of the contract.

No crucible manufacturer would more gladly welcome the production in America of graphite suitable for the manufacture of crucibles than the Joseph Dixon Crucible Co. To obtain a supply of graphite suitable for crucibles, it is necessary for the American crucible manufacturers to go some 12,000 miles for their supply; therefore, it is not because they desire to make use of Ceylon graphite in the manufacture of crucibles—it is because they are obliged to. It is not a question of purity, as the American graphite is as pure as that of Ceylon, but of physical formation, in the same manner as the question of physical formation in the selection of a sand suitable for making the proper mortar.

GEORGE E. LONG,

Joseph Dixon Crucible Co.

Jersey City, N. J., Apr. 26, 1918.

## House Debates Mineral-Control Bill

WASHINGTON CORRESPONDENCE

Discussion of the Mineral-Control bill in the House was much more prolonged than had been expected. Partisan controversy cropped out frequently. The Republicans could not refrain from taunting the Democrats for urging so energetically a measure which provides drastic means for building up home industry and for curtailing foreign importations. This brought forth retort in kind, and much time was spent in discussing matters not germane to the bill. Finally the Republicans, on Apr. 27, prevented a final vote on the measure. Representatives Cannon, of Illinois, and Good, of Iowa, were particularly prominent among those who opposed the bill. Mr. Good said:

The first thing we did after we declared war was to give the President \$100,000,000 to purchase things of this kind. Of course, this vast tonnage of ships should be released. It should be released at once. Do not wait for this authority; exercise the authority already granted and buy them at once. The authority and money have already been granted. Almost a year ago we granted this authority, and it should have been exercised long ago. We should have been buying antimony and manganese and bismuth—and all those things which you say you are going to buy, if this bill becomes a law—for a year. You have needed the ships all year. The President has the power to buy them now, at any price he may fix. He has the money in his hands with which to buy them, and there is no limitation on the price that he can pay. Why not exercise this power? Why create more useless offices, the salaries of which drain the substance of the people?

As has become customary, lawmakers were anxious to know the attitude of the President toward the bill. This led to considerable discussion, which was not terminated until Chairman Foster had a telephone conversation with President Wilson. The President told Dr. Foster he considers the bill a war measure and that he regards it as essential that it should become a law as soon as possible. He authorized Dr. Foster to advise the House that the bill has his endorsement. A letter from Secretary Lane endorsing the bill anew also was presented by Dr. Foster.

General opposition to creating a separate Minerals Administration was indicated during the debate. The fact that it is to be administered by the Secretary of the Interior added materially to the support the bill received in the House. Representative Johnson, of



Washington, made the following statement during the discussion:

I advise the holders of all kinds of dead mining stocks held by people throughout the East to make haste and dig them up from their trunks and garrets and hang onto them, because if, after having tried to develop these interests, we find them taken over or developed under Federal control and a revolving fund provided, the stock therefore may be galvanized into some value.

Mr. Johnson's statement brought forth from Dr. Foster his most extended argument in support of the measure, an extract from which is as follows:

Are you willing to get up here and say that this is to open up some worthless mines and make the stock of those mines worth more money; that this is to make valuable some worthless stock and bring it up to par? Are you willing to trifle with these necessary articles that enter into the production of the shells that go to the boys across the seas? If you are, defeat this bill, and in six months' time we may be in a position where we will not have these articles to carry on the war. . . . Are you going to say now that you will take back those ships, take them from the work of carrying troops and supplies to France, and put them on the route between Spain and the United States to carry pyrites, and between Brazil and the United States to carry manganese, when these minerals can be developed in our own country in sufficient quantities if only some organization is provided and some help is given? My friends, are you going to do this? If you are, then go ahead and defeat this bill. But if you are not, let us pass this bill and give the Government the right to secure these necessary minerals that they need for war purposes.

Representative Anderson declared that the Food Control Act is infinitely less drastic, infinitely less comprehensible and contains narrower powers than does the Mineral Administration bill. The House did not approve of the section of the bill which allowed the employment of the necessary technical and clerical assistants without having secured civil service status.

### Appeal for the People of Serbia

Our friend Capt. Anthony F. Lucas, a distinguished mining engineer, who is a member of the Serbian Relief Committee of America, has issued a letter, in which he says in part:

Serbia is in the direst distress, for, save for a small number who are devoting all their time to relief work, there are few of this wealthy nation who are rendering material aid or realize the pressing need.

The Serbian refugees, with their children, who escaped in 1915-'16, and who are scattered throughout Greece, Corsica, North Africa, and France, are in a most frightful plight for want of food, and those civilians who remain in Serbia under the reign of terror of the Bulgars and Hungarians are being rapidly exterminated.

Betrayed by the treachery of Bulgaria, the jackal of Germany, and the former King of Greece, of whom Serbia had every right by treaty to expect military aid if invaded, and whose only crime with them was the wish to be free, this little nation, after a year and a half of heroic deeds against the combined military might of the Central Empires, stands today unconquered in spirit, steadfast and true to the principles of freedom and justice for which these United States, with their Allies, are so valiantly contending. I was one of them, was beckoned early in life to this friendly shore, and am in a position to fully realize their slow agony.

It has been my privilege also to give to the cause of freedom my only son, who left for the front the day war was declared, and is now with the American army in the front line doing his best to stem the invasion, servitude and slavery. In the security of your happy homes, it is simply impossible for you to realize what the real misery of a free-born is when enslaved by hunger and the unspeakable indignities and atrocities of the conqueror's heel that knows no pity.

Please do give liberally, for we ourselves are standing

now on the brink of a precipice, and God in his mercy may heed us by our acts and deeds, and give victory to our valiant boys that fight now with France and England's best, for the liberty and freedom of the weak and oppressed.

Checks should be made payable to the Serbian Relief Committee and mailed to Capt. Anthony F. Lucas, 2300 Wyoming Ave., Washington, D. C. We bespeak for this worthy charity the generosity of the mining industry.

### Third Liberty Loan Boosted by Mining Industry

In addition to the amounts subscribed for Third Liberty Loan bonds, as obtained through the Special Liberty Loan Committee for the mining industry reported in the *Journal* of Apr. 27, the following subscriptions were reported to Apr. 29:

Previously reported .....	\$20,144,650
New Jersey Zinc Co.....	25,300
National Zinc Co.....	15,000
Western employees, National Zinc Co.....	33,200
Adolph Lewisohn & Sons.....	250,000
Miami Copper Co.....	50,000
Tennessee Copper Co.....	10,000
International Nickel Co. and employees.....	250,000
Consolidated Copper Co.....	70,000
Butte & Ely Copper Co.....	30,000
Employees of Ledoux & Co.....	1,900
United States Smelting, Refining and Mining Co. and subsidiaries .....	520,000
Consolidated Arizona Smelting Co.....	100,000
Federal Mining and Smelting Co.....	100,000
Nichols Copper Co.....	100,000
J. R. Stanton.....	125,000
E. G. Hothorn.....	10,000
Employees of L. Vogelstein & Co.....	4,700
Cerro de Pasco Mining Co.....	250,000
<b>Total.....</b>	<b>\$22,089,750</b>

### Will Restrict Manganese Imports From Brazil

Manganese importation from Brazil during the current year will not exceed 350,000 tons, it is believed in Washington. The amount brought in will probably be reduced on a graduated scale until July, when the rate permitted for the latter six months of 1918 probably will be made on a basis of 240,000 tons annually. The average monthly importation in 1917 was reported 42,709 tons.

Government specialists are of the opinion that the estimate of 175,000 tons for the domestic production of high-grade manganese ore in 1918 is very conservative. Cuba is expected to produce 100,000 tons this year and Central America 20,000 tons. The reduction in Brazilian imports will be more than met by increases in the domestic production of low-grade ore, it is believed. The estimates for low-grade production for 1918 are as follows: Appalachian region, 40,000 tons; Arizona, 25,000; Colorado, 100,000; Lake Superior region, 280,000; Montana, 25,000; New Mexico, 25,000; zinc residuums; 175,000; miscellaneous, 15,000 tons.

### What Your Liberty Bond Will Do

An investment of \$18,000 in Liberty Bonds will equip an infantry battalion with rifles; \$50,000 will construct a base hospital with 500 beds, or equip an infantry brigade with pistols, and \$100,000 will buy five combat airplanes, or pistols, rifles, and half a million rounds of ammunition for an infantry regiment.

## Editorials

### John D. Ryan To Build Aeroplanes

THE good news of the week was the appointment of John D. Ryan to take charge of the aircraft construction. This confirms the belief, expressed last week, that there has been an epoch-making, electrifying change in policy, and that at last business men are to be invoked to do the big jobs in a businesslike way. With Stettinius, Schwab and Ryan in the service, the country has three of the best. It may be taken for granted that Mr. Ryan, like Mr. Schwab, demanded and received a free hand. We cannot but feel a proper pride in the thought that two of these men have been found in the mining and metallurgical industry.

Of Mr. Schwab we could say that a shipbuilder had been chosen to build ships. We cannot make an analogous expression with respect to Mr. Ryan. We do not think that he ever built an aeroplane. But he has built or directed the building of many other things, and he knows how to get work done. We have a supreme confidence that he will accomplish our aeroplane program, no matter how big and complex it may be.

Mr. Ryan has proved himself one of our great industrial administrators. He has made the Anaconda Copper Mining Co. the greatest metallurgical company of the world, and has converted it into a wonderfully ramified, greatly diversified industrial concern. He has created the Montana Power Co. and has electrified the State of Montana. He is a constructive genius. In entering upon the aeroplane program he will simply be exercising his talent in a new direction.

### Platinum in Russia

IN THE *Journal* of Apr. 6, 1918, we published a communication on the subject of platinum in Russia by Mr. Rogovin, our Petrograd correspondent. Mr. Rogovin is an engineer who is connected with the "Association of Gold and Platinum Producers," and is therefore in a position to know whereof he speaks. By some misunderstanding in our office, his communication was presented in a rather misleading way, it being made to appear that he was writing in 1918 of the events in 1917. In fact his report was written in 1917 and referred to 1916. The original failed to reach us. In March we received a belated letter, enclosing a duplicate of the missing report, which we mistook for an original, relating to 1917, until subsequent reference to the accompanying letter disclosed our error.

This does not, however, in any way invalidate the most important part of Mr. Rogovin's statements; viz., that the platinum production of Russia has been decreasing and the price for the metal has been rising, not so much owing to war conditions as to the exhaustion of the deposits that have been worked heretofore; and that in order to maintain the production it will be necessary to exploit poorer areas, which could

be done, he thought, with platinum at \$97 per oz., the prevailing price at the time when he wrote. This opinion acquires increased weight, we think, when it is understood, as we have now explained, that it was given in 1917 when conditions, both in Russia and elsewhere, were not so bad as they are now.

### The Situation in Tin

AMONG all the metals, the situation in tin is the most serious. It was troublesome during 1917. Early in January, 1918, we were obliged to discontinue the quotation of spot Straits tin in New York, for the reason that there ceased to be any wholesale market here, not for absence of demand, but for lack of any supply. The position with respect to Banka and Chinese tins soon afterward became the same. The tin markets of the world became confined to the primary sources; viz., Singapore, Batavia, Hongkong, etc. The small American production of tin from Bolivian ore is sold mainly by contract, and therefore does not afford a supply that is generally available. The basic reason for the shortage of tin is that the world's production has failed to increase materially, while there has been a considerable loss of the metal on its way to England by submarine sinkings.

The situation, which is now causing a great deal of worry in Washington, has been heretofore viewed there in a very sleepy way. In the first place, the attention of the Government was drawn, a year ago, to the probability that an emergency might arise, but no notice of that warning was taken. At that time the situation was fairly easy, the price for tin being then 55@60c. per lb. However, the obvious thing to persons who are accustomed to think in terms of the metals was to begin to take steps to forestall what might easily happen, and what in fact has happened. Late in the summer of 1917 the Food Administration, seeing the handwriting on the wall, began to urge economy in the use of tin, its direct interest being, of course, the requirements for the canning industry. On Nov. 26 the Navy Department commandeered all of the supplies of tin in this country, thus taking care of direct Government requirements, at least temporarily. There has not been, however, any coördinated survey of the situation, such as should have been instituted a year ago with a view to the elimination of nonessential uses, the development of substitutes and the increasing of production, although the need for doing these things has been repeatedly pointed out in our own columns and in others of the technical press, besides what has been done privately by experts in the business.

There have lately been conferences in Washington on the subject. These have been directed especially to the regulation of use of the metal and the introduction of substitutes. Both of these thoughts are well and



good. But the matter of increasing the supply should not be overlooked.

Unfortunately, we cannot see any way of increasing the supply in this country. We have no tin mines. There are only a few tin prospects, none of which is very promising. We must therefore look abroad, and the direction whither we turn naturally is Bolivia, where production can be increased, there is reason to believe. The American Smelting and Refining Co. is already producing tin on a considerable scale from Bolivian ore at Maurer, N. J. Williams, Harvey & Co. (in which Señor Patino, a large tin producer of Bolivia, is interested) is building a smeltery in Brooklyn, which was expected to be in operation in April, but will not be until summer, unless it be hastened. Both at Maurer and at Brooklyn there have been delays in getting material, labor, etc.

Now, is it not the obvious thing that our Government should do everything possible to promote the production of tin in Bolivia, arrange the financial transactions if necessary, facilitate the transportation of ore hither, and render assistance by priority orders and otherwise, in completing the metallurgical plants in this country? Is there anything needful in this connection that cannot be done immediately (or could not have been done at any time during the last six months) by the War Industries Board? There is not a thing except to think and act. Is not this what the Germans would do?

Nor is Bolivia the only part of the world to think about.

The situation in tin was rendered more acute last week by the action of the Dutch government in checking the exportation of tin from Banka and Billiton. Whether or not this was a retaliatory measure, the fact remains that it is a condition, not a theory.

It is perfectly clear to us that the whole matter of tin supply should have more adequate study than has yet been given to it, and that the advice of experts in the business should be invoked.

### The New Spirit

AMERICA has at last awoke. Anybody who has followed the Liberty Loan subscriptions, especially in the West, and who observed the exaltation of the public on Apr. 26, which the President proclaimed as Liberty Loan day, can see that. The parades that occurred in cities, towns and hamlets all over the country, with civic bodies, fathers and mothers who had given sons to the service, school children and all, exhibited a devotion to the cause, a solemnity and a determination that were impressive. It marked the full awakening of a mighty people, with eyes open to the magnitude of the task before it, but with a grim determination to see it through, and a spirit that has never been conquered and never will be. The enemy may well tremble at this rising of a hundred million people, who possess the greatest resources of the whole world and who are fast learning how to employ those resources effectively. We used to think erroneously of Russia as the steam-roller. America will be the real machine.

### The Passing of the Glendale Works

THE Edgar Zinc Co. on Apr. 20 closed down its Glendale plant, in the Carondelet section of St. Louis. This was one of the oldest zinc smelteries in the United States; indeed, among the Western plants, that of the Matthiessen & Hegeler Zinc Co. at La Salle, Ill., is the only one that antedates it. The Illinois Zinc Co. did not build at Peru, Ill., until 1870. All of these plants were built before the Joplin ore came into the market, which was not until 1873.

The Glendale works was kept in regular operation during its history of half a century, lacking one year. It has been repeatedly the sole survivor of the old type of zinc-smelting works, equipped with grate-fired Belgian furnaces. About 1901, when the old works of Pittsburg, Kan., were driven out of use, Glendale continued. It was still going when the boom in 1915 caused every old plant to be rescued from the scrap heap, if possible. The works of Pittsburg, Kan., Collinsville, Ill., Nevada, Mo., and elsewhere, had a new and glorious but brief lease of life; but with the advent of the new era of depression they had to be abandoned again, and this time, which will be the last time without doubt, Glendale has to be closed, if not abandoned.

The survival of the Glendale works was due to good management. Long before anybody else thought of devoting attention to the production of a superior grade of spelter, the Edgar Zinc Co. achieved and maintained a high reputation with its "Glendale refined." Adhering to its old Belgian furnaces, this company exhibited conservatism, but nevertheless it sometimes displayed a spirit of adventure, being, in fact, one of the two works at which mechanical blende roasting was introduced in this country. Mr. Edgar, at Glendale, and Mr. Meister, at Collinsville, took a chance on the Brown horseshoe furnace at the same time. In recent years the Edgar Zinc Co. became a subsidiary of the American Steel and Wire Co., which itself is a part of the United States Steel Corporation. Its Cherryvale plant was the first successful natural-gas smeltery and has ever exhibited some of the best features of such constructions. Its Donora plant is the largest and one of the most modern of producer-gas-fired plants. Admiring the enterprise shown in those works, we are bound nevertheless to feel a pang in chronicling the passing of the historic old Glendale plant.

### The Mythical Metal Octopus

THERE was a good deal that was humorous in the discussions in Parliament while the non-ferrous metals bill was pending, which is aimed to head off a German octopus after the war. One of our New York dailies reported this under the caption "Dooms German Metal Octopus—British Parliament Has Bill Before It Providing for National Control—Teuton Cunning Bared—Capitalists of Berlin Sought to Dominate Copper and Other Markets."

We gather that the octopus is supposed to be the three great metal houses of Frankfurt-am-Main, which are independent concerns, but are alleged to have a sort of a cousinly relation. They have extensive mining and metallurgical interests on the Continent of

Europe, and previous to the war they had interests, but not controlling interests, in certain American and Australian trading and investing corporations; but if they had any idea of controlling the metal production of the world they did not get very far with it.

The United States produces the bulk of the world's copper, and through its interests in Canada, Mexico, Peru and Chile controls an even larger proportion, so large a proportion, indeed, that, except for the Japanese, the copper production of the rest of the world does not amount to much. Neither the Frankfurt houses nor their descendants ever had more than an insignificant participation in copper production. There is a widespread public interest in this, but the predominant groups are the Anaconda, Morgan-Guggenheim, Hayden-Stone & Jackling, Phelps Dodge, and Calumet & Hecla, none of which has any German affiliations.

In the zinc industry of the world the United States is the largest single factor, its output of 685,000 tons in 1917 representing, without any doubt, the major part of the world's production. The American production of zinc in 1917 was made by 30 smelters, operating 47 works, and competition among them was very keen.

The big lead producing countries of the world are the United States, where there is a division of interest similar to what exists in copper, and Australia and Spain. All of the lead production of Australia is in the control of British and Australian companies, while nearly all of the lead production of Spain is controlled by a French company, the Peñarroya.

The three metal houses of Frankfurt-am-Main have mining and metallurgical interests in many parts of the world, but the idea of their having any control of the several industries must be as humorous to them as it is to the people who really control them.

## Standardization of Directors' Reports for Mining Companies

IN THIS issue we present a contribution by T. O. McGrath dealing with the accounting phase of the mining industry, which at this time will undoubtedly be received with more serious attention than the subject has been accorded heretofore. Financial statements purporting to show "net worth," or the difference between assets and liabilities, and statements of "profit and loss," or the difference between receipts and expenditures, as presented in reports by the directorates of mining companies, are based on such a variety of accounting methods that no uniformity of principle exists, and many, if not most, are impossible to interpret without intimate knowledge of the manner in which charges have been made or evaluations based.

Under the War Excess Profits Tax Law many revisions of form have been necessary, entailing, as was inevitable, complete analysis of the books at least as far back as Mar. 1, 1913. The lack of uniformity, and, worse still, the lack of sound principles, that characterize the accounts and statements of most mining enterprises have been a topic of discussion for many years. The basic principles brought forth by Hoover and Finlay, although well recognized, have not been universally adopted in bookkeeping practice. Now that companies

are facing taxation on operating profits, from which certain charges for depletion and depreciation may be deducted, the vital question arises as to the equity of these charges from the accounts. Few companies are prepared to present statements that will reflect their true state of affairs with respect to these principles; and injustices are bound to result from a tax based on an "invested capital" that has not been properly accounted.

We are decidedly in favor of any practicable suggestion that will tend to promote simplicity and uniformity in mining company statements, and, furthermore, we believe that a great benefit is to be derived from a standardization of the accounts upon which such statements depend. Statements and costs would not only be comprehensible by all, but in point of cost comparison would have an engineering value plainly apparent. A few years ago an attempt was made to formulate a standardized system of mine accounting, and the subject has at different times received considerable space in technical literature. To the best of our knowledge, however, these efforts have not been followed up by any organized step on the part of mining companies, and, unlike the railroad accounts of this country, our mine accounts remain unstandardized.

This lack of response and coöperation is undoubtedly due to the absence of absolute individual necessity, the aspect of which is changed by the present exigency. The subject is one fraught with many complexities of technique and with impracticable obstacles, and radical changes in a system of accounting at a large property the present system of which has been evolved from years of experience and expanding operations would create, for a time at least, a state of chaos difficult to avoid. Mining, unlike most industrial manufacturing enterprises, is subject to a variety of working conditions which are complicated by elements of the unknown and the unexpected, and when viewed from this angle the effort toward standardization seems hopeless. The various operations, however, that, combined, make the total cost of transforming a ton of mineral-bearing rock in place into a certain quantity of marketable metal, may be easily enough classified to take into account the different mining methods in a manner uniform in principle. The difficulty lies in acquiring the data essential to the execution of a system requiring sharp lines of demarkation between each step in the process, and the cost of the additional clerical force necessary to collect, segregate, distribute and redistribute this data to obtain the desired result.

The advantages to be gained by a costly system are undoubtedly open to question in the smaller class of operations, and an ideal standard system should consist of controlling accounts and sub-accounts each further subdivided until the last item of cost has been properly accounted, the whole arranged in such form that the degree of refinement in cost segregation is entirely a matter of choice, to be decided by the extent of operations; but that, whatever the degree adopted, the comparative value of those costs derived will be unimpaired, constituting, as they would, the total of similar accounts at some larger company which has merely taken advantage of the elasticity of the system by extending the segregation possibilities according to the standard schedule.



At certain of the larger properties, we know of elaborate systems of cost segregation that fail utterly to check up with actual disbursements and stock on hand; and we not only question the wisdom of such cost-accounting systems, but we are confident that more effort to secure accuracy in the initial data and less attempt at minute cost segregations would not only involve no greater expense but would in reality be a truer index of the efficiency of the various departments and of the salient operations entering into the cost of each. Too much minute detail is often attempted, which, if the basic figures are not accurate, vitiates the entire result.

We know nothing that can be so misleading as inaccurate accounts, and it is noteworthy that the most successful mine managers, as a matter of fact, place little reliance upon their monthly figures, realizing existing fallacies and preferring to depend upon close observation of the work itself and to draw comparisons from their judgment and store of experience. Where this method fails, however, is in the human limitation of experience in all the various departments that enter into the business of present-day large corporations; and the evidence of this is patent in the fact that the most efficient department is usually that from which the manager has risen and which he consequently understands the best. For maximum efficiency in all departments, the manager should have a system of accounting for each, upon the accuracy of which he can place entire confidence, arranged to indicate the greatest leaks and compiled in time to be effective.

We have great hopes for the eventual standardization of mine accounting as well as bookkeeping; it is the work not of one man but of many minds. The accountant must have a high degree of familiarity with mining conditions, and the mining engineer must understand the principles of accounting, without which the problem cannot be solved. Coöperation between both professions is of essence, and if the present tax difficulty will lead to some such organized effort on the part of mine managers throughout the country, its present fallacies may be more clearly put before the lawmakers and a more equitable basis of taxation to all concerned would undoubtedly result.

We wish that we could understand the thought of Washington with respect to manganese. Importations of manganese ore are being restricted. An embargo has been placed on imports of ferromanganese. The price of ferromanganese of 70% remains, however, at \$250 per ton. The market says that the price would readily rise were it not for the probability of price-fixing. We think it was Mr. Farrell who remarked that \$500 ferromanganese that you have will make better steel than \$100 ferromanganese that you have not. The War Minerals Committee wants to stimulate the production of manganese ore and contemplates guaranteeing a *minimum* price in order to do so. A guaranteed minimum for manganese ore and a restrictive maximum for ferromanganese in combination constitute an interesting idea.

You owe a debt of Freedom to America. Buy a Liberty Bond and pay the debt.

## BY THE WAY

The really big executive does not despise suggestions from however humble a source. He has learned that the man lower down often gets a more practical view of things than his superior, and values his opinion accordingly. In the *Wall Street Journal*, the general manager of a large steel mill, one of the biggest in the country, tells the following in illustration: "Some years ago we decided on a \$10,000,000 addition to our plant. Naturally we employed the best talent to draw up the plans, and went over them with the greatest care afterward. Finally, before work was actually started, I decided to put a blueprint of these plans up in the works and to invite the men to study it and offer suggestions for improvement. We did not expect any important practical help, as the plans seemed to us as nearly perfect as it was possible to make them. But the next day an uneducated foreman of one of the gangs stopped me as I was passing through the yards and led me to the drawings. 'Boss,' he said, pointing to part of the plans, 'you goin' to have terrible mix-up here.' In a flash I saw his point. The plans as drawn meant congestion when we were busy and work had to be rushed through in one-two-three order. The whole set of drawings was remade. And today we never decide finally on any extensions without submitting the ideas suggested to the workers themselves. The foreman? Oh, he got a handsome bonus for the money he saved us."

## Mineral-Control Bill Passes House

By a vote of 291 to 6, the Mineral-Control bill passed the House on Apr. 30, after the appropriation had been changed from \$50,000,000 to \$10,000,000 and the authority granted to the Secretary of the Interior "to fix the prices of necessities wherever and whenever sold, either by producer or dealer" had been stricken from the bill. The clause was stricken out largely through the influence of members from the cotton-producing states, who withheld their approval, fearing similar legislation applying to their staple. Numerous minor amendments were approved, among them being one which terminates the provision of the bill six months after the close of the war.

Chairman Foster of the Committee on Mines and Mining declared that he considered the reduction of the appropriation as seriously affecting the successful working of the measure, but believes that the \$10,000,000 will be sufficient to demonstrate the great national benefit to come from its operation. Before that amount is expended, he believes that Congress will be ready to increase the appropriation, even if the Senate should agree to the \$10,000,000 appropriation. He also believes that the greatest difficulties will be experienced in checking profiteering with the price-fixing clause out of the bill.

The six members who voted against the measure were Thomas, of Kentucky; Sterling, of Illinois; La Follette, of Washington; Elliott, of Indiana; Garrett, of Tennessee, and Cannon, of Illinois.

Remember the Comfort Fund of the 27th Engineers.

# The Mining Index

This index is a convenient reference to the current literature of mining and metallurgy published in all of the important periodicals of the world. We will furnish a copy of any article (if in print) in the original language for the price quoted. Where no price is quoted the cost is unknown. Inasmuch as the papers must be ordered from the publishers, there will be some delay for the foreign papers. Remittance must be sent with order. Coupons are furnished at the following prices: 20c. each, six for \$1, 33 for \$5, and 100 for \$15. When remittances are made in even dollars, we will return the excess over an order in coupons if so requested.

## COPPER

- 9118—ANALYSIS—Volumetric Estimation of Sulphur. Louis F. Clark. (Colo. School of Mines Mag., Jan., 1918; 2½ pp.) 40c.
- 9119—ARIZONA—Story of the U. V. X. Bonanza—I and II. T. A. Rickard. (Min. and Sci. Press, Jan. 5 and 12, 1918; 14 pp., illus.)
- 9120—FLOTATION in Arizona. Rudolf Gahl. (Eng. and Min. Journ., Apr. 20, 1918; 2½ pp.) 20c.
- 9121—FLOTATION CONCENTRATES—Handling Flotation Concentrates at Utah Leasing Co.'s Plant. H. H. Adams. (Eng. and Min. Journ., Apr. 20, 1918; 3 pp., illus.) 20c.
- 9122—LEACHING—The 2000-Ton Leaching Plant at Anaconda. Frederick Laist and H. J. Maguire. (Min. and Sci. Press, Mar. 16, 1918; 6 pp., illus.) 20c.
- 9123—NEVADA—Mason Valley District in 1917. W. H. Goldsworthy. (Salt Lake Min. Rev., Jan. 15, 1918; 2½ pp., illus.) 40c.
- 9124—NITRIC ACID and Copper Ore. Geo. C. Westby. (Met. and Chem. Eng., Mar. 15, 1918; 6½ pp.; illus.)
- 9125—ORE DEPOSITS—Genesis of the Sudbury Nickel-Copper Ores, as Indicated by Recent Exploration. Discussion of paper of Hugh M. Roberts and R. D. Longyear. (Bull. 136, A. I. M. E., Apr., 1918; 10½ pp., illus.)
- 9126—PHYSICAL PROPERTIES of Copper and the Factors by Which They Are Affected. Paul D. Merica. (Met. and Chem. Eng., Feb. 1 and 15, Mar. 15, and Apr. 1, 1918; 16 pp., illus.)
- 9127—SMELTER—Operating Conditions at the Clarkdale Smelter. L. S. Austin. (Min. and Sci. Press, Apr. 6, 1918; 1½ pp.) 20c.
- 9128—SULPHURIC-ACID PLANT—Calumet & Arizona Sulphuric Acid Plant. Courtenay De Kalb. (Min. and Sci. Press, Mar. 30, 1918; 7½ pp.; illus.) 20c.
- 9129—TUNNEL—Drilling the U. V. X. Extraction Tunnel. D. J. O'Rourke. (Mine and Quarry, Feb., 1918; 10 pp., illus.)

## GOLD DREDGING, PLACER MINING, ETC.

- 9130—ALASKA—Placer Mining on Seward Peninsula. J. B. Mertie, Jr. (Bull. 662-I U. S. Geol. Surv., 1917; 8 pp.)
- 9131—SIBERIA—Drilling on the Lena Goldfield, Siberia. W. E. Thorn. (Min. and Sci. Press, Mar. 30, 1918; 4 pp.) 20c.

## GOLD AND SILVER—GENERAL

- 9132—ALASKA—Lode and Placer Mining on Seward Peninsula, Alaska. J. B. Mertie, Jr. (Bull. 662-I, U. S. Geol. Surv., 1917; 25 pp.)
- 9133—AMALGAMATION—Loss of Quicksilver in Gold Mills. W. J. Sharwood. (Min. and Sci. Press, Apr. 6, 1918; 3 pp.) 20c.
- 9134—AUSTRALIA—Replacement in the Bendigo Quartz Veins and Its Relation to Gold Deposition. F. L. Stillwell. (Econ. Geol., Mar., 1918; 12 pp., illus.) 60c.
- 9135—FLOTATION at Belmont Surf Inlet Mines. A. H. Jones. (Eng. and Min. Journ., Apr. 20, 1918; 3½ pp., illus.) 20c.
- 9136—FLOTATION VS. CYANIDATION. G. H. Clevenger. (Eng. and Min. Journ., Apr. 20, 1918; 3½ pp.) 20c.
- 9137—IDAHO AND WASHINGTON—Gold, Silver, Copper, Lead and Zinc in Idaho and Washington in 1916. C. N. Gerry. (Mineral Resources of the U. S., 1916—Part I, Mar. 14, 1918; 56 pp.)
- 9138—MANITOBA—Northern Manitoba Mining, Timber and Pulp Wood, Water Powers, Fish and Furs, Agriculture and the Hudson Bay Route. (Issued by Authority Province of Manitoba by Commissioners of Northern Manitoba, The Pas, Man., Nov., 1917; 47 pp.; illus.)
- 9139—MONTANA—Ore Deposits of the Northwestern Part of the Garnet Range, Montana. J. T. Pardee. (Bull. 660-F., U. S. Geol. Surv., Jan. 10, 1918; 81 pp., illus.)
- 9140—ONTARIO—Development of the Ankerite Gold Mine. Clifford E. Smith. (Can. Min. Journ., Jan. 15, 1918; 1 p.)
- 9141—ONTARIO—Gold Mining in Northern Ontario. P. E. Hopkins. (Bull. 70 Can. Min. Inst., Feb., 1918; 3½ pp.)
- 9142—SOUTH AFRICA—Notes on Treatment of Pilgrims Rest Ore. Robert Lindsay. (Journ. Chem., Met. and Min. Soc. So. Afr., Oct., 1917; 2½ pp.) Reply to discussion.
- 9143—UTAH—Gold, Silver, Copper, Lead and Zinc in Utah in 1916. V. C. Helkes. (Mineral Resources of the U. S., 1916—Part I, Jan. 24, 1918; 35 pp.)

## IRON ORE DEPOSITS, MINING, ETC.

- 9144—CONCENTRATION Experiments With the Siliceous Red Hematite of the Birmingham District Alabama. Jos. T. Singewald, Jr. (Bull. 110, U. S. Bureau of Mines, 1917; 91 pp., illus.)
- 9145—LAKE SUPERIOR ORE SHIPMENTS in 1917. R. V. Sawhill. (Iron Tr. Rev., Mar. 21, 1918; 3½ pp., illus.) 20c.

- 9146—STEAM-SHOVEL MINING on Mesabi Range—III. L. D. Davenport. (Eng. and Min. Journ., Mar. 30, 1918; 4½ pp., illus.) 20c.

## IRON AND STEEL—METALLURGY

- 9147—BLAST FURNACE—Coke as a Fuel for the Blast Furnace. G. W. Hewson. (Journ. Soc. Chem. Ind., Feb. 28, 1918; 3 pp.)
- 9148—COPPER IN STEEL—Effect of the Presence of a Small Amount of Copper in Medium-Carbon Steel. Carl R. Hayward and Arch. B. Johnston. (Bull. 133, A. I. M. E., Jan., 1918; 9 pp., illus.)
- 9149—ELECTRIC FURNACE of New Type; Description of an Electric Melting and Refining Furnace Recently Installed at the Midland Electric Steel Co. Terre Haute, Ind. (Iron Tr. Rev., Jan. 10, 1918; 2 pp., illus.) 20c.
- 9150—ELECTRIC FURNACE PRACTICE—Modern Electric Furnace Practice. J. K. Harrison. (Iron Tr. Rev., Apr. 11, 1918; 1 p.) 20c.
- 9151—ELECTRIC SMELTING in Brazil. Kirby Thomas. (Iron Age, Mar. 21, 1918; ½ p.)
- 9152—ELECTRIC STEEL-REFINING FURNACE. James Bibby. (Iron and Coal Tr. Rev., Feb. 15, 1918; 3 pp., illus.) 40c.
- 9153—FERROMANGANESE—Using Manganese Ore and Alloys in Sweden. (Iron Age, Apr. 11, 1918; 2½ pp.) 20c.
- 9154—FERROSILICON—Methods for the Commercial Analysis of Ferrosilicon. Earl M. Anger. (Advance copy, Am. Electrochem. Soc., Apr., 1918; 8 pp.)
- 9155—HEAT TREATMENT of Heavy Forgings. Sir Wm. Beardmore. (Iron Tr. Rev., Jan. 17, 1918; 2½ pp.; illus.) Paper read before the Institution of Mechanical Engineers, London, Eng., Mar. 16, 1917. 20c.
- 9156—ROLLING MILLS—Flywheel Design for Rolling Mills. G. E. Stoltz. (Iron Age, Jan. 31, 1918; 2½ pp., illus.) 20c.

## LEAD AND ZINC

- 9157—ANALYSIS—Quantitative Analysis of Bismuth in Lead Bullion. Douglas W. Jessup. (Eng. and Min. Journ., Mar. 30, 1918; 1 p.) 20c.
- 9158—BRITISH SPELTER INDUSTRY, The. (Engineering, Feb. 15 and 22, 1918; 5 pp., illus.) Data on production, imports, etc., also drawings and description of plant for manufacture of retorts, and distillation.
- 9159—ELECTROLYTIC ZINC—Some Economic Factors in the Production of Electrolytic Zinc. R. G. Hail. (Bull. 133, A. I. M. E., Jan., 1918; 2½ pp.) Discussion of article previously indexed.
- 9160—FLOTATION in the Coeur d'Alenes. Claude T. Rice. (Eng. and Min. Journ., Apr. 20, 1918; 9½ pp., illus.) 20c.
- 9161—FLOTATION—Differential Flotation of Lead and Zinc. W. L. Zeigler. (Eng. and Min. Journ., Apr. 20, 1918; 2 pp., illus.) 20c.
- 9162—JOPLIN DISTRICT—Development and Underground Mining Practice in the Joplin District. Howard I. Young. (Bull. 133, A. I. M. E., Jan., 1918; 2 pp.) Discussion of article previously indexed.
- 9163—JOPLIN DISTRICT—Zinc Ores of the Joplin District, Their Composition, Character and Variation. W. Geo. Waring. (Bull. 133, A. I. M. E., Jan., 1918; 3½ pp.) Discussion or article previously indexed.
- 9164—MILL—Media Mill, Webb City, Mo. H. B. Pulsifer. (Bull. 133, A. I. M. E., Jan., 1918; 6½ pp.) Discussion of article previously indexed.
- 9165—MILLING—Hand-Sorting of Mill Feed. R. S. Handy. (Bull. 136, A. I. M. E., Apr., 1918; 13½ pp., illus.)
- 9166—MILLING PRACTICE and Operating Costs in the Joplin District. H. W. Kitson. (Eng. and Min. Journ., Apr. 20, 1918; 7½ pp., illus.) 20c.
- 9167—NEVADA—Mining in Yellow Pine District, 1917. Fred. A. Hale, Jr. (Salt Lake Min. Rev., Jan. 15, 1918; 1½ pp., illus.) 40c.
- 9168—NEW JERSEY—Zinc Mining in Franklin, N. J. C. M. Haight. (Bull. 133, A. I. M. E., Jan., 1918; 4½ pp.) Discussion of paper previously indexed.
- 9169—ORE-DRESSING PRACTICE in the Joplin District. Clarence A. Wright. (Bull. 133, A. I. M. E., Jan., 1918; 3 pp.) Discussion of article previously indexed.
- 9170—REFRATORIES—Palmerston Zinc Refractories. C. P. Fiske. (Bull. 133, A. I. M. E., Jan. 1918; 2½ pp.) Discussion of article previously indexed.
- 9171—SOUTHEAST MISSOURI—Concentration Practice in Southeast Missouri. A. P. Watt. (Bull. 133, A. I. M. E., Jan., 1918; 8 pp.) Discussion of article previously indexed.
- 9172—UTAH—Gold, Silver, Copper, Lead and Zinc in Utah in 1916. V. C. Helkes. (Mineral Resources of the U. S., 1916—Part I, Jan. 24, 1918; 35 pp.)

## OTHER METALS

- 9173—ALUMINUM SHEETS—Erichsen Tests on Aluminum Sheets. Robert J. Anderson. (Iron Age, Apr. 11, 1918; 2 pp., illus.) 20c.
- 9174—ANTIMONY—The Practice of Antimony Smelting in China. Chung Yu Wang. (Bull. 136, A. I. M. E., Apr., 1918; 18 pp., illus.)



9175—**BISMUTH**—Quantitative Analysis of Bismuth in Lead Bullion. Douglas W. Jessup. (Eng. and Min. Journ., Mar. 30, 1918; 1 p.) 20c.

9176—**MANGANESE**—Greater Use of Domestic Manganese Supply. F. Lynwood Garrison. (Iron Age, Mar. 14, 1918; 2½ pp.)

9177—**NICKEL**—Genesis of the Sudbury Nickel-Copper Ores, as Indicated by Recent Exploration. Discussion of paper by Hugh M. Roberts and R. D. Longyear. (Bull. 136, A.I.M.E., Apr., 1918; 10½ pp., illus.)

9178—**TIN**—Hydraulic Tin Mining in Swaziland. J. Garrard. (Bull. 159, I. M. M., Dec. 13, 1917; 5 pp., illus.) Author's reply to discussion.

9179—**TIN DEPOSITS** Near Irish Creek, Virginia. Henry G. Ferguson. (Bull. XV-A, Va. Geol. Surv., 1918; 19 pp., illus.)

#### NONMETALLIC MINERALS

9180—**CHROME PRODUCTION** and Distribution. Samuel H. Dolbear. (Eng. and Min. Journ., Apr. 6, 1918; 2 pp.) 20c.

9181—**CLAYS**—Louisiana Clays, Including Results of Tests Made in the Laboratory of the Bureau of Standards at Pittsburgh. Geo. Charlton Matson. (Bull. 660-E, U. S. Geol. Surv., Nov. 26, 1917; 12 pp., illus.)

9182—**FLUORITE**—Optical Fluorite in Southern Illinois. Joseph E. Pogue. (Extract from Bull. 38, Ill. Geol. Surv., 1918; 8 pp., illus.)

9183—**LIMESTONE RESOURCES** of the Union of South Africa. W. Wybergh. (So. Afr. Journ. of Ind., Dec., 1917; 5 pp.)

9184—**MAGNESITE** Deposits of Washington. R. W. Stone. (Eng. and Min. Journ., Apr. 13, 1918; 3½ pp., illus.) 20c.

9185—**NITRATE**—The Chilean Nitrate Industry. Discussion of paper of Allen H. Rogers and Hugh R. Van Wagenen. (Bull. 136, A.I.M.E., Apr., 1918; 3 pp.)

9186—**PHOSPHATE ROCK**—Electric Furnace Smelting of Phosphate Rock and Use of the Cottrell Precipitate in Collecting the Volatilized Phosphoric Acid. J. N. Carothers. (Journ. Ind. and Eng. Chem., Jan. 1, 1918; 2½ pp., illus.) 60c.

9187—**POTASH**—Extraction of Potassium Salts from the Pintados Salar. Roger C. Wells. (Eng. and Min. Journ., Apr. 13, 1918; 2 pp.) 20c.

9188—**POTASH** in the Pintados Salar, Tarapaca, Chile. Hoyt S. Gale. (Eng. and Min. Journ., Apr. 13, 1918; 3½ pp., illus.) 20c.

9189—**POTASH**—Sales Potasicas de Cataluna. Francisco Samsó. (Revista Minera, Jan. 8, 1918; 2 pp., illus.)

9190—**POTASH PROSPECTS** in Montana. O. W. Freeman. (Min. and Sci. Press, Mar. 23, 1918; 1 p.) 20c.

9191—**SULPHUR**—Mineral Industries of the U. S. Sulphur: An Example of Industrial Independence. Joseph E. Pogue. (Bull. 102, Part III, U. S. Nat. Museum, 1917; 10 pp., illus.)

9192—**SULPHUR**—Oil, Gas and Sulphur in Toyah Basin. (Tex. Mineral Resources, Jan. 1918; 3½ pp., illus.)

#### PETROLEUM AND NATURAL GAS

9193—**COLORADO**—The Oil Shale of Colorado. R. L. Chase. (Min. and Sci. Press, Mar. 30, 1918; 1½ pp., illus.) 20c.

9194—**FUTURE SUPPLIES OF OIL AND GASOLINE**—Methods for More Efficiently Utilizing Our Fuel Resources: Part IX, Hydro-Electric Energy as a Conservator of Oil. H. F. Jackson and E. Emerson Hoar. Part X, Our Future Petroleum Industry. W. A. Williams. Part XI, Future Sources of Oil and Gasoline. Milton A. Allen. (Gen. Elec. Rev., Jan., 1918; 10 pp., illus.) 40c.

9195—**GEOLOGY** of Petroleum Deposits. C. C. O'Hara. (Pahasapa Quart., Feb., 1918; 22 pp., illus.) 20c.

9196—**KENTUCKY**—Irvine Oil Field, Estill County, Kentucky. Eugene Wesley Shaw. (Bull. 661-D, U. S. Geol. Surv., Sept. 5, 1917; 51 pp., illus.)

9197—**Laws** Pertaining to Oil. Milton A. Allen. (Bull. 84, Univ. of Ariz., 1917-18; 12 pp.)

9198—**OIL-SHALE INDUSTRY**. Victor C. Alderson. (Quart. Colo. School of Mines, Apr., 1918; 30 pp., illus.)

9199—**OKLAHOMA**—Geologic Structure of the Northwestern Part of the Pawhuska Quadrangle, Oklahoma. K. C. Heald. (Bull. 691-C, U. S. Geol. Surv., Feb. 7, 1918; 44 pp., illus.)

9200—**PROSPECTING**—Principles and Problems of Oil Prospecting in the Gulf Coast Country. Discussion of Paper of W. G. Matteson. (Bull. 136, A.I.M.E., Apr., 1918; 12 pp.)

9201—**TEXAS**—Oil, Gas and Sulphur in Toyah Basin. (Tex. Mineral Resources, Jan., 1918; 3½ pp., illus.)

9202—**VALUING**—Methods of Valuing Oil Lands. Discussion of paper of M. L. Requa. (Bull. 136, A.I.M.E., Apr., 1918; 5 pp.)

#### ECONOMIC GEOLOGY—GENERAL

9203—**IDAHO**—An Old Erosion Surface in Idaho: Is It Eocene? John L. Rice. (Econ. Geol., Mar., 1918; 16 pp., illus.)

9204—**MONTANA**—Ore Deposits of the Northwestern Part of the Garnet Range, Montana. J. T. Pardee. (Bull. 660-F, U. S. Geol. Surv., 1918; 81 pp., illus.)

9205—**ORE DEPOSITS**—The Evolution of Ore Deposits from Igneous Magmas. W. H. Goodchild. (Min. Mag., Mar. 1918; 11 pp.) Continuation of article previously indexed. 40c.

9206—**WESTERN AUSTRALIA**—Annual Progress Report of the Geological Survey for the Year 1916. (West. Aust. Geol. Surv., 1917; 32 pp., illus.)

#### MINING—GENERAL

9207—**BLASTING**—Use of Powder in Opencut Blasting. S. R. Russell. (Eng. and Min. Journ., Mar. 30, 1918; 3 p.) 20c.

9208—**BRITISH COLUMBIA**—Mineral Production of British Columbia in 1917. E. A. Haggen. (Bull. 70, Can. Min. Inst., Feb., 1918; 4 pp.)

9209—**CEMENT GUN** in Mining Work. Geo. S. Rice. (Eng. and Min. Journ., Mar. 30 and Apr. 6, 1918; 7 pp., illus.) 40c.

9210—**DRAWING PILLARS** in Metal Mines. W. R. Crane. (Min. and Sci. Press, Mar. 23, 1918; 3½ pp., illus.) 20c.

9211—**FIRST-AID TREATMENT** of Wounds. S. C. Dickinson. (Bull. 83, Univ. of Ariz., Bureau of Mines, Apr., 1918; 2½ pp.)

9212—**ITALY**—The Italian Mineral Industry in 1916. (Min. Journ., Mar. 9, 1918; 1½ pp.) 40c.

9213—**MOTOR TRUCKS**—Operating Cost of Motor Trucks. Ralph W. Horne. (Eng. and Contract., Mar. 6, 1918; 1½ pp.) 20c.

9214—**NEW BRUNSWICK**—Mining Situation in New Brunswick. W. E. McMullen. (Bull. Can. Min. Inst., Jan., 1918; 4 pp.)

9215—**SARDINIA**—La Miniera di Montevecchio in Sardegna. (La Miniera Italiana, Jan. 31, 1918; 5½ pp., illus.)

9216—**TAXATION**—Application of Federal Income Tax Laws to Mine Taxation. (Eng. and Min. Journ., Apr. 6, 1918; 4½ pp.) 20c.

9217—**UNWATERING**—Siphon to Unwater a Mine. J. A. McDonald. (Eng. and Min. Journ., Mar. 30, 1918; ½ p., illus.) 20c.

9218—**UTAH**—American Fork District. Geo. H. Ryan. (Sat. Lake Min. Rev., Jan. 15, 1918; 2½ pp., illus.) 40c.

#### FLOTATION

(SEE ALSO "COPPER," "GOLD AND SILVER," "LEAD AND ZINC")

9219—**CASCADE METHOD** of Froth-Flotation. H. Hardy Smith. (Min. and Sci. Press, Apr. 13, 1918; 4 pp., illus.) 20c.

9220—**GANGUE MINERALS**—Flotation in Relation to Gangue Minerals. James M. McClave. (Eng. and Min. Journ., Apr. 20, 1918; 1½ pp.) 20c.

9221—**RUTH FLOTATION MACHINE**, The. Joseph P. Ruth, Jr. (Eng. and Min. Journ., Apr. 20, 1918; 1 p., illus.) 20c.

9222—**TROUBLES** in Flotation. Oliver C. Ralston. (Eng. and Min. Journ., Apr. 20, 1918; 2½ pp.) 20c.

#### ORE DRESSING—GENERAL

9223—**CONCENTRATION**—Flat Table versus Vanner Concentration. Alex. McLaren. (Salt Lake Min. Rev., Feb. 28, 1918; 3 pp., illus.) 20c.

9224—**CRUSHING**—Recent Tests of Ball-Mill Crushing. Discussion of paper of C. T. Van Winkle. (Bull. 136, A.I.M.E., Apr., 1918; 11 pp.) 40c.

9225—**CRUSHING**—Theory and Practice of Ball-Milling. Pierre R. Hines. (Eng. and Min. Journ., Apr. 13, 1918; 4½ pp., illus.) 20c.

9226—**FEED**—Hand-Sorting of Mill Feed. R. S. Handy. (Bull. 136, A.I.M.E., Apr., 1918; 13½ pp., illus.) 40c.

#### METALLURGY—GENERAL

9227—**ALLOYS**—Les Alliages d'Aluminium et de Magnesium. Jean Escard. (Metaux et Alliages, Nov.-Dec., 1917; 2 pp.)

9228—**BRASS** Foundry Core-Making. H. M. Lane. (Journ. Am. Inst. of Met., Dec., 1917; 6 pp.)

9229—**BRASS**—Modern Plant for Manufacturing Brass; Production Costs Cut in Straight Line Routing in Works of Cleveland Brass and Copper Mills. (Iron Age, Feb. 21, 1918; 4 pp., illus.)

9230—**FOUNDRY**—The School End of the Job in Training Foundrymen. Clifford B. Connelley. (Journ. Am. Inst. of Met., Dec., 1917; 14 pp.)

9231—**STRUCTURE OF METALS**—The Amorphous Metal Hypothesis and Equicohesive Temperatures. Zay Jeffries. (Journ. Am. Inst. of Met., Dec., 1917; 30 pp., illus.)

#### SAMPLING AND ASSAYING

9232—**OILS**—Tentative Standard Methods for the Sampling and Analysis of Commercial Fats and Oils. (Journ. Ind. and Eng. Chem., Apr., 1918; 5½ pp., illus.) 60c.

9233—**SULPHUR**—Volumetric Estimation of Sulphur. Louis F. Clark. (Colo. School of Mines Mag., Jan., 1918; 2½ pp.) 20c.

#### FUELS

(SEE ALSO "PETROLEUM AND NATURAL GAS")

9234—**COAL GAS**—Some Applications of Coal Gas as a Furnace Fuel. H. Hartley. (Journ. Soc. Chem. Ind., Feb. 28, 1918; 2 pp.)

9235—**COAL SUPPLY**—The Problem of Coal Supply. Edw. W. Parker. (Journ. Frank Inst. Apr., 1918; 16 pp.) 40c.

9236—**CONSERVATION**—Methods for More Efficiently Utilizing Our Fuel Resources: Part IX, Hydro-Electric Energy as a Conservator of Oil. H. F. Jackson and E. Emerson Hoar. Part X, Our Future Petroleum Industry. W. A. Williams. Part XI, Future Sources of Oil and Gasoline. Milton A. Allen. (Gen. Elec. Rev., Jan., 1918; 10 pp., illus.) 40c.

9237—**GASOLINE**—Synthetic Gasoline by Electrochemical Means. Louis Bond Cherry. (Advance copy, Am. Electrochem. Soc., Oct., 1917; 20 pp., illus.)

9238—**PULVERIZED COAL**—A New Method of Burning Powdered Coal. (Iron Age, Feb. 28, 1918; 4½ pp., illus.) 20c.

9239—**STORAGE** of Coal. (Eng. and Min. Journ., Mar. 30, 1918; 1½ pp., illus.) 20c.

9240—**VOLATILE MATTER IN COAL**, New Views of the Combustion of the. S. H. Katz. (U. S. Bureau of Mines, 1918; 15 pp., illus.)

#### INDUSTRIAL CHEMISTRY

9244—**COAL PRODUCTS**—Mineral Industries of the U. S. Coal Products: An Object Lesson in Resource Administration. Chester G. Gilbert. (Bull. 102, Part I, U. S. National Museum, 1917; 16 pp., illus.)

9245—**FERTILIZERS**—Mineral Industries of the U. S. Fertilizers: An Interpretation of the Situation in the United States. Joseph E. Pogue. (Bull. 102, Part II, U. S. National Museum, 1917; 22 pp., illus.)

9246—**SODIUM CYANIDE**—Notes on Sodium Cyanide. W. J. Sharwood. (Journ. Ind. and Eng. Chem., Apr., 1918; 2½ pp.) 60c.

9247—**SULPHURIC ACID**—Modern Methods of Sulphuric Acid Manufacture. G. L. Moss. (Journ. Soc. Chem. Ind., Feb. 28, 1918; 4½ pp.)

9248—**SULPHURIC-ACID PLANT**—Calumet & Arizona Sulphuric-Acid Plant, Courtenay De Kalb. (Min. and Sci. Press, Mar. 30, 1918; 7½ pp., illus.) 20c.

## Personals

Have you contributed to the Association of the 27th Engineers?

**Dr. H. A. Newkirk** has been appointed mine physician for the Oliver Iron Mining Co. at its Aragon mine, at Norway, Michigan.

**Dr. J. McIntosh Bell**, representative of the Hamilton interests of London, England, is visiting the mining districts of Northern Ontario.

**Thomas F. Keeley**, of Chicago, treasurer of the Gold Hunter Mining and Smelting Co., at Mullan, Idaho, has returned from Honolulu.

**B. B. Thayer**, vice president of the Anaconda Copper Mining Co., has been elected a director of the Inspiration Copper Company.

**C. Colcock Jones**, mining engineer of Los Angeles, Calif., has changed his address from 605 I. N. Van Nuys Bldg. to 919 Investment Building.

**R. B. Watson**, general manager of the Nipissing Mines Co., Cobalt, Ont., is returning to Cobalt from Arizona, where he has been spending the winter.

**R. A. F. Penrose, Jr.**, was elected a director of the Utah Copper Co. at the annual meeting, succeeding Eugene Meyer, Jr. Other retiring directors were reelected.

**Justice Gragan**, mining engineer of New York, has discontinued his office at 30 Church St., to assume the duties of chief engineer for the Suffern Co., Inc., 135 Broadway, New York.

**H. W. Fox**, of the staff of the Dorr Company, New York, is at present examining rutile properties in Florida and Virginia under appointment as consulting engineer in the U. S. Bureau of Mines.

**Rush J. White**, mining engineer of Wallace, Idaho, is in Butte, Mont., preparing the case of Senator W. A. Clark in the pending litigation with the Butte & Superior company.

**A. F. Brigham**, recently appointed general manager of the Hollinger Consolidated Gold Mines, Ltd., at Porcupine, Ont., has returned to the mine from the West, bringing his family with him.

**Robert E. McConnell**, mining engineer of Los Angeles, Calif., has entered the Bureau of Ordnance of the Navy Department, with the rank of lieutenant, J. G., and is stationed at Washington, D. C.

**J. S. De Lury**, of the University of Manitoba, has returned to Winnipeg after an examination of the tungsten discoveries in the neighborhood of Falcon Lake, in Eastern Manitoba, with a large collection of samples for analysis.

**E. L. Hang**, secretary-treasurer of the United Alloy Steel Corp., Canton, Ohio, was elected vice president and treasurer at the company's annual meeting. **J. P. Mosely** was made secretary and **C. W. Kreig** succeeded **W. P. Woodin** as director.

**W. O. Havemeyer**, **W. P. Hamilton** and **Stephen Birch**, who had previously been appointed to vacancies on the board of directors of the Nevada Consolidated Copper Co., were reelected at the annual meeting, as were the remaining members of the board.

**W. S. Pilling**, of Pilling & Crane, Philadelphia, was elected president of the recently organized Merchant Pig Iron Distributors' Association, and **W. W. Hearne**, of the Matthew Addy Co., also of Philadelphia, was elected secretary at a meeting held Apr. 16.

**H. G. Weidenthal**, formerly works manager of the General Steel Co., Milwaukee, has joined the staff of metallurgical, chemical, testing and inspecting engineers maintained by James H. Herron, 2041 E. Third St., Cleveland. Mr. Weidenthal will be in the steel works design and operation department and will pay special attention to electric furnace operation.

**Samuel H. Cohen** has resigned his position as general manager of the Crown Reserve Mining Co., Ltd., of Cobalt, Ont., and of the Porcupine Crown Mines, Ltd. It is understood that **Gen. Sir John W. Carson**, president of both companies, will assume the management, the services of Mr. Cohen being retained as consulting engineer.

**Grafton D. Dorsey**, director of the National Lead Co., New York, and head of its subsidiary, the National Lead Co. of Argentina, has been made a member of the subcommittee on pig tin of the American Iron and Steel Institute, as a repre-

sentative of American producers of pig tin. He was appointed on the recommendation of **George Armsby**, chief in charge of the raw tin division of the War Industries Board. Mr. Dorsey is a vice president of the Williams Harvey Corp., which is a combination of American, English and Bolivian interests in the mining and smelting of tin. As the National Lead Co. is one of the largest consumers of tin in the world, Mr. Dorsey has been in close touch with every phase of the tin situation.

## Obituary

**Thomas Kyle**, assayer, of Leadville, Colo., died at his home in that city on Apr. 18, at the age of 50 years.

**Percy Le Roy Fearn**, consulting mining engineer, was killed in an automobile accident near El Paso, Tex., on Apr. 16. He was graduated from the Columbia School of Mines in 1889. Mr. Fearn was engaged in consulting work from 1903 to date, part of which time he was retained by the Abangarez Gold Fields of Costa Rica. At the time of his death he was connected with several companies and was devoting particular attention to the Lady Franklin mine, at Kingston, Sierra County, N. Mex. He was a member of the American Institute of Mining Engineers.

**Capt. Braxton Bigelow**, 170th Field Co., Royal Engineers, British Expeditionary Forces, who was reported missing on July 23, 1917, was killed in action on that night, according to word received at his home in New Brunswick, N. J. Captain Bigelow was graduated from Harvard in 1905 and from Massachusetts Institute of Technology in 1910, and was employed in Peru as a mining engineer at the outbreak of war. He returned to New York and sailed for England on Dec. 26, 1914. He first served with the American Ambulance Field Service and later in Siberia with a hospital unit. For bravery and unselfish work he received a medal. Returning to England in April, 1916, he obtained a commission in the British Army as lieutenant in the Royal Artillery, and was sent to the front. Later he was transferred to the Engineers, and early in the summer he was promoted to be captain. In August, Captain Bigelow was slightly wounded and received six weeks' leave. After his return to France, he was near Lens when there was a suspicion that the Germans were engaged in mine work at a particular point in his sector. On the night of July 23, Captain Bigelow volunteered to head a small party of sappers to investigate. He never returned. He was mentioned in dispatches for bravery and distinguished service. Captain Bigelow was the son of Maj. John Bigelow, U. S. A., retired, and the grandson of the late John Bigelow, author and Minister to France under President Grant. He was a member of the American Institute of Mining Engineers.

## Societies

**Montana Society of Engineers** held its annual meeting in Butte, Mont., on Apr. 18-20. The following officers were elected for the ensuing year: President, **Willis T. Burns**; first vice president, **Samuel Barker, Jr.**; second vice president, **Charles A. Lemon**; secretary, **Clinton H. Moore**; treasurer, **Harry A. Cochran**; trustee for three years, **Frank A. Linforth**. It was voted to invest part of the society's funds in Liberty bonds and war-savings stamps, to remit dues of members now in the service and to appoint a committee to handle all affairs concerning the society's activity in war matters. During the session, visits were made to plants of the Anaconda and other companies; **James Atkins, Jr.**, of the Portland Cement Association, discussed concrete road building and the construction of concrete ships, and **Reno H. Sales**, of the Anaconda company, recounted his experiences on his recent trip to South America.

**Iron and Steel Institute (British)** opened its annual meeting in London on May 2. The president-elect, **Eugene Schneider**, took the chair. The Bessemer medal for 1918 was awarded to **So Sir William Beardmore**, the retiring president. Awards of grants from the Andrew Carnegie Research Fund in aid of research work were announced. The papers presented included the following: "Practical Points Affecting Yield and Efficiency of Blast Furnaces" (report of the blast-furnace committee); "Importance of Coke Hardness," **G. D. Cochran**; "Economic Value of the Jurassic Iron

Ores of Great Britain," **Dr. F. H. Hatch**; "Fuel Economy in Blast Furnaces," **T. C. Hutchinson**; "Economy in Gas Cleaning," **A. Lennox Leigh**; "Potash Recovery from Blast Furnaces," **Kenneth Chance**; "Manufacture of Portland Cement from Blast Furnace Slag," **E. H. Lewis**; "Blast Furnace Bears," **Dr. J. E. Stead**; "Technical Aspects of the Establishment of the Heavy Steel Industry in India, with Results of Some Researches Connected Therewith," **Dr. A. MacWilliam**; "Production of Sound Steel by Lateral Compression of the Top Portion of the Ingot," **B. Talbot**; "Steel Ingot Defects," **J. N. Kilby**; "Notes on Inclusions in Steel and Ferrite Lines," **Dr. J. E. Stead**; "Non-metallic Inclusions in Steel," **A. McCance**; "A Cause of Brittleness in Mild Steel Boiler Plates," **Dr. W. Rosenhain** and **D. Hanson**; "Effect of Mass on Heat Treatment," **E. F. Law**; "Effect of Cold Work on the Divorce of Pearlite," **J. H. Whiteley**; "Effect of Cold Working on the Elastic Properties of Steel," **J. A. Van Den Broek**; "Iron, Carbon and Phosphorus," **Dr. J. E. Stead**; "Damascus Steel," **Col. N. Belaiew**; "Protection of Iron with Paint Against Atmospheric Corrosion," **Dr. J. N. Friend**; "Determination of Cobalt and Nickel in Cobalt Steel," **W. R. Schoeller** and **A. R. Powell**. The autumn meeting will be held on Sept. 12 and 13 in the rooms of the Institution of Civil Engineers, in London.

**Canadian Mining Institute.** A Manitoba branch of the Institute was organized at a meeting held at Manitoba University, Winnipeg, on Apr. 18. The branch, as formed, has 15 full members and 33 associate members. The following officers were elected: President, **Dr. R. C. Wallace**, Winnipeg; vice-presidents, **S. R. Bancroft**, The Pas; **T. B. H. Price**, Winnipeg; secretary-treasurer, **J. S. De Lury**, Winnipeg; councillors, **E. V. Neelands** and **N. T. Neal**, The Pas; **Capt. G. B. Hall**, **T. W. Harris**, **F. de Seyes**; **E. W. Jackson** and **E. E. Kain**, Winnipeg. A number of applications for membership are in the hands of the Council.

**American Institute of Metals** is taking a letter ballot of its members on the merger of its organization with the American Institute of Mining Engineers. When consolidated, the Metals Institute will be known as the Institute of Metals division of the latter society. The proposed union has been favorably acted upon by the executive board of the American Institute of Metals and the board of the American Institute of Mining Engineers and now requires only the sanction of the members of the Institute of Metals. This metals division will elect its own officers, raise funds for its own special work and will have active control of such funds. Two meetings will be held annually. The winter meeting will be held in February, in New York, the program to consist principally of technical papers on metallurgical subjects. The fall meeting will be continued and will be held concurrently with the annual convention of the American Foundrymen's association. The program will consist of papers on practical foundry topics and probably will be combined with the iron and steel section of the mining engineers, whose meeting will be held simultaneously. The headquarters of the mining engineers in the Engineering Societies Bldg., New York, will be the headquarters of the Institute of Metals division. **W. M. Corse**, Titanium Alloys Manufacturing Co., Niagara Falls, N. Y., is president of the American Institute of Metals, and **F. L. Wolf**, Ohio Brass Co., Mansfield, Ohio, is secretary.

## New Patents

United States patent specifications, listed below may be obtained from "The Engineering and Mining Journal" at 25c. each.

**Concentrating Table**—**Alva W. Tyler**, Los Angeles, Calif., assignor, by direct and mesne assignments, to **Young & Tyler**, Los Angeles, Calif. (U. S. No. 1,262,603; Apr. 9, 1918.)

**Copper**—Apparatus for the Electrolytic Production of Copper and Other Metals. **Marcel Perreux-Lloyd**, Boulogne-sur-Seine, France, assignor to **Marie Victorine Bailly**, widow **Garin**, Paris, France. (U. S. No. 1,262,248; Apr. 9, 1918.)

**Tungsten**—Extraction of Metals from Their Ores. **Edward M. Hamilton**, San Francisco, Calif., assignor to **Hamilton, Beauchamp, Woodworth, Inc.**, San Francisco, Calif. (U. S. No. 1,261,883; Apr. 2, 1918.)

**Zinc**—Producing Zinc Chloride from Ores. **Frank K. Cameron** and **John A. Cullen**, Salt Lake City, Utah, and **Reed W. Hyde**, New York, N. Y., assignors to **American Smelting and Refining Co.**, Salt Lake City, Utah. (U. S. No. 1,261,696; Apr. 2, 1918.)



## Editorial Correspondence

### SAN FRANCISCO—Apr. 24

**New Oil Wells Started in California** fields from the beginning of the year to Apr. 6 amounted to 183. For the week the number was 12, and for the preceding week, ended March 30, only five were started. The last figure is the lowest reported in three years. In the two weeks, 43 wells reported for test of water shutoff, 26 for deepening or re-drilling and four for abandonment. A formal public hearing is in progress at Taft for the purpose of determining the best methods of drilling wells and protecting oil lands. A well owned by the Union Oil Co. is the direct subject of inquiry, but the welfare of large surrounding territory is intimately involved. Underground conditions are complex, so the investigation will afford opportunity to studying methods employed by the State Mining Bureau in solving such problems.

**Union Consolidated**, the leading Comstock producer, milled 328 tons at the Mexican mill, having a total value of \$7012, and shipped five bars of bullion to Selby, in the second week of April. Extracted from 2500 level 149 tons of ore, sampling \$32.13 per ton. The shaft of the Mexican has undergone repairs, and the work in Con. Virginia was devoted entirely to development on the 2100 and 2700 levels. In Ophir, 2000 level, northwest drift, to be used as a main tramway to the Union shaft, was extended. Sierra Nevada advanced north drift in 2500 level and saved and sent to the surface 16 tons of ore, sampling \$19.90 per ton. Repairs to Union hoist completed, Andes hoist installed and laying of surface water and drain pipes completed. Work at the Jacket, in Gold Hill district, included advancing of first north drift on 300 level a distance of 14 ft. and timbering and sinking from floor of surface tunnel. Eight mills and tables operated 136 hours. The Middle mines are still idle, awaiting the installation of larger pumps. United Comstock Pumping Association continued repairs in the main south drift from the Union shaft, leading to the north lateral of Sutro tunnel, to be used to turn drainage water, and is one of the main outlets for the North-end mines. Also made general repairs to the Ophir shaft and Ophir incline below 1465 level station. Made necessary repairs in C. & C. shaft.

**Safety Rules for Gold Dredges**, amended tentatively, have been issued by the mining division of the Industrial Accident Commission. The tentative rules are the result of several conferences between members of the commission and representatives of dredging interests, forming a committee for this purpose, composed of the following: Harold Mestre, consulting engineer; F. L. Lowell, deputy mine inspector; L. D. Hopfield, department manager of the Natomas Company of California; C. W. Gardner, representing the Hammon Engineering Co.; A. L. Wilde, International Brotherhood Steam Shovel and Dredge Men; Carl Brown, manager of the California Casualty Indemnity Exchange; R. L. Eltringham, electrical engineer of the Industrial Accident Commission; H. M. Wolfen, chief mine inspector. The rules apply to all gold dredges operated in California; exemptions must be in writing and can't be revoked after reasonable notice. Air Pressure Tank Safety Orders and Orders Nos. 1104, 1105, 1106, 1107 of the General Construction Safety Orders pertaining to the control, storage and use of explosives and fuse, shall apply, where applicable to gold dredges. The rules are arranged under the following headings: General safety and welfare; guards against personal falls and falling objects; machinery and power transmission; electrical. They are printed in compact and convenient booklet form, with a blank page opposite each page of printed matter so that dredge men and others interested who receive copies of the ruling may make notes and suggestions as to further amendment or change that may be useful in the compiling of the final rules for safety in operating gold dredges. The initial work of collecting data and preparation of the rules for consideration of the committee was done by Fred L. Lowell, deputy mine inspector, whose duties included a careful study of the requirements of the employees of

dredges as well as the interests of the owners and operators. The commission is desirous of framing rules that will safeguard the dredge workers from injury and at the same time cause as little inconvenience as possible to the operator. Both employees and employers are invited to give some attention to a consideration of the tentative rules and mail their suggestions to the Chief Mine Inspector, 525 Market St., San Francisco.

### DENVER—Apr. 22

The Utility Commission is considering proposed modifications of demurrage rules affecting narrow gage roads serving the various mining districts of the state. On account of weather conditions in the high altitudes, it is often impossible to load or unload cars within the specified time. Since all of the mountain roads are prepared for these conditions, and there is no shortage of cars, and the rolling stock cannot be employed to relieve congestion on the main lines, operators are asking for a reasonable extension of time for loading and unloading. The Utility Commission has signified a disposition to grant the request, but states that it must first have the approval of Director General McAdoo. The matter has been taken up with Washington, and an early ruling is expected.

The Colorado Metal Mining Association Executive Committee recently appointed the following committees: Finance: Max Schott, E. N. Funston, George O. Argall, L. A. Ewing, Irving T. Snyder, R. M. Henderson, S. D. Nicholson, R. S. Ellison and J. F. Welborn. Executive: Bulkeley Wells, R. M. Henderson, George E. Collins, Jesse F. McDonald, E. N. Funston, C. B. Garnett, Charles E. Anderson, George M. Taylor, and M. B. Tomlin. Legislative: D. W. Strickland, Harry Robinson, L. E. Girard, John A. Ewing, John T. Barnett, George L. Nye, and Fred Caldwell. Ore Sales: Fred Caldwell, George E. Collins, R. M. Henderson, Rens E. Schirmer, Charles A. Chase, A. L. Bloomfield, and Warren Page. Compensation Insurance: Bulkeley Wells, D. W. Strickland, Fred Carroll. Mining and Milling: E. A. Colburn, Rens E. Schirmer, R. M. Henderson, W. C. Russell, and George L. Nye.

**Increased Cost of Production** has claimed the attention of operators in the West. Naturally, some anxiety is felt by producers of metals of which the prices are likely to be fixed. Mining costs have been compiled by the Commissioner of Mines of Colorado. The data were obtained from representative companies. A comparison of costs in 1913 with 1918 should be of interest to those who are pondering over such problems of price-fixing and establishing excess-profits taxation. In 1913, the minimum wage, less board, was \$2 for eight hours' labor. The cost of boarding a miner at a typical mine boarding house was 80c. per day. The cost of liability insurance amounted to 3.6c. The total cost of eight hours' common labor was therefore \$2.836. In 1918 the minimum wage, less board, was \$3 per day; board at the mine boarding house cost \$1.25; and compensation insurance amounted to 22c., making the total cost of eight hours' common labor, \$4.47. The increase in labor cost is equivalent to 57.6%. These figures would not be complete without noting the relative efficiency of labor in 1913 and 1918. In 1913 the hours of labor expended per ton of ore produced amounted to 5.92 hours. In 1917 this figure was 6.87 hours. The indicated decrease in efficiency was 16%. If we involve the efficiency of labor in the calculation of mining costs, then the increase during the last four or five years is over 87 per cent.

### SALT LAKE CITY—Apr. 24

**Semi-Monthly Pay Rolls** at Tintic mines have been adopted following a vote by the men taken at the request of the various companies concerned. Bingham mining companies are also adopting the same plan.

**The Threatened Strike at Tintic** has been averted. The men are receiving higher wages, the scale being the same as that in force in the Bingham district. The matter of union recognition dropped.

**Occupation Tax To Be Levied** against both the mines and blocks of leased ground has caused mine owners and lessees in the Tintic district to file reports of net proceeds with the state board of equalization in connection with any proposed 3% impost. Various legal questions are involved and there is a feeling that hardship would result from the proposed tax, as it would amount to double taxation.

### SPOKANE, WASH.—Apr. 24

The Northwest Mining Association in its last two sessions, held in Spokane, has shown itself in a reform mood by endorsing the Henderson bill in Congress, which it is hoped will do away with the vast and ruinous litigation that develops from apex and extra-lateral rights, and has passed a resolution favoring the proposal to put the Bureau of Mines in the War Department. The Washington State Metal Miners' Association also adopted a resolution at its last meeting in favor of the same measure.

The French Electrolytic Separation Process of Thomas French, of Nelson, has secured financial aid from the British Columbia Parliament, to the extent of \$25,000, to enable him to purchase ores for the practical tests to which he wishes to subject his electrolytic zinc reduction works at Nelson. The aid is a guaranty of 6% interest on the bonds for that amount and is conditioned on most of the money being raised in Nelson and vicinity. H. S. Stoolfire, of Spokane, is watching the tests, and if they are what Mr. French expects them to be he will consider building such a plant in Spokane.

The Northwest Magnesite Company, with large quarries in Stevens County, Wash., near Chewelah, states through R. S. Talbot, president and manager, that the company by May 1 will be producing and shipping 300 tons daily of magnesite, and has contracts for years ahead which will prevent any further shutdown. Early in March this company had in transit 15,000 tons of magnesite, worth \$675,000 f. o. b., eastern delivery. A good grade of iron ore is obtained by the company from deposits near Chesaw, Okanogan County, Wash., probably the first iron ore in eastern Washington ever mined at an actual profit. The company will use 20 tons a day of this ore. A pulverizing coal plant and a crushing and mixing plant are being completed at the quarries. The deposits are being extensively developed by tunnels to facilitate rapid mining as soon as the plant is completed. Mr. Talbot has gone to New York and Washington to ask for an extension of the Oregon Short Line for 10 miles into his newly acquired coal mine in Teton County, Idaho, from which he says he can produce 250 tons a day of good bituminous coal when transportation is assured.

### WALLACE, IDAHO—Apr. 22

The Success Mine Closed Apr. 15, the action following the failure of negotiations between this company and the Grasselli Chemical Co. for a modification of the contract held by the latter. In a statement issued by the officers of the Success company, only \$16.35 per ton on 40% zinc concentrates is received when spelter is 7c. per lb. and this against a production cost of \$22.75 represents a loss of \$6.40 per ton. The Grasselli company's contract covers the entire zinc output of the mine, and the profits derived from lead and silver about offset the loss of zinc. The zinc contract was made two years ago for a period of three years. Although it was then possible to earn a profit under the terms of the contract, the company was nevertheless severely criticized at the time. It is pointed out that Success ore contains 30% sulphur, which is utilized by the Grasselli company in the manufacture of sulphuric acid, for which the war has created an abnormal demand at a greatly increased price. As this has proved to be a source of great and unexpected profit to the chemical company, the mining company urged that a more favorable return should be allowed on the zinc. The Grasselli company, however, declined to make any concession. In view of the urgent demand for sulphuric acid by the Government, the Success directors announce that they will send representatives to Washington to appeal their case to the proper authorities.

**Settlement of Litigation between the American Smelting and Refining Co. and the Bunker Hill & Sullivan Mining and Concentrating Co.** was announced by Stanley A. Easton, manager of the latter company. Last October the smelting company, in anticipation that the Bunker Hill would undertake to smelt the ore from its mines at its own new plant, took out an injunction restraining the mining company from so doing and endeavoring to enforce compliance with the contract as construed by the smelting company, under which the product of the Bunker Hill & Sullivan mine carrying not less than 30% nor more than 75% lead is to be shipped to the smeltery of the plaintiff. The contract was involved, but the fight centered on this main provision. The injunction was granted by the court, and in December, after a hearing, Judge Woolverton decided in favor of the smelting company and ordered the restraining order made permanent, or until the case could be tried on its merits. Little had been heard of the case since this decision, and it was presumed that both sides were preparing for the big legal battle that had been staged. Under the agreement, half the product of the Bunker Hill mine will be shipped to the A. S. & R. plant, the total output being about 7500 tons of ore per month. The Bunker Hill company also received an important concession through which it will now receive payment for full 90% lead content based on New York quotation. Under the old rate, which prevails in most of the contracts in this district, when lead is above \$4.10 per 100 lb., the surplus was divided equally between the shipper and the smelting company. The settlement became effective at once, and the case has been dismissed. The capacity of the Bunker Hill smeltery is now fully utilized in handling present contracts, which include the output of the Hecla and Caledonia mines, and half the product of the Bunker Hill. Manager Easton states that the plant will be enlarged to meet the requirements of custom business, both large and small, but the difficulty in getting

machinery and building material renders it impossible to say when it can be made.

#### SHANNON, ALA.—Apr. 20

In the Russellville Brown Iron-Ore District more than 1000 miners have formed a union and have threatened to strike if not given an increase in wages and better working conditions. A strike, if it should occur, would cause the shut-down of six companies operating here.

#### TORONTO—Apr. 25

The Advisory Council has appointed R. A. Ross, C.E., one of its members, to act with Arthur A. Cole, C.E., of Cobalt, as a committee to take immediate steps for the development of the peat bogs of Ontario, for the production of a merchantable fuel. Definite action has also been taken as the outcome of a meeting of the Associate Committee of the Council on Mining and Metallurgy, held in Montreal, at which leading technical men from all parts of Canada were present, for the investigation of a new method of smelting iron, employing both coke and electric power. This process is regarded as especially suitable for the smelting of ores occurring in the vicinity of large supplies of available water power. The Council has made a grant for the prosecution of the work, and preliminary investigations will be at once begun at McGill University. Another matter that is under consideration by the Research Council is the utilization of refuse from sheet steel and galvanized iron, of which large amounts are now waste products.

#### VICTORIA, B. C.—Apr. 22

**Smelting Charges Recently Announced** by the Consolidated Mining and Smelting Co. of Canada, the greatest custom smelting company of western Canada, has roused the silver-lead mine operators of British Columbia, who claim that it will mean the closing down of many mines. In response to their petition, the Dominion government has approved a commission to

investigate the schedule, and the company has expressed its willingness to throw its plant and books open for inspection. Orville R. Whitaker, of Denver, has been asked to act in an advisory capacity as an independent judge. The province will be represented at the inquiry.

**Legislation Introduced in British Columbia** proposes granting to the government power to guarantee the bonds of the French Complex-Ore Reduction Co., Ltd., to the extent of another \$25,000. The Province already has endorsed this company's securities to the extent of \$40,000. With this capital a plant was built at Fairview, near Nelson, B. C., which was equipped especially to separate the complex zinc-lead sulphide ores of the Slocan district by means of the French electrolytic process. The cost of this plant however, exhausted the company's capital to the extent that it was unable to enter into the custom business on a scale sufficient to properly reduce the unit operating costs, and it became necessary to close down. This condition of the French company was accentuated by the rise in the prices of zinc and lead following the outbreak of the war, and because the Consolidated Mining and Smelting Co. of Canada, at Trail, was able by an electrolytic process to treat successfully the complex silver-lead-zinc ores of the district. Although the French company was compelled to abandon operations, the management anticipated the present situation in regard to operating costs, for the smelting company will be unable to treat ores at the original prices, and the cheaper electrolytic process will be able to demonstrate its worth. It is claimed for the French process that it is capable of an extraction of 90% or more of the zinc content of this class of ore and that a profit can be obtained when the price of zinc falls to 5c. per lb. The government, having placed its credit behind the French company in the first instance, has indicated, by the proposed legislation, which no doubt will be passed, that it is prepared to give the company and its process every opportunity for success.

## The Mining News

### ARIZONA

#### Cochise County

**SHATTUCK-ARIZONA (Bisbee)**—Mill ready to receive full equipment of especially constructed machinery designed to meet particular requirements of ore to be handled.

**CALUMET & ARIZONA (Douglas)**—Smeltery production in March was 7,802, 000 lb. copper, of which 4,386,000 lb. is credited to company mines.

**DENN-ARIZONA (Warren)**—Pumping facilities provided for unwatering mine from 1400 to 1650 level. Two cars of good ore have been shipped to smeltery daily from development of upper levels.

#### Graham County

**PORPHYRY COPPER CO. (Globe)**—Blocking out ore preparatory to mining and construction of permanent plant. The installation of a large-size air lift is under consideration. W. J. Miller is in charge.

#### Maricopa County

**PARMLEE SILVER MINES (Phoenix)**—Sold to a Nevada syndicate represented by J. K. Kinkade. Consist of 11 silver-ore claims, with tungsten as a byproduct. Development covering eight locations and aggregating 700 ft.

**ADAM MARSH MOLYB. (Wickenburg)**—Located at head of Copper Canyon and recently optioned to Louis F. Schultze. Mr. Schultze expects engineers to examine property soon and to begin operations.

#### Mohave County

**BANNER MINING CO. (Kingman)**—The recent strike said to be one of the best ever made on this property. New compressor and other machinery being installed.

**KEYSTONE CON. MINING (Kingman)**—Will sink main shaft 700 ft. and then drift. Low-grade ore to be treated at mill by flotation and high-grade ore shipped to smeltery.

**MINES EXPLORATION (Kingman)**—L. F. Bateman has mapped out considerable work at properties in Hualpai mountains. Shaft on one vein down 60 ft. and in good ore.

#### TOM REED GOLD MINING (Kingman)

—Within 10 days expects to connect west drift on 525 level of Bald Eagle with drift now advancing east from Grey Eagle winze. Three shifts now driving in both drifts, and 250 ft. to drive. Ore in east drift, where fault bisected big vein thought to have been picked up. Vein reported eight feet wide at this point.

**BIG JIM CON. MIN. CO. (Oatman)**—Started work at Bluebird under direction of A. G. Keating. Plan to sink shaft 135 ft. deeper or to the 400 ft. level and prospect vein.

**GOLD ROAD MINES CO. (Oatman)**—First Gold Ore ore went under stamps at Gold-Road mill on Apr. 8. New road in fine condition. Gold Ore thought to have a 90-day lease on Gold Road mill, after expiration of which Gold Road company will probably mill the ore from that property in conjunction with its own. Two Marcy mills formerly in use at Golconda mill have been secured and to be installed soon. Expect to start mining in Line Road tunnel in August.

**SECRET PASS GOLD TOP (Oatman)**—J. P. Loftus, general manager, reports new plant in successful operation. Additions made to insure sufficient water to operate mill at rate of from 15 to 20 tons per day.

**UNITED EASTERN MINING (Oatman)**—Production for March slightly less than normal, due to mining in south portion, where ore is low grade.

#### Pima County

**BLACK PRINCE PROPERTY (Ajo)**—F. G. Lane reports ore at property and hoist to be installed at once. Three claims under bond, and 16 owned outright by operating company.

**NEW CORNELIA COPPER CO. (Ajo)**—Copper production in March as follows: Electrolytic cathodes, 3,218,000 lb.; from cement copper, 918,000 lb.; from smelting ores, 440,000 lb. Plans ordered for a new and modern school building to house 600 children.

**BOSE GROUP (Tucson)**—Eight men working at property, which lies to north of Mohawk.

**FLUX MINE (Tucson)**—Taken over under bond and lease by Bisbee interests. Ground broken this week for mill.

**MAMMOTH DEVELOPMENT (Tucson)**—Employing 100 men at mine and reduction plant. Producing from 150 to 175 tons wulfenite-gold ore per day and expect to increase output to 400 tons upon completion of enlarged working shaft and new equipment destroyed last fall by fire.

**MOHAWK MINES (Tucson)**—Colin Timmons and associates preparing to work mines on large scale and under improved methods. Will rework tailings from former operations while preparing mine and plant for resumption of stopping operations.

**NORTH STAR MINE (Tucson)**—Recently acquired by W. R. Ramsdell. Hoist being erected and operations beginning.

**OLD GENERAL MORGAN (Tucson)**—Reported to be about to pass under bond to a large copper company.

**OLD HICKORY MINE (Tucson)**—Reports discovery of high-grade sulphide ore at this property.

**PIMA MINING AND SMELTING (Tucson)**—Said to have completed final payments on plant. Site selected and reconstruction of plant to follow. Bond and lease acquired in Dos Cabezas district and another to be acquired soon. Expected output, 250 tons per day.

**TOTAL WRECK MINE (Tucson)**—Reported to have shut down.

#### Pinal County

**QUEEN CREEK COPPER (Superior)**—Shaft now down 690 ft. and to continue to depth of 1000 feet.

**SILVER KING MINE (Superior)**—Rapidly sinking shaft and will soon be in position to explore ground between 450 and 250 levels.



**Santa Cruz County**

**ARIZONA-EUROPEAN (Nogales)**—Latest development in this section. Consists 16 claims near Three R camp.

**PRUDENTIAL M. & D. (Nogales)**—Annual meeting of stockholders at 1 p. m., Apr. 25, in office of Border Videtta.

**HARDSHELL MINE (Patagonia)**—Reported to have changed hands and operating under Marcus Daly estate. H. K. Welsh is in charge.

**Yavapai County**

**ARIZONA PORTLAND (Jerome)**—Installed new 35 h.p. gasoline engine. Dr. L. O. Morgan is in charge.

**CALUMET & JEROME (Jerome)**—Conducting vigorous development campaign in effort to reach presumed orebody.

**GENERAL MINES DEVELOPMENT (Jerome)**—New shaft in Amulet mine down 200 ft. and is reported to have found high-grade silver and galena ore.

**GREEN MONSTER (Jerome)**—Developing at two points, one-half mile apart. Employing 35 men at present.

**JEROME COPPER (Jerome)**—Reported to have suspended operations, resumption depending upon showing Green Monster makes in the future.

**JEROME PORTLAND (Jerome)**—Elected new officers as follows: President, Jas. M. Mahoney; vice president, George Brookshire; directors, J. H. Morgan and Mrs. Maggie Marks; secretary, T. P. Esond.

**FORTUNA MINING (Prescott)**—Tunnel reported 20 ft. from the east-west fissure toward which driving for six months.

**PECK, GIROUX AND BURMISTER SILVER GROUP (Prescott)**—Recently acquired by El Paso syndicate.

**RED MOUNTAIN CON. (Prescott)**—New machinery being installed and shaft work started.

**NEW UNITED VERDE (Skull Valley)**—Extensive development plan announced. The 20-stamp mill is fully equipped and is expected to be in operation early in May.

**ARIZONA-BINGHAMTON (Stoddard)**—General Manager Geo. W. Johnson announces a \$20,000 Liberty Bond subscription by 105 employees of the company.

**Yuma County**

**CATHERINE MINE (Salome)**—Prospecting said to have developed large body of ore. Machinery installed and work of driving across big fault to proceed rapidly.

**CALIFORNIA****Calaveras County**

**PENN. MINING CO. (Campo Seco)**—N. Loraghi was instantly killed Apr. 13 by cave-in while barring down rock in shaft No. 3, where he and his helper were repairing timbers.

**SAFE DEPOSIT (Mokelumne Hill)**—Crew started to work. Expected water supply will insure long season of hydraulic mining. J. P. Keene is superintendent.

**SHEEPRANCH MINES (Sheepbranch)**—Recent metallurgical tests prove satisfactory, and development and production to start immediately. New compressor to be installed and mill put in commission. Good season expected.

**Kern County**

**ARGUS (Randsburg)**—Developments increasing ore reserves and arrangements are being made for increasing air supply to operate 15 drills. More snow and rain have fallen in Argus and Panamint ranges since Jan. 1 than in any similar season in 20 years.

**Sacramento County**

**NOBLE CHROME (Folsom)**—Mill installed for crushing and concentrating low-grade chrome ore now in commission. Large tonnage being mined by Noble Electric Steel Co., with smeltery at Heroult, Shasta County.

**San Bernardino County**

**AMERICAN TRONA CORP. (Trona)**—Decision of U. S. Land Office completes to 3300 acres Searles Lake potash lands. Marks conclusion of 10 years' litigation and guarantees uninterrupted development and production of potash, borax and other by-products.

**Tuolumne County**

**SPRINGFIELD TUNNEL (Columbia)**—Active work begun on the Wright ranch where new tunnel starts to tap the proved gravel deposits on the edge of Springfield flat. Joseph Cademartori is superintendent.

**WARNER MARBLE (Columbia)**—Road being built and hydraulic machinery installed for stripping the overburden of earth from the marble formation. Quarry machinery ordered and en route. J. E. Warner is owner.

**TABLE MOUNTAIN MNG. (Jamestown)**—Suit in Superior Court brought by Francis W. Wilson asking judgment for \$27,000, interest and cost of suit. Plaintiff claims that George L. Gary, acting for the company, sold to him 310,000 shares of the capital stock and that a portion of the \$27,000 was used by Gary and not in connection with the mining property; that the company failed to pay for lease on Roderick shaft and machinery to be used to work the mine, and thus forfeited the lease, preventing operation of the mine.

**BELMONT SHAWMUT MNG. (Shawmut)**—Articles of incorporation filed under laws of Delaware, main office at Wilmington. Capital stock, \$1,000,000. Original subscribers, M. L. Rogers, L. A. Irwin and M. L. Gatchell. Property is the Eagle-Shawmut, which has been in course of development since the present operators took hold. Many improvements made, including removal of mill to the mouth of the transportation tunnel.

**COLORADO****Boulder County**

**LUCKY TWO (Boulder)**—Tungsten property near Boulder Falls; purchased recently by Warren F. Belker. Property has been large producer and to be extensively operated this summer.

**TUNGSTEN PRODUCTS MFG. (Boulder)**—Refining tungsten ores and manufacturing tungsten products. Value of output for 1917: Ferrotungsten, \$1,000,000; tungstic acid, \$30,000. A large quantity of molybdenum ore also treated. Company recently capitalized for \$2,500,000.

**Clear Creek County**

**AMERICAN SISTERS (Lawson)**—Lease and bond acquired by Denver company on group of 27 claims. To be developed by crosscutting from Elida tunnel, to cut vein at depth of 1300 ft., and raising to old upper workings. Mine formerly a large producer of silver-lead ore, but shut down for last 14 years on account of litigation.

**TEDDY BEAR (Lawson)**—Worked by W. W. Gibb, of Denver, lessee. Drifting on No. 3 vein on main tunnel level has opened shoot of high-grade lead-silver ore.

**Lake County**

**BARTLETT TUNNEL (Leadville)**—Narrow streak of ore assaying 2 to 10 oz. gold per ton opened recently. Has been steady producer of good-grade silver ore, and this is first discovery of gold in quantity, and hence of considerable importance.

**JASON LEASE (Leadville)**—Sold recently to Denver men for \$10,000. Shoot good-grade manganese ore opened.

**LEADVILLE UNIT (Leadville)**—Subsidiary of U. S. Smelting, Refining and Mining Co., operating Harvard, Jamie Lee and Tip Top shafts, on Fryer Hill. Large body of silver-bearing pyrite opened recently between Jamie Lee and Denver City shafts. Shipments of 100 to 150 tons daily now being made.

**SEELEY (Leadville)**—Lease secured on large block of ground in Poverty Flat section. New hoisting equipment to be installed at Seeley shaft, and workings reopened and retimbered. Property not worked for several years.

**Ouray County**

**CAMP BIRD LIMITED (Campbird)**—Tunnel heading advanced 515 ft. in March. Expect main vein to be cut in April, after which drifting on vein and raising to old shaft workings is planned. Tunnel 500 ft. below former lowest workings.

**BEAVER & BELFAST (Ironton)**—Regular shipments lead-silver ore being made via Ouray. Ore hauled on sleds.

**GUADALOUPE (Ironton)**—This copper property in Gray Copper Gulch to be reopened by lessees. Shipments made last fall were encouraging. Tramway to Red Mountain road may be built.

**WHITE CLOUD (Ironton)**—Being reopened by Denver men. Work greatly retarded by non-delivery of mining machinery.

**San Miguel County**

**TOMBOY GOLD MINES (Telluride)**—Machine shop and blacksmith shop not injured by fire at mine. Timber shed was only loss.

**Summit County**

**BULKELEY WELLS (Breckenridge)**—To start sinking shaft from 100 to 250 ft. depth in June. W. T. Keogh is superintendent.

**ELLA (Breckenridge)**—Being worked by lessees. Shipments lead-carbonate ore made.

**MONTE CRISTO (Breckenridge)**—Operated by Liberty Leasing Co. Mill remodeled and flotation installed. Plant now in operation.

**POWDER RIVER (Breckenridge)**—Dredging company's new dredge now operating successfully; 8-cu. ft. buckets used. Gravel channel 40 to 45 ft. deep.

**QUAIL (Montezuma)**—Heavy galena ore opened recently by lessees.

**DENVER MINING AND MILLING CO. (Wortman)**—Mill overhauled and improved; will start operating soon. Large tonnage lead-zinc ore developed.

**Teller County**

**DANTE (Cripple Creek)**—Fred Cobb, sub-lessee, shipping carload lots of 6-oz. gold per ton ore from 500 level.

**ECONOMIC (Cripple Creek)**—Shipped in March, 2500 tons ore to Gold Coin mill; all dump material of average \$3 gold per ton.

**ELKTON (Cripple Creek)**—Company and lessees shipping from Elkton workings and lessees from Tornado shaft workings. March shipments, 19 cars.

**EXCELSIOR M. & L. CO. (Cripple Creek)**—Operating Longfellow group of Stratton estate. Crosscut from 500 level of Llewellyn shaft has cut Legal Tender vein, opening 4-ft. shoot milling-grade ore with 12-in. streak of high-grade ore.

**GRANITE (Cripple Creek)**—Company and lessees shipped 3500 tons ore during March from Dillon, Gold Coin, Monument, Upper Granite, and Dead Pine mines.

**MARY MCKINNEY (Cripple Creek)**—Steam hoist and drag-line excavator installed at Howard shaft to handle dump material. To be shipped to Golden Cycle mill. Victory Gold Mining Co., leasing Howard shaft workings, to begin shipping soon.

**ROOSEVELT TUNNEL (Cripple Creek)**—Main heading advanced 100 ft. in March; Cresson lateral, 189 ft.; Portland lateral 220 ft.

**IDAHO****Shoshone County**

**HYPOTHEEK M. & M. CO. (Kingston)**—An option has been given by J. H. Kern, of Moosejaw, Sask., Can., president of the company, and his associates, to J. K. George, of New York, for 1,100,000 shares of the capital stock of the company at 15c. per share, payable on or before Aug. 15, 1918. Other stockholders have been invited to option their stock also. In a letter to stockholders Mr. Kern explains his action by the unsatisfactory financial conditions in Canada and the United States due to the war, the adverse conditions under which the company has long labored, and the necessity to levy assessments to continue operations. The agreement includes payment by Mr. George of all assessments on stock placed in escrow under the option.

**AMAZON-DIXIE (Mullan)**—Contract to sink shaft 200 ft., making total depth 1500 ft. below main working level, nearing completion. Oreshoot proved 600 ft. on main tunnel and by raise to surface, 700 ft. Also proved in crosscut from shaft at 250 ft. If ore holds good at new level, company to proceed to build mill. Property in Montana, just across state line. Controlled by Cleveland capitalists.

**SUNSET MINE (Sunset)**—Announcement that Senator W. A. Clerk is negotiating with the Sunshine Mining Co. to drive jointly a tunnel that will tap the Sunset orebody 1500 ft. below the bottom of the shaft, which is now 1000 ft. deep. Considerable lead-zinc ore has been developed in all levels. Portal of proposed tunnel to be within mile of Beaver Creek railroad.

**MICHIGAN****Copper**

**CALUMET AND HECLA (Calumet)**—Adding to its railway equipment, 250 forty-ton cars, beginning to arrive from the American Car and Foundry Company.

**ALLOUEZ (Houghton)**—Maintaining output, largely due to electric haulage system.

**ISLE ROYALE (Houghton)**—Influenza has laid up so many miners at Isle Royale that no shipments have been made to the Point Mills plant in 10 days, and the mine has difficulty in keeping three shifts at its own mill running at full capacity.

**MASS (Houghton)**—Output down to 10 cars of ore per day, due to illness of employees.

**MAYFLOWER (Houghton)**—Old Colony's shaft down 375 ft. Sinking to speed up, as the skip is in operation. No ore can be expected until a depth of 2000 ft. is reached.

**NEW BALTIC (Houghton)**—Ore in shaft changing from average grade to high grade, with considerable small mass; only 30 ft. further to sink to reach 3rd level.

**OSCEOLA (Houghton)**—Shipments normal. Ahmeek averaging 90 cars per day.

**SUPERIOR (Houghton)**—Shipping three times normal capacity and averaging 23 cars per day. Due to the milling opportunity at the Point Mills.

**MICHIGAN (Rockland)**—Still maintaining average of over 30 lb. of copper without mass. Shipping three cars daily.

#### Menominee Range

**KEWEENAW ASSOCIATION** has just closed with the Thomas interests, selling the property known as the West Indiana, consisting of an 80-acre tract. Original exploration was by John T. Spencer. New work under management of Superintendent Richards, of Indiana. Diamond drilling and test-pit sinking to begin immediately.

**BRISTOL MINING CO. (Crystal Falls)**—Mine opened Apr. 22, and will operate at full capacity or to the extent of the number of miners obtainable from now on.

**ANTOINE (Iron Mountain)**—Company shipping ore to the Escanaba docks. Entirely new plant, operated by electric power from Peninsula Company. One hundred men employed. Plant has two new pumps, capacity 1200 gals. per minute, new haulage equipment and new compressor. New headframe was erected during winter. Superintendent Carbin expects to make new record for low costs.

**INDIANA MINE (Iron Mountain)**—Plans for largely increased output this summer. Stripping operations have been resumed, and 200 men will be put to work.

#### MONTANA

##### Fergus County

**BARNES KING DEVELOPMENT (Kendall)**—March production: North Moccasin ore mined, 1305 tons, assaying \$5.49 per ton; bullion produced, \$12,468; Piegan-Gloster and Shannon, in Lewis and Clark County, total ore treated, 4317 tons; bullion produced, \$42,568 shipped from Gloster, 1459 tons, assaying \$11.20 per ton; from Shannon, 2655 tons, assaying \$7.86 per ton; total bullion produced from all properties valued at \$55,036.

##### Jefferson County

**FREE-COINAGE MINE (Clancy)**—Controlling interest in Amalgamated Silver Mines company, a \$1,000,000 organization, was acquired by Eastern and Colorado capitalists, who are taking steps to develop Free Coinage mine, in Lump Gulch. Mines in this district formerly large silver producers.

#### NEVADA

##### Nye County

**MANHATTAN CONSOLIDATED (Manhattan)**—Southeast crosscut on fifth level has reached a point 135 ft. from shaft. The space is in a hard close-grained dark-blue quartzite which has delayed progress considerably. Water flow still steadily diminishing, and the pumps are only necessary for 12 hours per day. Flow estimated to be 30 per cent. less than when it first appeared. Mark Page is mine superintendent.

**UNION AMALGAMATED (Manhattan)**—Producing steadily about 50 tons per day, and with the improved equipment this output is maintained with ease.

**WHITE CAPS EXTENSION (Manhattan)**—Southeast drift on 400 level, extended 26 ft., is now 97 ft. along footwall of the limestone formation. Several calcite and quartz stringers have been cut.

**WHITE CAPS MINING CO. (Manhattan)**—Have opened up shaft orebody from bottom level of mine. West crosscut on fifth level now 468 ft. from station and for three rounds ore close to the footwall has been exposed. The dip of the orebody has flattened a great deal, compared with fourth level. Orebody exposed for about one-half of face of crosscut. Upon reaching the ore, the crosscut has been changed to a drift, and has been developed for about 20 ft. Slope distance between levels along orebody is 220 ft. At the fourth level the shaft orebody had an average width of 30 ft. between hanging and foot wall. The grade where the ore was first cut on the fourth level was \$13 and \$17 per ton. The grade recently indicated by three trench

sample across the orebody, which assayed \$20.80, \$14 and \$30.40, average \$22.60 per ton. If this orebody comes up to expectations, in all probability the management will immediately start to plan for the doubling of the mill capacity.

**TONOPAH DISTRICT PRODUCTION** of ore for the week ending Apr. 13 amounted to 10,276 tons of an estimated gross milling value of \$174,692. Producers were: Tonopah Belmont, 2277 tons; Tonopah Mining, 3250; Tonopah Extension, 2459; Jim Butler, 493; West End, 956; MacNamara, 527; Montana, 200; Cash Boy, 46; and Midway, 68 tons.

#### UTAH

##### Juab County

**TINTIC DISTRICT SHIPMENTS** for week ended Apr. 13 were 172 cars, Chief Consolidated leading with 36 cars.

**TINTIC STANDARD (Eureka)**—Production first quarter 1918 about 6000 tons, valued at \$30 per ton. Chief work on 1260 level from new shaft. Drifting to east and northeast, 200 ft. in each direction. Ore averages about \$1000 per car. Company has four trucks and a team hauling ore.

**CHIEF CONSOLIDATED (Eureka)**—Company liberal subscriber to first two Liberty Loans, subscribing \$100,000 to third, credit for sale to be placed to Tintic committee.

**TINTIC DELAWARE (Tintic Junction)**—Twelve to fifteen cars of ore on dump at this West Tintic property, and several carloads broken in stopes. Awaiting better haulage conditions. Force of 15 men at work and ore coming from development only. Three crosscuts driving to footwall, where good orebody is expected.

**DRAGON CONSOLIDATED (Silver City)**—Extensive prospecting in progress. Shipments of fluxing ores, although demand holds good, not quite so heavy, owing to scarcity of labor. Other ores also shipped. Profits held down somewhat by expense of prospecting.

**IRON BLOSSOM (Silver City)**—Shaft sinking to 2200 level to be discontinued, objective point in about two weeks, and lateral work to start from this level. Some water appearing, but not beyond capacity of small pump. Later, property to be drained by Tintic drain tunnel.

##### Plute County

**FLORENCE M. & M. CO. (Marysvale)**—New 100-ton unit of mill for treatment of alunite under course of construction doubling present capacity. Jacob W. Young is in charge.

##### Salt Lake County

**EMMA CONSOLIDATED (Alta)**—Winze below Bay State tunnel sunk 1700 ft. and is showing streaks of exceptionally rich ore. Streaks said to assay high in silver and lead.

**MONTANA-BINGHAM CON. (Bingham Canyon)**—Company owns 312 acres of ground near Utah and Ohio copper companies, as well as 20% of stock in adjoining Bingham Amalgamated, from which to receive 10% on returns of ore transported through Montana-Bingham tunnel. Tunnel is 7 x 7 ft. driven 5900 ft. in easterly direction, beginning opposite Markham Gulch. Property made up of several groups, of which most developed is Fortuna, where orebody in Mayflower vein has been followed laterly 1000 ft. This is about 600 ft. vertically above Montana-Bingham tunnel, which has cut porphyry-quartzite contact. Distance on slope of rim between upper and lower workings, 1200 ft. Run or mine ore in Fortuna workings a little over 2% copper. Mill at Fortuna workings capable of treating 150 tons daily, and negotiations in progress for leasing idle mills owned by Bingham Coalition Mines at portal of tunnel, capacity also 150 tons daily. This to be altered. Formerly used as lead plant to treat copper ores. Beside ore body in Fortuna group, other large orebodies expected.

**OHIO COPPER (Bingham Canyon)**—Rapid progress being made on 3000-ton flotation plant. Five units: First two expected to be in operation by beginning of May, third to be completed early in June, and two others in July. Expected to make recovery of 80 to 85% from slimes of old mill, at present treating 2200 to 2300 tons of ore daily.

**UTAH APEX (Bingham Canyon)**—Estimated took 15,000,000 gal. of water to fill workings and three weeks in time, at occurrence of fire last year. Total expense \$42,884; \$2390 to flood mine, \$16,443 to unwater, \$12,225 to prepare to resume mining, \$2040 overhead expense and \$7856 to resume work.

#### Summit County

**PARK CITY DISTRICT** shipments week ended Apr. 13 were 3,968,880 lb. of ore and concentrates, and include 63,200 lb. spelter from Daly-Judge zinc mill.

**DALY WEST (Park City)**—Arrangements being made so as to treat ore from this company in Judge mill under new management. Reduction in expense expected. Anchor tunnel to be driven to connect with Daly West shaft. Changes to entail considerable outlay. First of month mine practically closed, but working force retained by Judge management.

**ONTARIO SILVER (Park City)**—High-grade ore discovery reported on 500 level. New orebodies of lower grade on 1600 and 1700 levels stated to be opening up satisfactorily.

#### CANADA

##### British Columbia

**CANADA COPPER CORP. (Princeton)**—Concentrator and company spur railroad in course of construction.

**VOIGT'S GROUPS (Princeton)**—Reported that this group, adjoining the Canadian Copper Corporation's property, has been bonded.

**CURLE GROUP (Kalso)**—Manganese property being equipped and operated by American capitalists, whose headquarters are in Seattle.

**SLOCAN STAR MINE (Sandos)**—Purchased by Roy O. Lammers, of Spokane, and associates at a bid price of \$24,000 from the Slocan Star Mines, Ltd. Expect to reorganize, leaving no obligations against property save debentures of \$98,000. John B. White, of Spokane, is one of the chief stockholders. Property for a short time was in the hands of a receiver, appointed at Victoria.

##### Manitoba

**GOLD PAN (Rice Lake)**—Shaft at 150 level, from which depth drifting shows that high-grade orebody cut at 80 ft. in shaft continues at this depth. Vein 10 ft. wide and is stated to assay \$20 per ton, with rich pay streaks of higher grade 18 in. wide.

##### Ontario

**PROVINCIAL (Cobalt)**—Stopping at 175 level.

**BEAVER (Cobalt)**—Company now able to finance Kirkland Lake Gold property without outside assistance.

**COBALT MERGER (Cobalt)**—Company affairs being wound up, James D. Cunningham, of Ottawa, having been appointed liquidator.

**GENESSEE (Cobalt)**—A new vein, heavily mineralized, has been discovered at the 500 level.

**KERR LAKE (Cobalt)**—Production in March was 207,100 oz. of silver, as compared with 204,953 for February. Production for the first quarter of the year was 615,894 oz., compared with 641,035 for corresponding three months of 1917.

**NIPISSING (Cobalt)**—Acquired a gold property in Arizona.

**TEMISKAMING (Cobalt)**—New vein, carrying niccolite and cobalt, has been discovered above the diabase sill on the 1600 level.

**THREE-STAR (Cobalt)**—A vein 5 in. wide carrying high silver contents in some places has been discovered.

**ELLIOTT-KIRKLAND (Kirkland Lake)**—Main shaft is being put down from 400 to 500 level. The drift at the 300 level driven to a point over ore occurrence at the 400 level, but no ore is yet found.

**LAKE SHORE (Kirkland Lake)**—Mill at capacity, treating 50 tons per day, from development. Millheads varied considerably, the average during first two weeks of operation being \$23 per ton.

**PITTSBURGH-LORRAIN (South Lorrain)**—Three Groch flotation machines of an aggregate capacity of 30 tons per day are being installed.

**PORCUPINE CROWN (Timmins)**—The staff to be reduced about May 1, as it has been decided to curtail operations on account of the competition for labor by the large producing mines.

**THOMPSON KRIST (Porcupine)**—Vipond vein followed over the line into this property and shows over two feet of \$12 gold ore per ton. Drifting to be continued.

#### MEXICO

##### Baja California

**COMPAGNIE DU BOLEO (Santa Rosalia)**—Production of copper in March was 1,631,500 pounds.



# The Market Report

## SILVER AND STERLING EXCHANGE

Apr.	Sterling Ex-change	Silver		Apr. May	Sterling Ex-change	Silver	
		New York, Cents	Lon-don, Pence			New York, Cents	Lon-don, Pence
25	4.7550	99½	49½	29	4.7550	99½	49½
26	4.7550	99½	49½	30	4.7550	99½	49½
27	4.7550	99½	49½	1	4.7550	99½	49½

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

Apr. May	Copper		Tin		Lead		Zinc
	Electro-lytic	Spot.	N. Y.	St. L.	N. Y.	St. L.	St. L.
25	*23½	↑	6.60	6.52½	6.60	6.52½	6.55
26	*23½	↑	6.60	6.52½	6.60	6.52½	6.57½
27	*23½	↑	6.60	6.52½	6.60	6.52½	6.62½
29	*23½	↑	6.60	6.52½	6.60	6.52½	6.57½
30	*23½	↑	6.60	6.52½	6.60	6.52½	6.62½
1	*23½	↑	6.60	6.52½	6.60	6.52½	6.60

\*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

Apr. May	Copper		Tin		Lead		Zinc
	Standard	Electro-lytic	Spot	3 Mos.	Spot	3 Mos.	Spot
25	110	110	125	350	350	29½	54
26	110	110	125	350	350	29½	54
27	110	110	125	350	350	29½	54
29	110	110	125	350	350	29½	54
30	110	110	125	360	360	29½	54
1	110	110	125	360	360	29½	54

The above table gives the closing quotations on London Metal Exchange. All prices are in pounds sterling per ton of 2,240 lb. For convenience in comparison of London prices, in pounds sterling per 2,240 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—May 1, 1918

In both lead and copper there were signs of a little better feeling, but this was scarcely reflected quotationally.

**Copper**—The British government is now making big demands on the producers, who anticipate difficulty in meeting the requirements for copper in May.

The copper producers were in session with the price-fixing committee of the War Industries Board to-day.

**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. Higher prices are expected.

**Tin**—The situation weekly becomes worse. Sales of tin for April shipment from China at 95c. and bids of 97½c. made and refused for 99% grade in San Francisco indicate the situation. Houses dealing in tin receive only vague reports from Batavia, and it is still uncertain whether the Dutch government has actually placed an embargo on shipments or has only checked them by supervisory measures.

**Lead**—This was a very dull week, transactions aggregating only a small total. Although consumers did not exhibit interest, it was noteworthy, also, that sellers were not disposed to push things, and it was conjectured that those producers who heretofore have been desirous of selling have now exhausted their supplies. The large producers, being well sold out, have not figured in the market during the decline. An interesting feature this week was the inquiry of Japan for a considerable lot of lead, and also an inquiry from a European country. These orders would naturally be filled with Mexican lead.

The freight rate of lead from St. Louis to New York has been advanced to 19½c. per 100 pounds.

According to the compromise between the American Smelting and Refining Co. and the Bunker Hill & Sullivan, the latter is to have the right to smelt half of its output of ore. On the other half, which is to be taken by the smelting company, payment is to be made for 90% of the lead at the full market price.

**Zinc**—There were increased transactions, buyers manifestly having been attracted by the low level. On Apr. 30 the liberal offerings of Western producers ceased and fractionally higher prices began to be realized. Although cheap spelter is still to be had, producers do not seem to be disposed to contract for forward deliveries at the present prices. An interesting feature of the week was the sale of some round lots of common spelter for export.

The smelters who are the principal producers of sheet zinc have agreed with the producers of "premium ore" in the Joplin district to pay them \$75 per ton for such ore, basis 60%. The quantity of ore that can be taken under this agreement is limited. The ore producers will allocate the orders among themselves. This agreement followed representations by the ore producers that they ought to participate in the profits that the sheet-zinc rollers realize from the price of 15c., less 8% discount, that the sheet-zinc rollers realize by their agreement with the Government, which price is out of line with the price for common spelter.

**Zinc Sheets**—Unchanged at \$15 per 100 lb., less usual trade discounts.

**Aluminum**—The price quoted is the Government price of 32c. per lb. but the market is unsettled and there are few transactions.

**Antimony**—The Government was in the market for antimony and was understood to be desirous of purchasing a rather large quantity. This led naturally to some considerable buying by consumers. Therefore, the market stiffened. We quote 12½@12¾c. for spot, while at the close the foreign producers were asking 13c. Nobody seems to be keen about quoting futures, but a price relatively higher than for spot would undoubtedly be demanded.

**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 \$1.40 per pound.

**Nickel**—In the "Journal" of Apr. 20, we reported that the price for nickel had been fixed at 38@40c., according to grade. This was incorrect, no price having been fixed, but arrangement to supply Government requirements at 35@40, having been made. The outside market quotation at that time was 40@45 cents.

**Quicksilver**—The market is rather uncertain. We quote California virgin at \$120@125, and Mexican virgin at \$115@117. San Francisco reports, by telegraph, \$115.

By a typographical error we were made to quote California virgin last week at \$102, when \$120 was intended.

## Gold, Silver and Platinum

**Silver**—The market has ruled steady and firm the past week, with unchanged quotations at 49½% in London.

The passage of the Bullion bill by Congress has naturally stabilized the price at \$1 per oz. and the outlook is for a firm market on that basis without speculative fluctuations.

Mexican Dollars at New York: Apr. 25, 77; Apr. 26, 77; Apr. 27, 77; Apr. 29, 77; Apr. 30, 77; May 1, 77.

**Platinum**—Refined ingot unchanged at \$108, which is asked for such as can be supplied to the open market.

**Palladium**—Unchanged at \$150.

## Zinc and Lead Ore Markets

**Joplin, Mo., Apr. 27**—Blende, per ton, high, \$56.50; basis 60% Zn, premium, \$55@50; medium to low, \$42.50@37.50; average basis \$46.25; calamine, per ton, 40% Zn, \$30@25. Average selling prices: Blende, \$45.87; calamine, \$31.46; all grades, \$45.26 per ton.

Lead, high, \$85.30; basis 80% Pb, \$80; average selling price, all grades of lead, \$80.38 per ton.

Shipments the week: Blende, 10,750; calamine, 480; lead, 1895 tons. Value, all ores the week, \$660,550. Shipment four months: Blende, 150,533; calamine, 7247; lead, 25,857 tons. Value, all ores four months, \$10,359,820.

Producers are claiming they will obtain a price of \$75 basis for premium ore next week, based on a secret conference held in this city with representatives of the smelting industry. In such event, there will be a wide distance between prices for premium and other grades of ore, as purchasers of all other grades see no possibility of an advance.

**Platteville, Wis., Apr. 27**—Blende, basis 60% Zn, \$50 base for premium grade down to \$44 base for second grade. Lead ore, basis 80% lead, \$80 per ton. Shipments reported for the week were: 2757 tons blende, 154 tons galena and 1834 tons sulphur ore. For the year to date the totals are: 41,474 tons blende, 2401 tons galena and 16,925 tons sulphur ore. During the week 3,029 tons of blende were shipped to separating plants.

**Antimony Ore**—Unchanged at \$1.75 per unit, with no particular demand for it.

**Chrome Ore**—Unchanged at \$1.50 per unit for 45% grade.

Owing to the shipping situation, shipments of foreign chrome ore have virtually ceased. The few thousand tons that happen to be afloat and unsold have fetched as high as \$100 per ton. The market for domestic ore is still chaotic, as, indeed, it has been during the last year. Buyers complain that sellers of this ore on the Pacific Coast seem to consider sales contracts as mere scraps of paper. The Pacific Coast is overrun with agents of Eastern consumers, who pick up whatever they can find, and some producers who have already sold lots of ore are charged with reselling when somebody comes along and offers a higher price. This makes it impossible for the consumer to know where he stands, for although he may have contracted for the delivery of many thousands of tons, he may not receive any at all. This business obviously needs to be organized.

**Manganese Ore**—Unchanged at \$1.20@1.30 per unit for metallurgical ore. Shortage of high-grade ore becomes more and more acute, and an increase in the schedule price is expected.

**Molybdenum Ore**—Molybdenite is offered freely without finding buyers. No quotations are made.

