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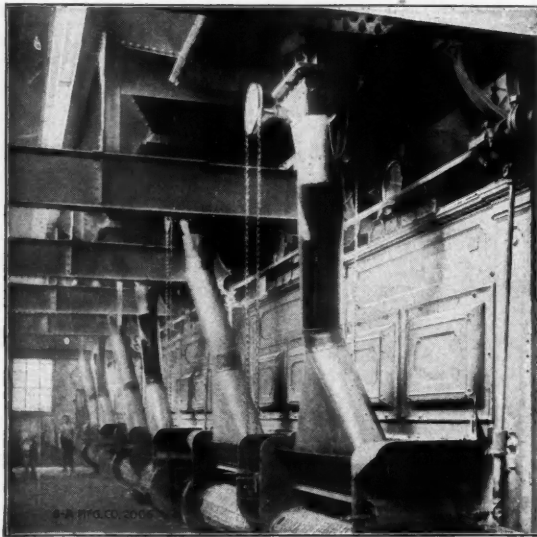
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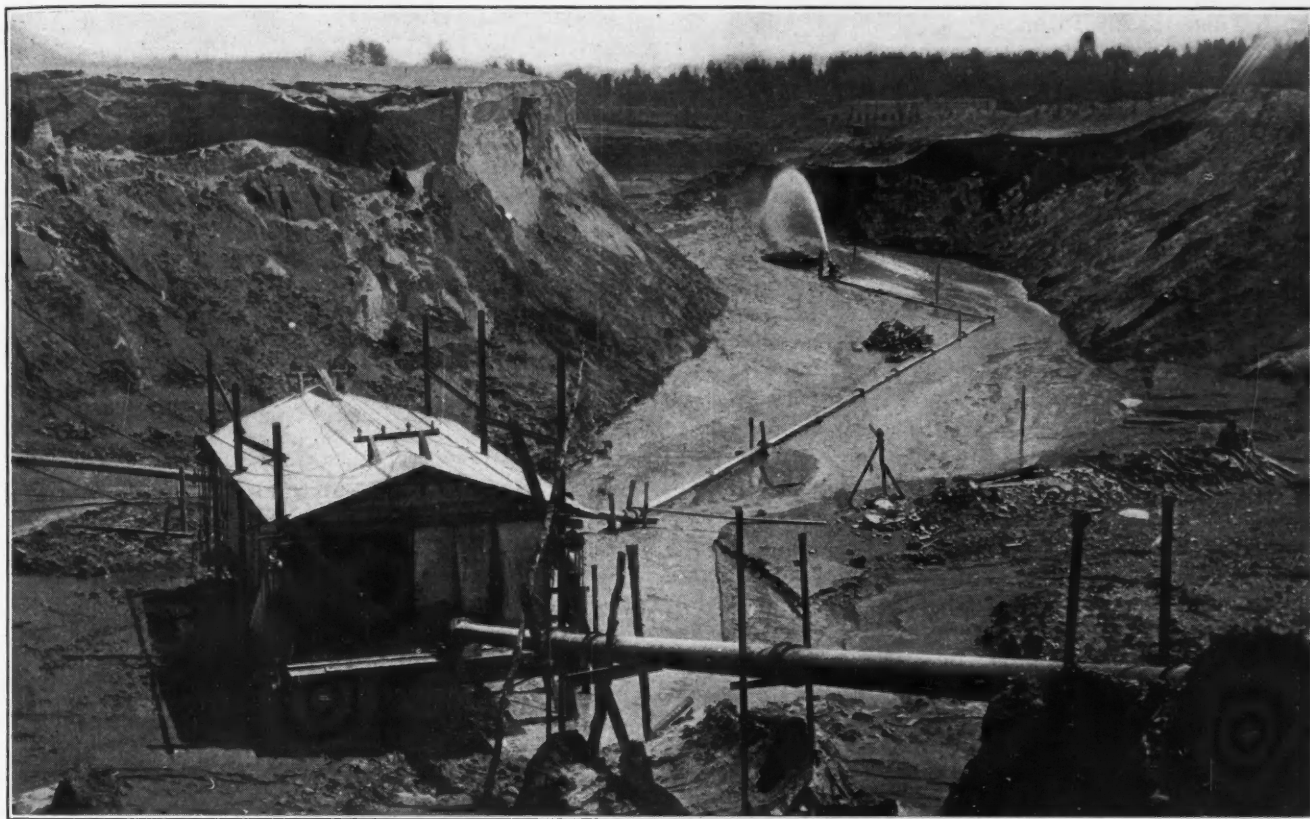
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# Engineering and Mining Journal

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ROWE MINE AT RIVERTON, MINN., SHOWING HYDRAULIC STRIPPING OPERATIONS

## Manganiferous Iron Mining in the Cuyuna District, Minnesota

By P. M. OSTRAND  
Mining Engineer, Crosby, Minn.

*Mines of the Cuyuna district of Minnesota have shipped nearly seven and a half million tons of iron and manganese ore since its opening in 1911. Two bodies, which differ in character of ore, are separated by a narrow strip of barren formation*

*and are known as the North and South ranges. Openpit, milling and caving methods of mining are used. Hydraulic stripping, as instituted at the Rowe mine at Riverton and the Hill Crest at Ironton, has proved successful and economical.*

**T**HE restriction on the export of manganese ores from India, the cutting off of the Russian supplies caused by the blockade of the Black Sea, and the increased demands for manganese in steel manufacture have contributed within the last year or two toward the development of the Cuyuna range, the manganiferous iron ores of which constitute one of the important deposits in this country. Should access to the Brazilian deposits be cut off, the steel industry of the United States would face a serious situation and for immediate

relief would probably have to rely largely on the production of the mines operating on the Cuyuna range.

The Cuyuna iron range of Minnesota embraces an area approximately 65 miles in length, and from one to 10 miles in width and is near the geographical center of the state. This area has locally been divided into two ranges, known as the North range and the South range. A strip of territory three miles wide, in which no iron-bearing formation has yet been found, separates the two ranges. It so happens that the main line of the



Duluth-Brainerd branch of the Northern Pacific RR. follows this strip through the district, and the track has been popularly regarded as the line of division between the ranges. The two ranges, while structurally and geologically similar, differ somewhat in the character of the ore. The North range, comprising an area of approximately 50 square miles, contains nearly all of the productive mines of the district and it is in the Northern part of this area that the important manganese iron ore deposits are found.

#### MAGNETIC SLATES AID PRELIMINARY EXPLORATION

The district has no marked topographic features. The surface is level and is covered by a heavy glacial mantle of sand from 50 to 100 ft. thick, deeply dented in places by lakes, swamps and marshes. No outcrop indicates the mineral-bearing formation, so that prospecting is difficult, although magnetic surveys with dip needle and sun dial have been of assistance, especially on the South range. The orebodies in the district and the majority of the enclosing rocks are not in themselves magnetic, but the association of certain magnetic slates with the iron ore has made magnetic surveys valuable in new ground. In fact, it was the deflection of the compass that caused the engineers of the Northern Pacific Ry., as early as 1883, to classify this area as being underlain by iron-bearing rocks, and this fact perhaps influenced the building of the railroad through the barren strip separating the two ranges. Preliminary drilling in new ground has been and still is largely directed by the results of magnetic surveys. However, the rule has exception, particularly as applied to the deposits on the North range, and no royal road to finding ore by means of magnetic surveys alone has as yet been discovered.

#### MANGANESE DEPOSITED BY DESCENDING SOLUTIONS

The prevailing opinion among geologists seems to be that the area comprising this district was originally a part of an inland sea, and that the iron formation was deposited as a sediment with other associated rocks. Subsequent to the precipitation and deposition of the iron sediments, the rocks of this region were subjected to intense pressure and folding and the various sediments deposited were altered to the slates, schists, ferruginous cherts and other rocks found today by heat and pressure. Following this period of folding came the period of glacial erosion, in which the tops of the anticlines were eroded and carried away, thus exposing the iron formation to weathering and the action of atmospheric waters, which resulted in local concentration of the iron ore. The manganese was originally deposited at the bottom of the inland sea along with the iron. During and subsequent to the folding processes, the manganese salts (through the action of descending atmospheric waters), were dissolved and carried downward through the exposed limbs of the iron formation; other constituents were dissolved and in their place manganese was deposited. The fissures and cleavage planes in the formation and the pore space developed by the leaching out of the silica and other constituents, all of which controlled the circulation of the descending solutions, developed different phases of the manganese replacement that have been fully discussed<sup>1</sup> by E. C. Harder.

The main structural features of this range consist of a series of more or less parallel folds extending in a northeast-southwest direction, in general the same as that of the Lake Superior synclinorium, and probably contemporaneous with and produced by the same forces which caused the distortion of the whole Lake Superior region. The folding and subsequent erosion and concentration resulted in a series of more or less parallel, lense-like and tabular orebodies with their longer dimension parallel to the bedding and dipping at an angle usually of from 60° to 70°. The formation usually dips to the southeast, probably due to overthrust folding, and is surrounded by barren rocks. The orebodies on the North range average over 100 ft. in thickness, and in places are as much as 500 ft., while those on the South range are narrower and do not average over 50 ft. Some of the orebodies extend unbroken for more than a mile along the strike of the iron formation. As a rule the highest degree of concentration is found on the hanging wall side and near the top of the formation, although drill holes have encountered merchantable ore 700 ft. below the base of the glacial drift.

#### PRODUCING MINES INCLUDED IN FIVE BELTS

Seven or eight main belts of iron- and manganese-bearing formation follow an approximate northeast direction through the district. The main producing belts, as defined by the location of operating mines, beginning with the most northerly belt, are five. The first includes the Ferro, Algoma, McKenzie and Ida May mines, all mined for their manganese content only; the second includes Merritt (manganese) and Kennedy (iron) mines. There are breaks in the continuity of this belt. The third belt includes Cuyuna-Mille Lacs, Sultana, Mangan No. 1, Hopkins and the Joan mines, all of which are mined for their manganese content excepting the Hopkins, which is partly iron. In the fourth belt are Mahanomen, Mangan No. 2, Evergreen, North Thompson, Armour No. 1, Armour No. 2, Pennington, Feigh, Hill Crest and Rowe mines. This belt contains both iron and manganese in commercial quantities and most of the ore is sold on a combined basis. The metal-bearing formation continues unbroken along the same strike for more than eight miles and contains the most important ore deposits in the district. Cuyuna-Duluth, Armour No. 2, South Thompson, Meacham and the Croft mines are in the fifth belt, all being mined solely for their iron content. These five belts contain all the producing mines of the North range. In addition, other belts, which in a measure complete the successive limbs of the folds described above, have been partly explored by drilling, but their continuity for any great distance has not been proved. The rocks between the limbs are barren and do not have uniform characteristics. It is possible that the relation between the limbs may be determined from a study of the associated rocks and ore that has thus far escaped the drillmen.

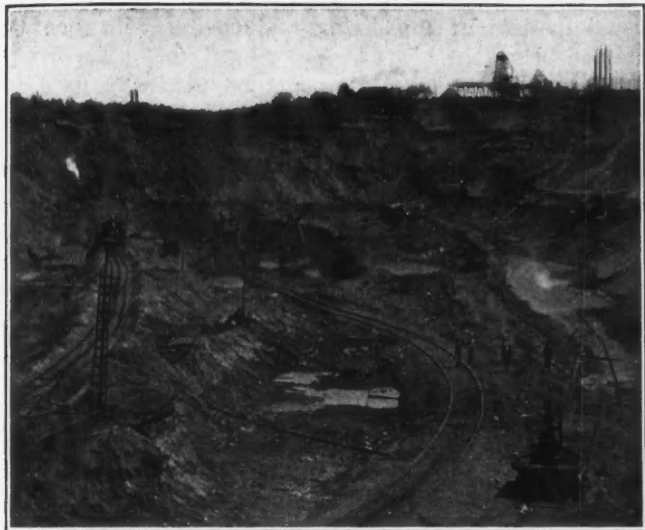
#### MAGNETIC SURVEYS DEFINE EXPLORATORY DRILLING

The unit of exploration is usually 40 acres of land. Previous to exploration, the corners and property lines are established and a dip-needle survey is usually made in the following manner: Beginning at any corner of the property, dip-needle readings are taken at 100-ft. intervals along the property lines surrounding the tract.

<sup>1</sup>Bull. of A. I. M. E., Sept., 1917.



The needle is held in the same manner as a compass until it comes to rest and then turned so that the axis of the bearings of the needle is perpendicular to a vertical plane passing through the magnetic meridian. The points of greatest attraction around the traverse are noted and, bearing in mind that the strike is in a north-



PENNINGTON OPENPIT AT IRONTON, MINN.

east-southwest direction, a line connecting the two points of highest attraction is projected across the tract and stakes are set along this line at 100-ft. intervals. Readings are then taken at 50-ft. intervals on lines passing through the stakes at right angles to the projected line. From the data thus obtained, deductions as to strike, the direction and approximate inclination of the dip may be made, and the drilling operations directed accordingly. A sun-dial compass has been used in connection with the dip needle, but generally the dip needle alone is used. The interpretation of the results of a magnetic survey and the direction of the subsequent drilling call for technical skill as well as considerable local experience.

#### VERTICAL DRILLING MORE RELIABLE THAN INCLINED

Drill holes on the Cuyuna are usually placed on a line at right angles to the strike and across the formation. Inclined drill holes are sometimes made, although vertical bores have been found to be more dependable. Both churn and diamond drills are used and average charges by local drill contractors are \$2.75 per ft. for churn drilling and \$4.25 per ft. for diamond drilling. Drill holes are numbered and, upon completion, their position in the field is substantially marked. During the drilling, samples of the formation are taken at 5-ft. intervals. The situation of the holes as well as the results of the drilling are carefully plotted and preserved as permanent records. Probably 5000 holes, averaging 300 ft. in depth, have been drilled on the Cuyuna, and exploration is still active. The deepest drill hole in the district was bottomed at a vertical depth of 1037 ft. in the formation. This hole is situated on the northwest quarter of the northwest quarter, Sec. 17-46-29, and is a part of the Rowe lease held by the Pittsburgh Steel Ore Company.

Openpit, milling and underground mining systems are used in the district; the method decided upon being

a question of cost and adaptability. In each case, cost of the plant, stripping and other steam-shovel operations, shaft sinking, underground cost of mining, etc., are estimated and the figures compared. In many cases the narrowness of the orebody and the irregularity in the composition of the ore make the use of a steam shovel impracticable, while some of the wider orebodies, originally operated as openpits, will eventually use all three methods. The steam-shovel operations are followed by milling, and this in turn will be succeeded by the regular underground methods. Of the six openpits operating on the Cuyuna range, but one—the Thompson, at Crosby—has as yet reached the milling stage and that operation was begun in the early part of 1917, when the grade of the pit approach became too steep for the economical employment of a locomotive.

#### STEAM-SHOVEL OPERATIONS PRACTICABLE TO 80 FT. BELOW BASE OF STRIPPING

Mining an orebody having a width of not more than 100 ft. and a dip of 70° by steam shovel has its disadvantages. The pit is narrow and track grades to or from the approach have to be developed by switchbacks. The shovel must continue ahead in a straight line until the limits of the mining operations are reached, and all material, rock as well as ore, must be taken as it comes. This makes the problem of grading the ore a



SAND PUMP AT HILL CREST MINE, IRONTON, MINN.

difficult one, so that some of the pits have established and are shipping as many as four or five grades of ore.

The depth to which ore may be mined by steam shovels is limited largely by the track grades developed on the approaches, and the depth of milling operations is controlled largely by the proximity of the overburden, the

pitch of the orebody and by the nature of the hanging wall, which also affects steam-shovel operations. Under usual conditions, 80 ft. below the base of glacial drift is considered a maximum depth for steam-shovel work, with an average of perhaps 60 ft. Milling will further reduce this ore level an average of 60 feet.

Milling is a combination of openpit and underground mining. A shaft, usually well off the orebody, is sunk to a depth below the limit of the proposed milling operations, and a main haulage drift is then run from the shaft to a point at about the center of the orebody, which in this district, owing to the dip, will be near the foot-wall side. A drift cross-cutting the main drift



THOMPSON MILLING PIT ON CUYUNA RANGE

at an angle and parallel to the strike of the orebody is then driven to the limits of the desired operations and raises to the top of the ore, now the surface, are driven at intervals of from 50 to 70 ft. along this crosscut. Well-timbered chutes are constructed at the bottom of these raises and the ore is blasted and broken into the raises or mills from the surface and drawn from the chutes into tram cars, hauled to the shaft and hoisted. Inverted cones of ore will be left between the raises, as the ore is mined into the chutes, and are tapped by another set of raises situated halfway between the first set, and so on until all the ore to a point about 10 ft.

above the roof of the main haulageway has been mined. When conditions limiting the depth of milling operations have been reached, the surface of the pit will probably be leveled off and covered with a layer of poles and boards. The surrounding overburden will then be blasted in on top of this to a depth that will insure safety to subsequent mining operations below. The usual method of top-slicing and caving will then be started below the boards.

The underground mining method generally used in the Cuyuna district is the top-slicing and caving system, which is so well known that a description is scarcely warranted here. However, some features peculiar to this district may be mentioned. Some difficulty has been experienced with sand runs. The sand overburden is usually fine, and when saturated with water forms quicksand, which, having once found an outlet through the caves to the rooms below, is an exceedingly difficult thing to stop. Often a layer of ore four to five feet thick, left in the back of the top sublevels in wet mines, will reduce if not eliminate trouble from sand runs and in the end result in a larger recovery. A mattress of carefully laid poles and lagging on the top sublevels will also help considerably.

#### PORTABLE SAND PUMP INSTALLED AT ROWE MINE

Hydraulic stripping has been successfully used on two openpit properties on this range, namely at the Rowe and the Hill Crest mines. The method was initiated at the Rowe mine in 1913, under the direction of J. Carroll Barr, general manager of the Pittsburgh Steel Ore Co. The light sandy overburden at this property being comparatively free from boulders and hardpan, the proximity of favorable dumping grounds and the availability of water suggested the hydraulic methods finally adopted. Two hydraulic giants were used at the Rowe, each requiring one 10-in. clear-water pipe, one 10-in. two-stage centrifugal pump for the clear water and driven by a 200-hp. motor, one 12-in. discharge-pipe line and one 12-in. two-stage centrifugal pump, used as a sand pump, driven by a 250 hp. motor. The clear-water pump was situated on the lake shore near the inlet of the clear-water pipe, and the sand pump, with its motor, was mounted on a standard flat car so that it could be moved to different points in the pit. Wherever it was desirable to establish a sump, six 4-in. casings were driven from surface to the top of the ore, around the platform of the car and in 10-ft. lengths. The platform was attached to these pipes by clamps. By releasing the clamps the car could be lowered and the distance from the suction to the sump regulated as required, a minimum grade of 4% being maintained between the working face and the sump. The innovation of using a portable flatcar and lowering same by means of casings and clamps, as far as known originated at this mine.

Previous to the installation of the regular hydraulic machinery a unique method of moving dirt was used. A 12-in. pipe line with a 75 hp. steam pump was available at the time, and the pump was installed near the lake and about 1200 ft. of the pipe attached and laid on the rising ground back from the lake shore, the grade of which was slightly over 6%. A furrow was plowed in a straight line from the lake to the outlet of the pipe and the pump started. Water flowing from the



pipe into this furrow eroded and moved 80,000 yd. in a month at a cost of 1.8c. per cubic yard.

Approximately 2,000,000 cu.yd. of overburden was moved at the Rowe mine in three years, at a cost of 6.7c. per cu.yd. The distance between the center of the excavation and the center of the dump was about 1200 ft. and nearly level. The best stripping record was made in June, 1914, when dirt was moved at the rate of 205.2 cu.yd. per hour. The plant was in operation 74% of the 720 hours in the month, the remaining 26% representing the time taken out for Sundays, repairs, etc., and at times the presence of heavy gravel cut down the rate to an average of 64.7 yd. per hour. The total cost of plant was \$34,000, which includes material for repairs bought from time to time. Electric power was purchased at the rate of 1½c. per kilowatt-hour.

The manganiferous orebodies of the district, owing to adverse market conditions in the past and consequently a restricted output, have naturally had a high unit cost per ton, and the irregularity and narrowness of the deposits have contributed toward high exploration and development charges. However, the larger iron mines have a fairly uniform range of costs and the following figures represent an average of amounts paid per ton for underground mining in the district, based on a daily production of 700 to 800 tons of ore and assuming that the orebody contains a million tons or more. A hoisting depth of 250 ft. and a pumping capacity of 1000 gal. of water per minute have been assumed.

COSTS PER TON OF UNDERGROUND MINING ON CUYUNA RANGE

Exploration.....	\$0.07
Slicing or stoping.....	.90
Tramming.....	.08
Hoisting.....	.10
Pumping.....	.15
Supervision and office.....	.10
Insurance.....	.04
Total.....	\$1.44

To the above cost must be added the royalty charge, usually about 50c. per ton removed, and an amortization charge of 15c. per ton. The slicing cost includes timber, powder, tools, compressor charges and labor. The cost of operating the surface plant has been prorated among the items of pumping, hoisting and compressor charges.

In so-called "all-manganese" mines the costs, for the reasons mentioned, are considerably higher. It is probable that the cost in stockpile or on cars at the mine, including all charges, will range from \$3 to \$4 per ton at a property producing 150 tons or more per day.

The cost of stripping an openpit property by steam shovel will range from 15 to 20c. per cu.yd., depending on nature of material encountered, proximity of the dump and grades necessary. Hydraulic stripping when applicable will reduce the cost perhaps 50%. The cost of mining ore by steam shovel, including necessary sub-drainage, maintenance of tracks and all supervision and office charges, will average from 25 to 35c. per ton. Milling costs range between the amounts paid for openpit and underground mining.

ORE RESERVES OF CUYUNA TOTAL 100,000,000 TONS

Over 100,000,000 tons of merchantable ore have been developed in the district to date. The greater part of this reserve is iron ore sold for iron content only, while about 20 million tons is manganiferous iron ore running 4 to 30% in manganese. Two million tons will perhaps

average 20% and the remainder 10 to 12% manganese. These figures are conservative. Should the manganese situation require it, the known reserves of manganiferous ore could be grouped with respect to iron, phosphorus and manganese content, so that not only will present metallurgical requirements be met but a much larger amount of manganese than indicated by the above figures would be available for steel manufacture.

The following figures show the growth of the district since 1911, when the first shipment was made from the Kennedy mine, to date:

CUYUNA SHIPMENTS OF IRON AND MANGANESE ORES, 1911-1917

Year	Tons Shipped
1911.....	147,000
1912.....	305,111
1913.....	733,021
1914.....	859,000
1915.....	1,136,113
1916.....	1,716,218
1917 (estimated).....	2,400,000

The district in 1918 will, in all probability, be a very active one, for the seriousness of the present situation on the Atlantic seems to justify the belief that fewer ships will be used in the manganese trade. Furthermore, should the Government guarantee that the price of manganese will not be regulated downward during the period of the war, a natural rise will result and an unprecedented boom in the exploration and the development of the manganiferous ores of this district may be looked for.

Extralateral Mining Rights

BY A. L. H. STREET\*

A clear and concise pronouncement on the law of extralateral mining rights is handed down in the decision of United States District Judge Dietrich in the Idaho case of Bourne vs. Federal Mining and Smelting Co., 243 *Federal Reporter*, 466.

The opinion recognizes that *prima facie* the owner of a mining claim is the proprietor, not only of the surface but of everything beneath it. An adjoining owner, asserting the right to follow a lode on its dip under the surface of the particular claim, has the burden to prove, by a preponderance of the evidence, facts establishing that right.

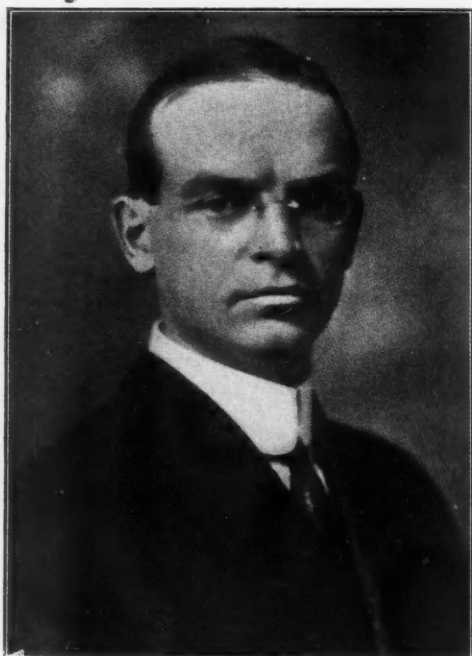
If a lode or vein apexing in plaintiff's claim crossed the southwesterly side line, he was not entitled to pursue the vein beyond the vertical plane of such side line, unless the apex intersected at least one of the end lines.

"Where the apex has in part been disclosed, and, so far as known, its course is parallel to the side lines, it may be inferred that the strike of the hidden portion is substantially the same as that which has been exposed," the court declares. But where a vein crossed the southwesterly side line of plaintiff's claim, and continued in an irregular and northerly course toward the corner at the intersection of the northwesterly end line and the northeasterly side line, being more nearly parallel with the end lines than with the side lines, no presumption could be indulged that it crossed the northwesterly end line, rather than the northeasterly side line.

\*Attorney at law, 829 Security Bldg., Minneapolis, Minn.



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# Irtysh Corporation Developments in Siberia and the Russian Internal Situation

*Following the flooding of its Ridder mine in Siberia, the Irtysh Corporation increased exploration in the Sokolni and opened an important oxidized gold orebody, also some sulphide bodies as rich as those of the Ridder; both the zinc and lead smelteries in the Ekibastous coal basin are now operating. Construction program delayed but conditions are not so bad in the Altai region as in European Russia, of which an interesting review is given. New holding company, Russo-Canadian Development Corporation, formed, with perpetual voting trust, to hold the shares of the Russian companies.*

AT THE meeting of the Irtysh Corporation in London on Dec. 11, 1917, important events relating to the company's mining and smelting operations in Siberia were reviewed by the chairman, Leslie Urquhart, who also discussed Russia's internal situation. Mr. Urquhart has spent much of his life in Russia and his judgment of present conditions is consequently of great interest. His address at the second annual meeting of the shareholders of the Irtysh Corporation is reproduced herewith practically in full and is worthy of careful reading by all who think of Russia as a future mining field. He said:

"The report of the technical committee which accompanies the report and accounts deals fully with the developments and operations at our properties in Siberia, and although I am sure it has been well studied by shareholders it will not be out of place if I comment on the most salient features.

## DISCOVERY OF GOLD ORE IN SOKOLNI MINE

"In the technical committee's report there is a paragraph headed 'Discovery of gold ore in Sokolni.' It is a short paragraph, but of extreme importance; in fact, we have discovered in the Sokolni mine a belt of oxidized gold ore 200 ft. wide and averaging nearly 30 dwt. gold. While our engineers are not yet able to assign any definite length to this orebody, it would certainly seem reasonable to suppose that an orebody 200 ft. wide must extend to considerable length and depth. As a means of visualizing the possibilities of this deposit a rough estimate of the ore above the present tunnel level, which in the report is given as 140 ft. from the surface, represents about 200,000 tons for every 100 ft. of length. You will realize from these few remarks that we have here an orebody of great present value and of great future possibilities. The treatment of this ore presents no metallurgical difficulties.

"The flooding of the Ridder mine, of which you were duly advised, forced us, pending its unwatering, to expedite the development and extraction of ore from the Sokolni mine. The developments at Sokolni have been most satisfactory; our work has proved important new bodies of rich sulphide ore as high grade as the Ridder, and has increased our total ore reserves by at least an-

other 360,000 tons of developed ore, not including any extension in depth, and has found for us the important new gold discovery, and has shown us that the probable value of the Sokolni mine is as great as the Ridder.

## RIDDER MINE CAN BE UNWATERED IN SIX WEEKS

"The unwatering of the Ridder mine can be taken up at any time we may consider that labor and other conditions permit; the mechanical equipment is now on the spot and the mine can be unwatered in at the outside six weeks. I would again mention that the ore being at present extracted from the Sokolni is quite as profitable as Ridder, cheaper to mine and more than sufficient to cover all our mill and smeltery requirements for a long time to come without the help of Ridder. While it would have been quite possible to have continued our drilling campaign to show up still larger reserves of ore, we considered it best, in view of the ample reserves in sight, that our geological department should concentrate its energies on a detailed geological survey of the mineralized belts on the concession. This work has immensely increased the mineral possibilities, as the map which has been sent you clearly shows. Five of the mineralized belts contain the outcrops of a number of deposits similar in character to Ridder. The belts are the same type, but of much greater extent than that on which the Ridder, Sokolni, Krukovsky and our other known mines are placed. The sixth belt is similar in occurrence to the Kyshtim mineralized areas, and contains several gold-bearing iron gossans, which have now been conclusively proved to be the cappings of copper ore deposits.

## ORE RESERVES INCREASED

"You will expect me to say a few words about our ore reserves on the Ridder Concession. As no drilling work has been done for the last year, the reserves of ore at Ridder mine remain unchanged, while there is an increase of 360,000 tons due to the opening of the Sokolni mine. Based on the pre-war prices of metals, the total proved ore reserves now show a profit value of £13,000,000, but no gold ore is included in this estimate from the new Sokolni gold find. I find it difficult to deal satisfactorily with this question on the basis of our proved reserves, as these serve as no measure or criterion of what we can confidently expect from our great mineralized concession. It will require years of diamond-drilling work on our many known deposits alone to give any definite idea of this. In a word, the question of quantities of ore need never trouble us, and the output can be limited only by our ability to handle and smelt it. The remarks I have just made about ore at the Ridder concession apply in the same way to the Ekibastous coal basin, the reserves of coal there being practically unlimited. Summarizing the operations generally which have been described in detail in the technical committee's report, I may say the concentration mill is sufficient for all our requirements for some time to come, and has been giving excellent metallurgical results.

"The Ridder railway, 70 miles in length, is now completed and in operation. The Ekibastous railway has



been further extended to a total length of 90 miles. The fleet and river transport is in the meantime ample for all our requirements. The coal mines are equipped and developed for an output far greater than the output which owing to labor difficulties we obtained this year, and when conditions are again normal there will be no difficulty in increasing this to meet all future requirements.

#### ZINC AND LEAD SMELTING PLANTS IN OPERATION

"There are two furnaces in operation at the zinc plant which have given good metallurgical results; additional furnaces of the same type as are now in operation are in course of construction.

"Since the date of the technical committee's report we have news that the lead smeltery has been started, is working satisfactorily and is producing a valuable output of lead, gold, silver and copper metals. This great self-contained enterprise from the mining of the ore to the final extraction of its metals is now established. The metallurgical processes have all been proved, rail and river transport facilities provided and the mills and smelting works generally fully equipped. We are now working on a commercial scale, only requiring additions to the different plants to attain large outputs and profits. You will realize that to have accomplished these magnificent results during the war required the unselfish devotion to our interests of everybody concerned in the management of our properties. Since the revolution the work of our directors, managers and staff in Russia has been carried on very often under conditions of danger; labor difficulties, owing to the political ferment which has demoralized the discipline of the workmen, have created endless troubles which our managers had to overcome. Notwithstanding these conditions we are all proud to say that we have not had a single day's stoppage at any of our works. I feel that we owe a deep debt of gratitude to our president in Russia, Baron Meller-Zakomelsky, and the directors and managers of our companies, and I am sure that this meeting will express its appreciation of their unselfish devotion.

#### CONSTRUCTION PROGRAM AND GREATER EXPLOITATION RESTRICTED BY THE UNSETTLED CONDITIONS

"The political and economical chaos of the last eight months in European Russia has naturally seriously affected and delayed our program of construction work and the exploitation of the properties on the larger scale anticipated, but although the output at Ridder and Ekibastous is still small, the income derived is considerable and is being applied for the purposes of our general construction program. Notwithstanding the difficulties we had to contend with, it will be some satisfaction to you to learn that the estimated recoverable values in metals and concentrates in stock at all points and mostly at the smeltery approximate roughly 20,000,000 rubles at present market prices. Further, we have provided and transported all the fuel requirements of the Ridder mines and railway until the middle of 1918.

"The large stocks of concentrates at the smelting works and the supplying of all fuel and other requirements at the mines for operations on a large scale have necessarily required the provision of considerable working capital, but this sound and satisfactory position insures a large continuous and increasing revenue to the Russian companies as soon as conditions permit of nor-

mal work. But for the present events in Russia we should today be making large profits, which could have been employed in further construction work and in adding to the larger working capital required for the increased operations of our business. Owing to the restricted operations of the zinc smeltery at Ekibastous and the delay in starting the lead plant the receipts from the sale of metals have been barely sufficient to cover all current working expenses, and while we have strengthened the business by continuing the construction program and preparing and carrying all stocks necessary for operations on a large scale, this has required financial assistance from outside which, if the smelting plants had been working up to full capacity, the realization of the metal values in the concentrates we are carrying would easily have provided.

#### FINANCING THROUGH RUSSIAN BANKS

"In times like these your directors were very loath to appeal to the shareholders to support further the company, and we decided to make every effort to carry on in these difficult times and to bring the company to the profit-earning stage without asking the shareholders to take the burden on themselves, and I am glad to say we have succeeded in doing this. I informed you last year that a long credit of 1,800,000 rubles had been opened to the Russian companies by an important Russian bank. For some time past your directors have felt that the internal financial position in Russia was such that the foreign rate of ruble exchange was bound to go still further against Russia and that therefore we should gain on the exchange if we in the meantime financed in Russia instead of remitting moneys from here. Immediately on my arrival at Petrograd in the spring of this year favorable arrangements were entered into whereby the credit of 1,800,000 rubles was increased to 5,000,000 rubles. I am pleased to say that our enterprise is held in such high esteem in Russian business circles that we had no difficulty whatever in arranging this long-term credit and, further, should it be necessary, we have obtained assurances from more than one Russian bank that this credit can be still further increased.

"This is not surprising when one considers the vast metal resources of the Ridder and Kirgiz companies and the fact that whatever the perturbations the politico-economical events in Russia may bring about, the zinc, lead, copper, gold and silver metals which these companies produce have a world's market and standard values. The shortage of production generally and the enormous world's requirements in these metals both now and after the war naturally make the future prosperity of these enterprises independent of the fluctuations which may affect producers of other commodities. Now, this credit sounds like a very large sum, as at pre-war exchange it would have amounted to more than £500,000. Had we remitted the 5,000,000 rubles at the time we required it in Russia this would have cost us about £335,000. I am glad to say that by financing in Russia, as we have done, this credit will require only about £130,000 to cover—a saving to the company of over £200,000. It was my intention to have given you a financial résumé of the operations of the Russian companies, but unfortunately the disorganization in Russia has prevented the completion of the necessary statements and, therefore, although I can give you no actual figures, I



can only repeat that the financial arrangements made in Russia provide with a margin for all requirements which can be reasonably foreseen at present, and which make allowance for the present labor situation at Ridder and Ekibastous. It is probable that with the lead smelter now in operation and the large additional revenue that this will now bring, our financial position will be henceforward very sound and will be covered by revenue. In times like these, however, it is best to be prepared for the unexpected. A highly satisfactory arrangement has been made with the Russo-Canadian Development Corporation to hold the shares of the Russian operating companies, British control being assured through a perpetual voting trust.

#### POLITICAL AND ECONOMIC DISTURBANCES IN RUSSIA

"As the Irtysh properties are far removed from the centers of chaos and anarchy in Russia, 2000 miles at least from Petrograd, these events have not affected us as seriously as other industrial enterprises in the country. Nevertheless, a reflex of these anarchist influences does reach and seriously affects the discipline of the Russian workmen, the relations of these workmen and the management, and the normal operation of our business. I would mention that at the Kirgiz properties the majority of the men are local Kirgiz Mussulmans, who are peaceful, and have caused no trouble of any kind.

"Immediately after the fall of the late Czar's government, the Socialists and extremists formed at Petrograd what is known as the Soviet, or Council of Workmen's and Soldiers' Delegates, and hundreds of local Soviets subordinate to Petrograd were formed all over the country. These Soviets were supposed to represent the working classes of the towns and the soldiers; these, being simple, ignorant men, were naturally influenced and controlled by the executive committees of the Soviets, composed of wild idealists, internationalists, pacifists, anarchists and the scum and pro-German traitors who came with them. At first the moderate Socialists and pro-Russians were in control, but extremist influences continued to gain ground, until to-day the Bolsheviks, a curious jumble of conflicting elements, ranging from wild idealism to German intrigue and reactionary monarchism, not only control the Soviets, but have proclaimed themselves the government of the country. The Soviets, by preaching a furious doctrine of class hatred and plunder among the working classes, and being liberally supplied with German money, carried on an active peace and fraternization propaganda among the ignorant soldiers at the rear and front. The industrial workers and the soldiers were quickly demoralized, and as a natural result there is chaos in the country today.

#### RUSSIAN POPULACE EASILY MISLED

"Political freedom was suddenly granted to 200,000,000 people, the great majority of whom were ignorant and illiterate, politically undeveloped, used for generations to a parental government with the Czar and Church to keep alive the consciousness of their spiritual being, their understanding of right and wrong, the ideals that kept them together as a people, the symbols and emblems of their nationhood. The ideals which they understood were replaced by sublime doctrines, by Socialist theories, by rotten international trash which

killed their love of country and pride of race, by the preaching of class hatred and plunder, by peace and fraternization propaganda, by German money and alcohol, by the mad ravings of demagogues and fools. The untutored Russians, full of mystical theories, with childish trusting simplicity, believed every lie they were told, every lying promise made; their childish ignorance made them the easy victims of the adventurers, demagogues and traitors.

#### BOLSHEVIK GOVERNMENT CANNOT LAST

"The Russian democracy is not ready for a socialistic or republican self-government; the proletariat and peasants are too ignorant for independent political life. Personal rule is what they have been used to, and a paternal government in the form probably of a conservative constitutional monarchy is what they understand, require and must have, but an anarchist government had to come to drive that simple truth home to them. They have tried liberty and misconstrued it into license; they have suffered too much and have already had enough; they are longing for that law and order which the proletariat of the towns, the ignorant demagogues and traitors who have jumped power cannot and will never give them. The present anarchist or Bolshevik government is artificial and cannot last, and these absurd fanatics and traitors obtained control of the technical equipment of the country, the railroads, posts and telegraphs, by pandering to the lower instincts of the town and industrial workers.

"But these people do not represent 10% of the population. The real Russia is the 85% living on the land, the peasant proprietor, the peasant communities who own communal lands, their own horses, cattle, food; they have a stake in the country to lose, and when they at last understand, as they are rapidly realizing to-day, the real issues preached by the Bolsheviks, they will have nothing to do with socialistic and anarchist theories. I am sure that every shareholder present, and indeed every Briton throughout the world, will have seen with the utmost pleasure that the British government had the insight and the courage to break off all relations with these opera-bouffe usurpers. The town, railway and industrial workers, thanks to the incitements of their anarchist leaders to work as little as possible for as much money as possible, have brought about the breakdown of the railways, and as a result hundreds of thousands of factory workers are now out of work in Petrograd and other large towns, as there is no fuel for the works. The proletariat have paper money in abundance, but they cannot buy food, as this has to come from the interior and Siberia, and the railways cannot supply the towns. Famine is staring them in the face; the proletariat is being forced by Nature to see reason at last. The demoralized, undisciplined army of 12,000,000 men is mainly drawn from the peasant classes, and while many are loyal to their country and may remain at the front, many millions, mostly infantry, committing excesses as they desert, are returning to their villages for food, but they will there eventually come under the sobering influence of their elders and women folk at home.

"Today the governing issue in the settlement of the terrible crisis that Russia is going through is the question of food. In the districts where food is abundant,

as in the Ukraine, the Don, the country of the Cossacks, the Caucasus, the Urals and Siberia, where all the properties of this group of companies are situated, there is comparative law and order. I do not pretend that there are not individual excesses even there, but these are mainly due to deserting soldiery. You will already have noticed in the papers that these districts, representing possibly 80% of the former Russian Empire, refuse to recognize the usurping Bolshevik government at Petrograd and all it stands for. They refuse to supply the Bolsheviks with food for fear it falls into the hands of the Germans; they are organizing a determined opposition, and in the end they must win, because they have Nature, the great majority of the people, common sense and food on their side.

#### THIS WINTER WILL BRING RUSSIA TO ITS SENSES

"The elections to the Constituent Assembly are gradually revealing the will of the nation. The latest election returns show that the Bolsheviks have 2,700,000 votes, but the Cadets, representing the intelligent bourgeois elements, and the revolutionary Socialists, who are both opposed to a German peace, have each obtained over 2,200,000 votes, or together 4,500,000 votes, thus considerably exceeding the votes cast for the Bolsheviks. The action of the latter is characteristically despotic; they threaten to use force and other unfair means to suppress the meeting of the Assembly representing the electors of the country, but it is doubtful whether they will really venture the attempt. If they do, the reaction against them will be the greater and quicker; they can never go against the will of the nation. The Bolsheviks are on the point of collapse; Russia is rising again, the country is coming back to common sense, and the sufferings of the deluded masses this winter will finally complete their downfall and that of all other extremist elements. To my mind, this is certain and bound to take place very soon.

#### DIFFICULTIES WITH THE MINERS AVOIDED BY FORE-HANDED ACCUMMULATION OF FOOD

"In the earlier days of the revolution a number of our employees, both at Ridder and Kirgiz, were arrested and driven off the properties by the local Soviet simply because they did not please the extremist leaders of the men. The majority of our workmen are moderate in their views and see the unreason of the Soviets, but many are terrorized and submissive to the agitators, who endeavored by every means in their power to usurp the authority of the managers. The managers have naturally had great difficulties to contend with, but we are and have been fortunately in a position to prevent any further excesses, for we provide our people with food and they realize that if they force us to close down they will starve. The internal purchasing value of the ruble to-day and the wages paid are entirely dependent on the price of food. Wheat, meat, butter and other essential foods are plentiful in the districts of Siberia adjacent to the Ridder and Kirgiz properties. The Russian companies, by purchasing large quantities ahead, can do so at comparatively low prices, and by selling from its own stores at cost prices to the workmen keep down the price of essential food commodities. By this common-sense policy wages have been kept within reasonable limits.

"During the four months of this summer, when I was in Petrograd on the affairs of these companies, I had frequent opportunity of meeting and discussing political and economical questions directly affecting our enterprises in Russia both with delegations of our workmen and with the ministries concerned. The extreme Socialist officials of the new ministry for labor at Petrograd, and Skobeleff, a minister appointed by Kerensky, were, if anything, more extreme in their demands than the workmen themselves, and I can say that this ministry during Kerensky's government, instead of helping to moderate the appetites of the men, incited them to increase further their demands. But all these are small matters; they have naturally given us great cause for anxiety and unlimited thankless work, but they will be very much in the past when the politico-economic happenings in European Russia today will by a simple process of nature bring about stable government in the country, and I feel sure that ere this winter is past Russia will be herself again.

#### SANER ELEMENTS SLOWLY REGAINING INFLUENCE

"The peace question is much broader and more fundamental than that of the passing Bolshevik authority. The Russian people, the ignorant masses with famine staring them in the face amidst all the anarchy and confusion, an army demoralized by the promise of peace negotiations, are longing for peace, but in my judgment they are not going to agree to peace on Germany's terms. At the same time the prostration of Russia is a heavy blow for the Allies, but it would be a mistake if we allowed our feelings to endanger Anglo-Russian relations. The intelligent Russian classes are suffering the deepest feelings of humiliation and shame. The officers in the army are martyrs to the Allied cause. But they are powerless in numbers to prevent what is happening. There are still many brave and loyal soldiers who can be depended upon when the opportunity comes to fight for the honor of their country and give their lives as they have done before.

"The saner elements in the population are slowly regaining influence, and if, for the moment, Russia is out of the war, she will still continue to contain considerable German forces on her front, and possibly later may be able to render considerable assistance. There is a great deal going on in the real Russia, but it cannot be told to the world just yet, because the Bolsheviks at Petrograd are at the end of the telegraph lines. But there is no reason to be pessimistic. Nature must and is reasserting herself. I have lived in Russia for the best part of my life, and I know and trust the real Russian people, and I have a certainty of conviction that Russia, after all her humiliation, will rise again; her destiny marks her out for a great future; her natural resources, her immense population are security for this. If we can show the Russian people that we sympathize and understand their terrible difficulties, if for the sake of all we have suffered and sacrificed together in the common cause we continue our moral support, we shall be repaid a thousandfold by a people who, though temporarily misguided, are generous and kind-hearted. If we judge them harshly we shall be only playing into the hands of our enemies.

"There is a matter which I understand has caused anxiety to some shareholders, and which it may be well



if I mention. That is the question of the titles to the properties of the Ridder and Kirgiz companies. The Ridder titles, as you know, were granted to us by the late Czar's Cabinet on a lease of 76 years and on a low royalty basis. The Kirgiz coal and other properties are held directly from the state until complete exhaustion, under the usual mining leases and terms. When the Czar abdicated all crown lands became the property of the state—in other words, they were nationalized. The benefits and obligations of the Ridder contract, therefore, reverted to the state. No change was necessary in the lease of the Kirgiz properties, as these properties already belonged to the state. It will be evident that as all these properties already belong to the state they cannot be subjected to further nationalization. The Bolsheviks, or anarchists, whose power is passing, as Russia will have none of them, talk of expropriation in favor of the state. In our case there is nothing to expropriate except the leases. The properties themselves are not yet fully developed and equipped, and require considerable working capital, and besides capital special expert technical knowledge to operate. Neither of these conditions, even if we take them seriously, are the Bolsheviks, or anarchists, able to fulfill. As a matter of fact, by doing this they would undoubtedly lose a source of revenue to the government in the royalty the company is at present paying.

NEGATION OF PROPERTY RIGHTS IMPRACTICABLE

"Apart from this, however, the negation of all property right is the negation of statehood, and to my mind is inadmissible, as history has never shown us such a precedent. Even the most savage tribes in the world recognize the right of the person and of property as necessary for their existence. The whole Russian industry has been developed by foreign capital and enterprise, and Russia requires foreign capital to develop her unlimited natural resources. How is she going to get this if she turns herself into a robber state? It is more especially absurd, therefore, to expect that Russia, a country undeveloped, with few industries, a population of 200,000,000, practically untutored and politically undeveloped, 70% of whom at least are illiterate, is in a condition fit for socialist self-government and the carrying into effect of extreme socialistic measures. What is there to socialize? What is there to expropriate? Of the population, as I have already mentioned, less than 10% are factory workers, 85% live on the land, and these have a stake in the country to lose. Only 10% are large landowners in European Russia, while Siberia is entirely owned by the state. The state cannot discriminate, and therefore legislation must cover everybody. If, therefore, our properties are expropriated, then the whole of Russia must be expropriated, which is an absurdity. Nationalization? But our properties already belong to the state. Any way you look at it I really cannot see that any change can be made in the titles to our properties when a stable government is established and these absurd anarchists and traitors are put in their right place.

"I now come to deal with the paragraph in our report which runs as follows: 'The urgent necessity for the adoption of prompt measures to uphold and safeguard British interests in Russian mining undertakings which British enterprise discovered and British capital has

developed has been so forcibly impressed on your directors that they recently made arrangements which they believe will secure the object desired. The nature of these arrangements will be explained by the chairman at the ensuing meeting.' I ought to say that exactly similar arrangements have been made by each of three companies—namely, this corporation, the Kyshtim Corporation and the Tanalyk—all of which, as you know, are in many respects allied. For several months past this matter has caused us great anxiety; we became aware of attempts in more than one quarter to purchase blocks of shares in some of the group of companies I have mentioned, in order to acquire control and apparently to substitute foreign for British influence as the determining factor in the policy and administration of our Russian enterprises in which so large an amount of British capital has been invested. It is interesting to observe that only last week the *Frankfurter Zeitung* had leading articles (Nov. 23 and Nov. 26) on the value to Germany of our properties.

The Coronado Incline Top-Slicing Method

A description of the incline top-slicing method devised and adopted by the Arizona Copper Co. at its Coronado mine, in the Morenci-Metcalf district, Arizona, was published in the *Journal* of Apr. 7, 1917. This method has been in successful operation for over a year as indicated by the accompanying tabulated comparison<sup>1</sup> of costs between the incline and the flat top-slicing methods.

COMPARISON SHOWING SLICING STOPE AVERAGES, GIVING COSTS PER TON DELIVERED TO HAULAGE CRUTES

1	2	3	4	5	6	7	8	
Month	Ton-nage	Tons per Man	Labor Cost	Material Cost	Total Cost	Average Adjusted Labor Cost	Total Adjusted Cost	Remarks
1916								
June	12,295	4.90	0.790	0.272	1.060	0.872	1.144	Flat slicing.
July	13,355	4.38	0.835	0.325	1.160	0.975	1.300	Flat slicing.
Aug.	13,934	4.20	0.808	0.299	1.107	1.017	1.316	First incline slices tried out.
Sept.	11,901	3.98	0.943	0.381	1.324	1.073	1.454	Going through change of system from flat to incline.
Oct.	13,270	5.04	0.785	0.341	1.126	0.848	1.189	Going through change of system from flat to incline.
Nov.	9,580	6.58	0.689	0.347	1.036	0.649	0.996	Going through change of system from flat to incline.
Dec.	12,038	7.16	0.659	0.298	0.957	0.596	0.894	Going through change of system from flat to incline.
1917								
Jan.	13,629	8.10	0.672	0.294	0.966	0.527	0.821	Going through change of system from flat to incline.
Feb.	10,367	7.60	0.569	0.309	0.878	0.562	0.871	Change of system completed on all stopes.
Mar.	13,072	9.30	0.647	0.235	0.882	0.459	0.694	Incline slicing entirely.
Apr.	13,141	11.20	0.502	0.280	0.782	0.381	0.661	Incline slicing entirely.
May	15,937	11.20	0.445	0.305	0.750	0.381	0.686	Incline slicing entirely.

Column 4, labor cost, shows actual cost at is occurs monthly. Owing to the sliding scale of wages, its fluctuations do not do justice to the comparison.

Column 7, average adjusted labor cost, shows comparison of labor cost if the same rate were used over the entire period. In this case the average figures out to be \$4.27 per day. Therefore this column shows the difference in cost on that basis.

Column 8, total adjusted cost, shows total of columns 5 and 7, giving average adjusted labor cost plus material cost.

<sup>1</sup> Excerpt from an article on the "Incline Top-Slicing Method," by W. G. Scott to be presented at the February meeting of the A. I. M. E.



## Zinc Ores of the Joplin District\*

The ores of the Joplin district of southwest Missouri and adjoining areas of Oklahoma and Kansas carry an almost uniformly high metal content of both lead and zinc. As they will eventually be exhausted, it is expedient to ascertain the conditions under which ores of this character were deposited in the form in which they occur, in order to simplify the search for similar deposits in other regions. Studies of the ore deposits by Siebenthal,<sup>1</sup> show that these ores of zinc and lead were probably deposited in the present geological epoch. Siebenthal's hypothesis assumes that artesian waters of alkaline composition, charged with  $H_2CO_3$ ,  $Si(OH)_4$  and  $H_2S$ , dissolved metallic sulphides in the Cambrian and Ordovician strata and carried them westward to regions where the absence of impervious covering of Chattanooga shale and the presence of fissures enabled the solution to rise. At points where the diminution to pressure permitted the gases,  $H_2S$  and  $CO_2$ , to be released, the dissolved silica precipitated as a gel and the sulphides slowly crystallized out.

In the vicinity of Joplin the Duenweg-Oronogo ore channel assumes the form of a nearly vertical fissure three or four feet wide, closed, though perhaps not

casite, although orthorhombic instead of isometric, gives fragments sufficiently near to being roughly spherical to answer for practical purposes in concentration. The chert and jasperoid-flint gangue, more than 90% of the "mine dirt" in the sheet-ground mines, splits up into conchoidal splinters and flakes that facilitate a rapid and complete separation of the ore.

The relative content in zinc, cadmium, copper, lead and iron of various zinc concentrates from the Joplin district is shown in the accompanying table. Analysis of one sample of rich crude ore or "mine dirt" is also given.

Prof. Waring's paper contains an interesting comparison of the analyses of zinc concentrates and of flue dust from the calcination of Webb City and Cartersville ore, the latter showing an increase in the cadmium-zinc ratio to 15 times that of the original ore. The conversion of 95.4% of the cadmium from  $CdS$  into soluble  $CdSO_4$  suggests that the extraction of the cadmium from such material should be made by hot water, followed by cementation upon zinc, instead of returning the flue dust to the calcining furnace.

A summary shows the highest, lowest and average assays of 426 shipments of zinc- and lead-ore concentrates from 34 principal mines in the Joplin district (including seven Oklahoma mines) during the first quarter of 1916.

REPRESENTATIVE ANALYSES OF ZINC ORE CONCENTRATES OF THE JOPLIN DISTRICT

Mine	Locality	Description	Zinc %	Cadmium %	Copper %	Lead %	Iron %
Standard	Fortune, Mo.	Rosin jack	61.97	0.436	0.133	0.815	0.55
Big Six	Aurora, Mo.	White jack	56.75	0.018	0.004	None	1.88
Ayres and Messick	Stratford, Mo.	Lead gray, pebble jack	64.05	0.841	0.015	0.625	0.80
Hudson	Pleasant Valley, Mo.	Ruby red, pebble jack	62.05	0.322	0.030	None	0.61
Jack Rose	Alba, Mo.	Yellow blende	54.70	0.225	.....	1.025	1.36
Sphinx	Neck City, Mo.	Yellow blende	65.77	0.135	0.077	None	0.55
Big Circle	Oronogo, Mo.	Yellow blende	56.90	0.110	Trace	1.510	1.64
Welton	Cartersville-Prosperity	Dark brown, rosin blende	57.40	0.410	0.036	1.340	3.05
Maude B.	Webb City, Mo.	Rosin jack	55.70	0.227	Trace	Trace	4.90
Yellow Dog	Webb City, Mo.	Rosin jack	57.95	0.710	.....	1.620	1.60
Yellow Dog	Webb City, Mo.	Crude ore	12.78	0.170	.....	0.293	1.90

everywhere, by ribbons or upright layers of jasperoid flint. The formation consisted normally of thin bands of alternating chert and limestone, but the limestone deposits have been replaced by sulphides, and in places by calcite and jasperoid, on each side of the fissure for distances varying from several hundred feet to half a mile or more. The wide extensions of the ore-bearing ground appear to coincide with oblique cross-fractures, some of which show more or less displacement. The main fissure of the ore channel is well defined in the lower workings of the Oronogo Mutual mine, and in the Oronogo Circle mine it is visible almost to the surface. The first deposits mined in the district were of the open-ground or soft-ground variety, and were undoubtedly outlets of the artesian mineral solutions. They were filled with irregular deposits of blende and galena and other minerals in a gangue of brecciated chert associated with clay and fragmentary debris resulting from the tumbling in of surface strata.

Conditions differ in details in other portions of the region, but the hypothesis of probable origin applies to all. The sulphides in the deposits are hard and crystalline. When comminuted, as in the process of milling, each minute fragment remains approximately an isometric crystal; galena as a cube, sphalerite a hextetrahedron, and chalcopyrite a perfect tetrahedron. Mar-

Supplementary analyses are also given, in more or less detail, of typical calamine, blende, lead ores, mine water and leach water from tailings dumps. The mine water is typical of certain areas about Galena, Joplin and the Cartersville districts and shows, in parts per million: Free  $H_2SO_4$ , 29.4;  $FeSO_4$ , 157.4;  $Fe_2(SO_4)_3$ , 179;  $ZnSO_4$ , 2840.5;  $Pb$ , 1.9;  $Cd$ , 5.25;  $Cu$ , 0.3;  $Mn$ , 24.5;  $Ni$  and  $Co$ , 2.1; and  $CaSO_4$ , saturated. Mine waters of other areas are alkaline.

At the smeltery of the Bartlesville Zinc Co., in Oklahoma, an alloy of gallium and indium oozed out upon the drusy surfaces of cakes of lead residuum that had been taken out of retorts used for the redistillation of crude spelter.<sup>2</sup> Later the presence of germanium in Joplin ores was proved by G. H. Buchanan.<sup>3</sup> Still more recently, the presence of thallium in zinc ores of the Webb City-Cartersville district has been noted.<sup>4</sup> Practical methods for the extraction of rare metals from zinc-blende ores are lacking, but it is suggested that little difficulty would be met in separating the cadmium, thallium and indium, along with copper, etc., in metallic form, from the leach liquors of the electrolytic process by cementation upon granulated spelter. It is thought that gallium and germanium would concentrate in the electrolyte until their precipitation could be effected, by a method yet to be devised.

\*Abstract from a paper by W. George Waring, presented at the St. Louis meeting of the American Institute of Mining Engineers, October, 1917.

<sup>1</sup>Origin of the Zinc and Lead Deposits of the Joplin Region," Bull. 606, U. S. Geol. Surv., 1915.

<sup>2</sup>"Recovery of Gallium from Spelter in the United States," "Jour. Ind. and Eng. Chem.," 8, 225, 1916.

<sup>3</sup>"The Occurrence of Germanium in Zinc Materials," "Jour. Ind. and Eng. Chem.," 8, 585, 1916.

<sup>4</sup>"Revista real academia cientifica," Madrid, 8, 49-63.

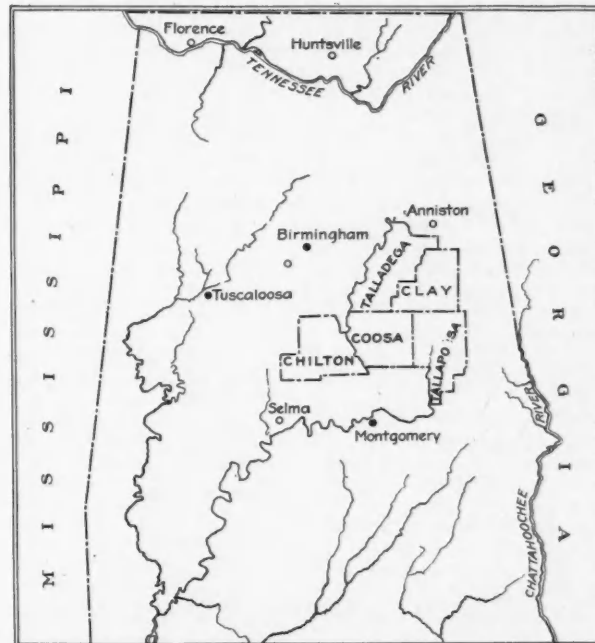
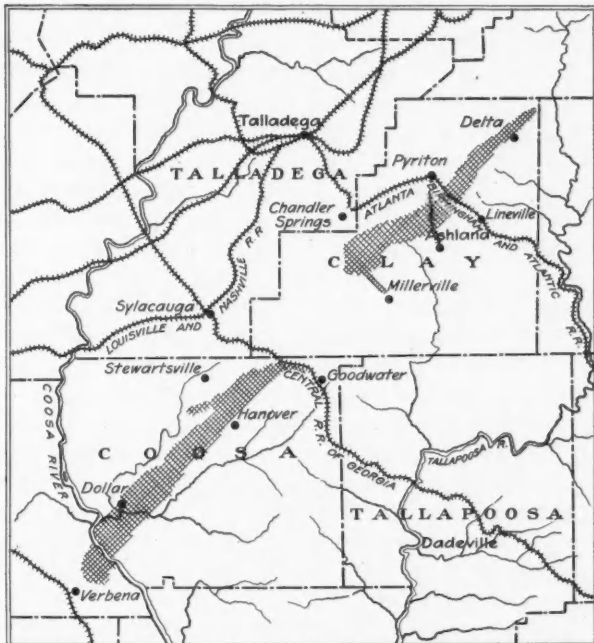
## Graphite Industry in Alabama

The larger number of Alabama graphite plants are situated in the Ashland district of Clay County, but the field of operation is being rapidly widened, and plants are in operation in both Coosa and Chilton Counties. Prospecting is also being carried on in Cleburne County.

Efforts are being made to compile figures on production of graphite for 1918, the individual producers in Alabama having been asked to estimate their output, as this will be of unusual importance owing to the bearing it will have on the policy of the War Trade Board with regard to imports from Ceylon and Madagascar. Producers in Alabama are displeased with the action of the War Trade Board in allowing large importations, while the output of their mines has had to be curtailed for this reason. Despite the shortage of ocean tonnage, ships have been provided to bring graphite half way around the globe, while orders placed within 300 miles

The country rock of the district is a metamorphosed mica schist with igneous intrusions forming long dikes. A green-colored schist, called the Hillabee by the Alabama Geological Survey, borders the mica schist on the west for the entire length of the area. The character of the graphite beds is widely different, being continuous in some instances, and in other cases extensive changes occur in short distances along the strike. Sometimes a bed may be capable of being worked for a width of 100 ft., but more commonly for less than 60 ft. The occurrences of the beds themselves are not regular, but certain well-defined groups may be recognized. The origin of the deposits is assumed to be sedimentary, the carbonaceous material being metamorphosed into the flake variety of graphite. The ground averages usually less than 5%, but the size and grade of the flake also determine the possibility of profitable extraction.

Simple openpits provide an inexpensive method, loosening the rock with occasional shots if necessary, but



SKETCH MAPS SHOWING GRAPHITE AREA NOW UNDER EXPLOITATION IN ALABAMA

of the consuming plant could not be delivered owing to railroad embargoes. These and other complaints made by the Graphite Producers' Association of Alabama are to be called to the attention of Congress.

### AREAS OF GRAPHITE DEPOSITS

The area of known important flake-graphite deposits includes two belts. The belt to the northeast, from the northeastern part of Clay County, extends southwesterly about 27 miles past Delta and Ashland, to Millerville. The flake quality at this point is absent, especially between Millerville and Goodwater. The second belt begins at Goodwater, in Coosa County, and for a short distance has a northwest direction which gradually changes to the southwest through Coosa County and extends about five miles farther into Chilton County. This southwest division from Goodwater to where the sands and clays of the cretaceous formation cover the graphitic rocks is approximately 33 miles long. The outcropping of the deposits, not considering the 10-mile strip between Millerville and Goodwater, is about 60 miles, with a maximum width of four miles.

the rock can be barred down or loosened with pick and shovel in most cases. Weathered rock is much softer and is easier to work. This condition sometimes penetrates to a depth of 100 ft. as a maximum, and for other cases a minimum of 25 ft. is found. The weathered rock usually produces better concentrates, as less crushing is necessary and the size of the flake is less reduced.

### REDUCTION OF THE ORE

This phase of operations is still in its infancy, the several processes are new and subject to considerable further experimentation. The object is to produce the largest amount of No. 1 flake with as little dust as possible. Most of the mills are using flotation without oil, while the dry method is being introduced and has proved successful in different plants. A combination of both processes may be adopted. At present there are hardly any plants that are identical in concentration practices. The Ceylon Graphite Co., in Coosa County, is using the oil-flotation method with success, while the Flaketown Graphite Co., in Chilton County, is using the dry method, including a Huff electrostatic machine.



The ordinary wet method consists briefly in crushing in a gyratory crusher, followed by finer crushing with intermediate screening if found advantageous. After being put through the drier, another crushing is made and the material is then subjected to water-flotation separation, sometimes after having had a preliminary pneumatic separation.

The following is a current list of the graphite companies in the state, alphabetically arranged, showing production and other details of operation, as compiled by W. F. Prouty, of the Geological Survey of Alabama.

#### GRAPHITE COMPANIES IN ALABAMA

	Main Office Address	Shipping Point	Capacity per 10-Hr.	Date of Beginning Operations
Acme	Ashland	Ashland	200	Oct. 1, 1917.
Alabama No. 1	Ashland	Ashland	100	About 1910.
Alabama No. 2	Ashland	Ashland	40	Jan., 1917.
Alabama No. 3	Ashland	Ashland	400	(d)
Allen, C. B.	Ashland	Ashland	100	Sept. 15, 1917.
American	Ashland	Ashland	150	July 1, 1917.
Ashland Graphite Co.	Ashland	(c)	(c)	Incorporated Nov. or Dec., 1917.
Atlas	Ashland	Ashland	100	Oct. 1, 1917.
Axton-Noe	Ashland	Ashland	150	July 1, 1917.
Birmingham	Pyriton	Pyriton	(a) 100	Beginning to build.
Black Diamond	Ashland	Ashland	100	Have not begun construction.
Banner	Lineville	Graphite	(a) 100	Have not begun construction.
Carbon Mountain	Lineville	Graphite	100	Beginning construction.
Ceylon	Goodwater or Sylacauga	Parkdale	125	Feb., 1917.
Consolidated	Lineville	Graphite	100	Have not begun construction.
Crucible Flake	Ashland	Ashland	100	Oct., 1917.
Clay County	Ashland	Plant on R.R. near Hassell Gap	100	Mar., 1916.
Continental	Lineville	Graphite	(a) 100	Have not begun construction.
Central	Lineville	Graphite	(a) 100	Have not begun construction.
Crystalline Flake Graphite Co.	Birmingham	(c)	(c)	Incorporated Nov., 1917.
Coosa Carbon Co.	Birmingham	(c)	(c)	Incorporated Nov., 1917.
Dixie	Ashland	Ashland	(a) 100	Have not begun construction.
Enterprise	Chandler Sp.	Weathers Station	100	About Nov. 1, 1917.
Eagle	Ashland	Ashland	150	June 15, 1917.
Empire	Ashland	Ashland	100	Beginning construction.
Fixico	Montgomery	Mountain Creek	(b)	Have not begun construction.
Flaketown	Montgomery	Mountain Creek	120	Have been running 10 years or more.
Goodwater	Goodwater	Goodwater	150	July 1, 1917.
Graphite Co. of America	Goodwater	Goodwater	300	Started building.
Griesemer	Ashland	Ashland	400	Aug. 2, 1917.
Graphite Mills, Inc.	Ashland	Ashland	200	Have not begun construction.
Great Southern	Lineville	Graphite	100	Oct. 15, 1917.
Gulf States	Ashland	Ashland	100	Nov. 1, 1917.
Hood-Graves	Ashland	Ashland	100	Oct. 1, 1917.
India Graphite Co.	Birmingham	(c)	(c)	Incorporated Nov., 1917.
Jennings No. 1	Ashland	Hassell Gap	100	Two years.
Jennings No. 2	Ashland	Hassell Gap	100	July, 1917.
Keystone Co.	Ashland	(c)	150	Incorporated Oct., 1917.
King	Ashland	Hassell Gap	100	Oct., 1917.
Leeroy Graphite and Mining Co.	Birmingham	Hollins	300	Incorporated Oct., 1917.
Lineville	Lineville	Graphite	100	May, 1917.
May Bros	Ashland	Ashland	400	Oct. 1, 1917.
Monitor	Ashland	Hassell Gap	100	Sept. 1, 1917.
National	Ashland	Ashland	100	Aug. 2, 1917.
Norway Graphite Milling Co.	Chandler Springs	Weathers Station	100	Under construction.
Orleans Flake	Lineville	Graphite	(a) 100	Under construction.
Peerless	Lineville	Graphite	100	July, 1917.
Pocahontas	Ashland	(c)	200	Incorporated Nov., 1917.
Pure Graphite Co.	Ashland	(c)	(c)	Incorporated Nov. or Dec., 1917.
Quenelda	Ashland	Ashland	150	Several years.
Republic	Ashland	Hassell Gap	100	Oct., 1917.
Royal Graphite Mining and Crucible Co.	Goodwater	Goodwater	(a) 100	(d)
Southern Star	Ashland	Ashland	100	Oct., 1917.
Superior Flake	Ashland	Ashland	100	Just begun construction.
Seminole	Sylacauga	Sylacauga	350	(d)
Southern	Ashland	Ashland	100	Winter, 1915.
Standard	Ashland	Ashland	(a) 100	Not started.
Talladega & Parkdale Graphite Production Co.	Talladega	(c)	(c)	Incorporated Dec., 1917.
Union Flake	Lineville	Graphite	(a) 100	Not started.
Vulcan Graphite Co.	Birmingham	(c)	(c)	Incorporated Sept., 1917.

(a) Approximate capacity only; (b) Not yet producing; (c) Recent construction; details of proposed output not available; (d) No record available.

The Alabama Geological Survey is conducting experiments on flake graphite to determine if it is possible by use of compression to compact the graphite so as to make it of greater value in crucible manufacture, and thus do away with the necessity of using the imported product.

## Grading of Graphite in Alabama

FLETCHER G. DOWNS\*

Graphite is produced in a number of grades which are principally the result of the method of its separation from gangue minerals. This operation is attended by so many difficulties that numerous failures inevitably occur, due not so much to poorness of yield, as to the installment of unsuitable mechanical appliances. At present important developments in concentration practice are being carried out in the Alabama field now at a number of properties starting production.

#### RECENT DEVELOPMENTS IN CONCENTRATION METHODS

Several concentrating systems are being used or installed in the Alabama graphite districts. The old standard flotation process described by Irving Herr in the *Journal*, April 21, 1917, involves the drying of the ore and a complicated crushing system. Many of the ores will not stand such an expensive procedure. This process loses one-half to two-thirds of the graphite and produces low-grade concentrates running 50-55% carbon. A modification of this system uses an improved type of washer invented by H. G. Colmer, and produces better concentrates. Minerals Separation and Callow flotation machines were installed in several plants; other mills put in the Sutton, Steele & Steele dry-concentrating process. These last three have resident agents in Ashland, and will demonstrate their several processes there, for the benefit of prospective or existing operations. At Goodwater, the Simplex Graphite Refining Process Co. has a plant for demonstrating another form of froth-flotation apparatus.

The Alabama Flake Graphite Producers' Association was organized in 1917, for mutual benefit and has a plan under way for the establishment of a central finishing mill, which will take the product of the various mines and refine it to standard grades. This would be of great benefit both to producers and to consumers.

#### GRADES OF FLAKE AND DUST GRAPHITE

Alabama graphite is produced, in general, in four grades: No. 1 flake, No. 2 flake, No. 1 dust and No. 2 dust. The flake grades all remain on a No. 12 standard silk bolting cloth, which corresponds to a fineness of about 125 mesh. The distinction between No. 1 and No. 2 flake is entirely one of fineness, and the dividing line is drawn differently in different mills. Some call flake coarser than 70 mesh No. 1, while others give that designation to flake coarser than 90 mesh. One or two mills divide this flake into three grades of coarseness, and there was a movement during 1917 to make only one grade of flake, all of which shall stand on 125 mesh. There is little difference in carbon content between the No. 1 and No. 2 flake. Either grade will run from 80 to 94% carbon, according to operating conditions in the mill. Most of the mills produce a flake product run-

\*Mining engineer, Southern Graphite Co., Ashland, Ala.



ning better than 85% carbon, and the average carbon content is 87-88%. The material finer than 125 mesh is called dust. A small part of that made (10-15%) will run better than 45% carbon, and is called No. 1 dust. Most of it, however, averages 30% carbon.

Alabama flake does not stand in high favor with manufacturers as a material for graphite crucibles. This is because few of the producers have been able to maintain a uniform standard of 90%+ in carbon, and because of fineness and thickness of the flake. Crucible makers like a thick flake, little of which is finer than 70 mesh, more than half of which is coarser than 50 mesh, and running over 90% carbon, if possible. The Alabama product is light and fluffy. A large part of that standing on a 70-mesh screen will pass through a 50-mesh, and it is not uniform in carbon content. In 1917, however, producers were able to dispose of practically all of their flake as crucible stock because of the shortage of ideal material for this purpose; particularly the graphite from Ceylon.

Alabama flake is suitable for lubricating, stove polish and electrical purposes. The miners aim to dispose of as much of their product as possible, however, for crucible use, as that grade brings the best return for the bulk of the material. On this account, the flake, as marketed, is seldom in a form suitable at once for these other purposes. The No. 1 dust is suitable for paint stock. The No. 2 dust can be used only for foundry facings and is difficult to sell. The No. 2 flake production varies in amount from 20% of the No. 1 up to the entire amount of flake produced, according to the milling system employed and the condition of the flake in the ore. About as much dust is produced as flake.

Flake prices for the first half of 1917 varied from 16 to 22c. per lb. for No. 1, according to the carbon content. No. 2 flake brought 2c. per lb. less than the first grade. No. 1 dust brought 3 to 5c. per lb. in 1917. No. 2 dust, when it could be sold at all, brought \$20 per ton. Good flake was worth 15c. per lb. at the end of the year.

In the fall of 1917 some shipments of Ceylon graphite came in, and the crucible manufacturers were able to stock up a supply sufficient to last them until the spring of 1918. At the same time, the freight congestion in the East put a practical stop to shipments from Alabama to the principal graphite-consuming centers. Consequently little Alabama flake is being shipped at present, and no new business is likely to be done before the latter part of the first quarter.

## Bureau of Mines Reports Progress in Smelting Investigations

WASHINGTON CORRESPONDENCE

Van. H. Manning, director of the Bureau of Mines, in his annual report presented to Congress on Dec. 14, lists several important achievements of the Bureau, among which are the references to smelter smoke investigations. Enlarging upon this subject, Mr. Manning later in his report writes as follows:

As a result of investigations that have been carried on in cooperation with the Bureau of Mines, one large copper company is expending \$1,600,000 for equipment to recover dust and fume from the smoke of its smelter.

During this year the metallurgist in charge of the Salt Lake City station has represented the Anaconda Smelter

Commission and has been directly interested in the investigations being conducted at the smelting works at Anaconda, Mont., to improve the smoke conditions there. One electrical precipitation plant costing about \$100,000 has been in operation since October, 1916, treating about 800,000 cu.ft. a minute of the roaster gases. Full-scale experiments with this plant led the Anaconda company to begin work on an installation to handle all the gases of the roaster, about 3,000,000 cu.ft. a minute. The plan adopted calls for 20 electrical precipitation units, a 525-ft. stack, and the necessary flues, and involves an expenditure estimated at \$1,600,000.

The reduction of the sulphur dioxide in the smelter gases will probably be slower. However, progress is being made. During the fiscal year much study was given to the scheme of utilizing sulphuric acid in the manufacture of phosphate fertilizers for shipment to the Eastern markets. The acid plant at Anaconda is now being enlarged to a capacity of 180 tons a day, and plans are being made for a plant that can treat about 50 tons of phosphate rock a day for the production of a high-grade acid phosphate. It is expected that in a few months at least 30 tons a day of the sulphuric acid being made at Anaconda will be utilized in the manufacture of this phosphate.

During the last year the work conducted in cooperation with the smelting companies for the purpose of improving smoke conditions around smelters has been aimed primarily at the recovery and utilization of the material wasted in the smoke. It is found that at most plants the recovery of the solid constituents—dust and fume—is feasible and would pay a reasonable return on the investment required. Usually the recovery of all the waste gases is not feasible. At plants where the waste gases cannot be utilized the investigations are for determining what emission of gases into the atmosphere may constitute a nuisance or be a menace to agricultural and other interests and, where the gases are found to cause damage, to determine the most practicable method of preventing injury to crops.

Decided advances have been made in plans for utilizing locally the sulphuric acid that can be obtained from smelter smoke; these plans include the manufacture of superphosphate for fertilizer and high-grade phosphoric acid, and improvement of alkaline soils by direct application of acid.

The American Smelting and Refining Co. has continued the elaborate and careful investigation begun by it in Utah in 1914 along lines indicated by the work of the Selby Smelter Commission. These investigations are being extended to the company's plants at Tacoma, East Helena, El Paso, and Eastern points. The metallurgist in charge of the Salt Lake City station of the Bureau of Mines has been directly interested in these investigations and has had access to all the data obtained. These data have been made available for helping others in similar investigations.

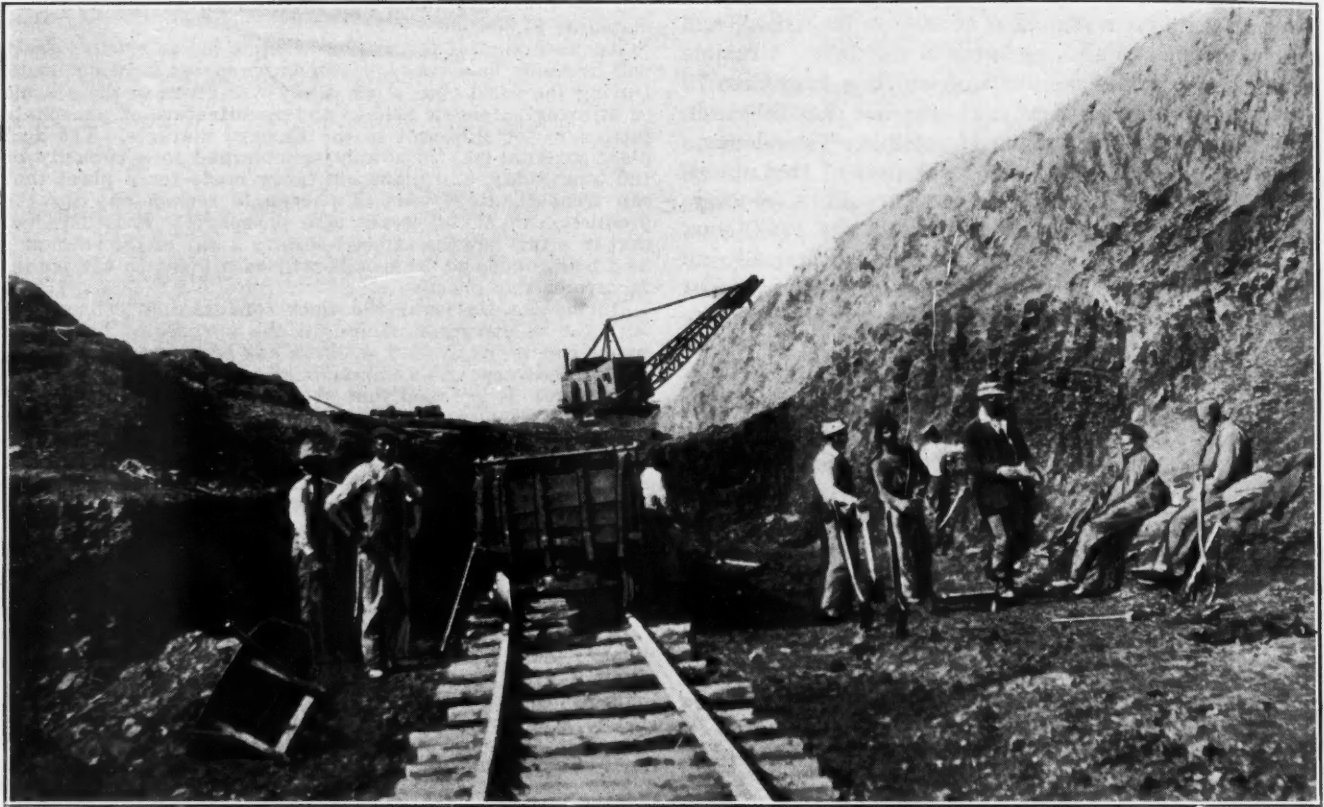
At the request of the officials of the St. Louis Smelting and Refining Co. and the American Zinc, Lead and Smelting Co., the metallurgist in charge of this station has studied the smoke conditions about smelters in Illinois, Kansas, Oklahoma, and other states of the Middle West and has begun investigations for the improvement of those conditions. These investigations are now being carried on by the staffs of the companies, and the results will be available and will enable the bureau to assist other companies in similar problems.

The utilization of sulphuric acid through the manufacture of phosphates for fertilizers is discussed by Mr. Manning as follows:

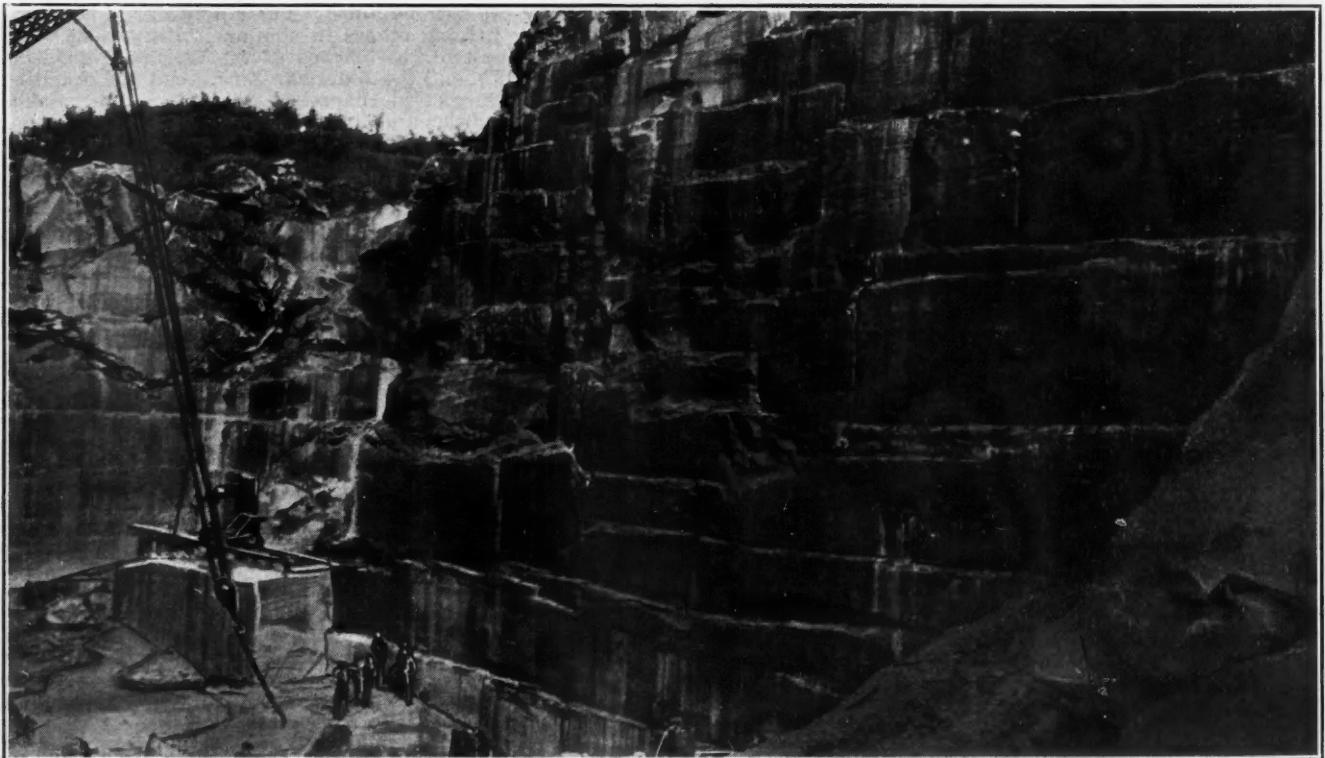
How to bring about the manufacture of phosphate products on a commercial scale is an important problem, as it involves the utilization of the waste sulphur dioxide in smelter smoke and the development of the phosphate deposits of Utah, Idaho and Wyoming. The investigations are being made in connection with the work of the Anaconda Smelter Commission.

Experiments have been made at Anaconda toward the manufacture of a glacial phosphoric acid, or a high-grade acid liquor, and preliminary experiments have been made at the byproduct-coke plant of the Illinois Steel Co., at Joliet, Ill., for utilizing this acid liquor to make ammonium phosphate in place of the ammonium sulphate now being made. In these preliminary experiments the presence of iron and alumina in the Anaconda phosphoric-acid liquor prevented the formation of a product that could be handled in the apparatus at Joliet. Further experiments will follow. Other experiments, aimed at determining the best practical method for making the ammonium phosphate from the impure acid, are being continued on a small laboratory scale at the Salt Lake City station.

# Opencut Mining in Tennessee

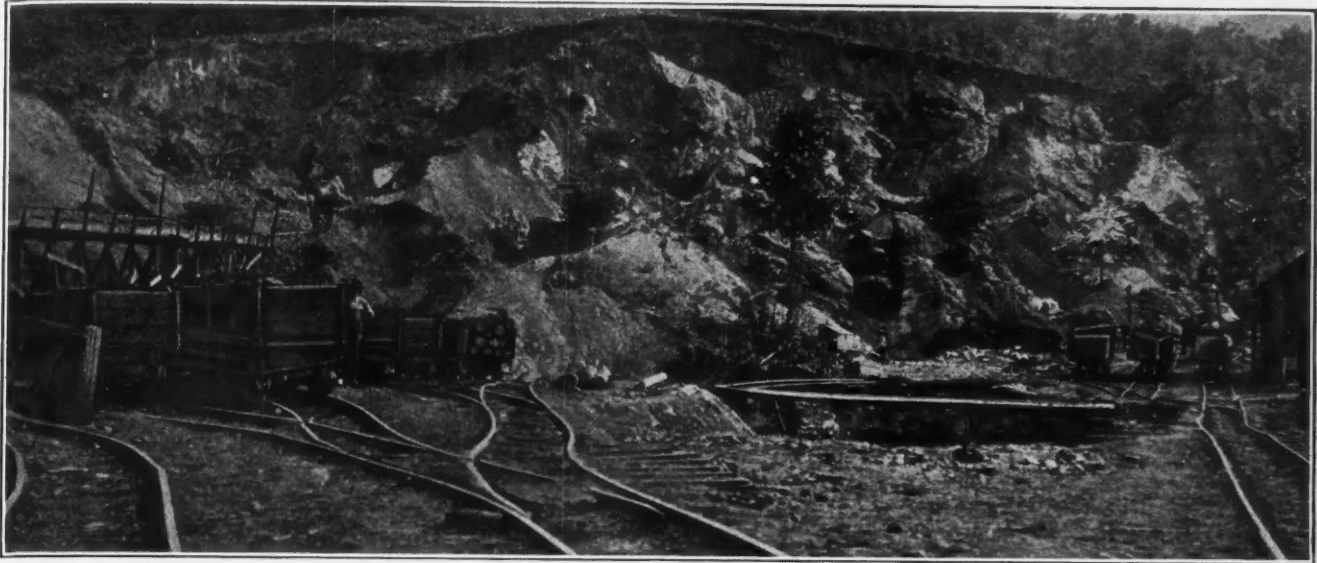


PHOSPHATE WORKINGS OF INTERNATIONAL AGRICULTURAL CORPORATION, MT. PLEASANT, TENN.



MARBLE QUARRY OF TENNESSEE PRODUCERS' CO. NEAR KNOXVILLE, TENN.





ZINC MINE OF EMBREE IRON CO., EMBREEVILLE, TENN.



HYDRAULIC MINING AT PROPERTY OF BLUE GRASS PHOSPHATE CO., SOUTH OF MOUNT PLEASANT, TENN.



OPENCUT OPERATIONS OF MIDDLE TENNESSEE PHOSPHATE CO., MAURY COUNTY, TENN.

## Prospecting for Manganese

BY HENRY V. MAXWELL\*

There are areas in the Appalachian region containing manganese that are now either entirely neglected or only partly developed. In view of the present shortage in the manganese requirements in this country, it may be interesting to know how to proceed in the prospecting of these areas and how one may judge the possibilities of developing a mine in a given territory. The region to which I have specific reference is that lying north of the Blue Ridge.

First, the prospector should go over the surface to find lumps of manganese. If in doubt as to whether a lump is manganese, or merely iron ore, pick up a fragment of white stone and scratch it with a piece of the ore. If it makes a brown mark it is iron. If it makes a black mark it is manganese, and the blacker the mark the higher the grade of your ore. This is the starting point, but be careful right now not to make up your mind that you have "struck it rich," as likely you have not; but you have the first evidence. Now frighten away your idol, steel yourself against too much enthusiasm and get to work. Lose sight of the lumps and search for smaller units. Get down on your knees and examine the clay, if any is exposed. Take your prospecting pick and dig a little hole and at intervals rub a portion of clay between your thumb and finger. If your pick hits ore it will tell you by the sound. If the small lumps of ore show on the surface, and the rubbing of the clay shows grains of sand, clean a few of them and break them on a rock. If they are black, they are manganese. If silica, they will be white. When thus far along you are assured that you have not only "dornicks" (boulders), smaller lumps and sand but that you will probably find good pay ore. Now sink a shallow pit, and look for the source of your ore.

Since the manganese ore is residual and probably originated from the sandstones, and is bedded in clay, it is well first to examine the topography of the immediate field. If the area under consideration is in a depression, or if it is upon the flat surface of a ridge or the flat summit of a mountain, you have found a place where clay would naturally deposit and lie. If the float is found upon the slope of a steep rocky ridge, you must know that there is little there but rock. If the ridge slopes gradually, then examine it, for it is possible that the whole ridge is a mass of clay, and perhaps the rock lying around is float from the quartzite ledges. Now look for the walls; first, the quartzite which may be the hanging wall or the foot wall, as the case may be. Then look for the other wall, which in the majority of instances is limestone. Consider whether the ore is in a depression, whether upon top of a ridge or whether your bed of clay crosscuts the ridges which come down from and lie parallel to the quartzite wall. If it does, then trace it to the next hill, and if the ore is there you may expect that the body of clay "matrix" will be worth looking into. You will also know that your ore is in place and is not "drift"; that instead of the ore being mixed up with fragments, boulders and sands of the broken-down walls, the bed of ore-bearing clay was formed before the period when

the erosion of the adjoining walls took place, that your ore will be comparatively free from silica and that even the finest sand can be saved and shipped in addition to the larger sizes. On the other hand, if the clay is filled with boulders, pebbles and grains of sand, you will know that the ore has been transported and that jigs, screens and other separating machinery will be required to bring it to proper grade.

Having thus satisfied yourself as to the source of the ore, and being impressed with the fact that the area of ore-bearing clay justifies your confidence, work right on. Sink a pit, and another pit, and if the ore still shows, put down a shaft or drive a tunnel. In the meantime, as the work progresses, take a pan of the clay and wash it, and determine how much ore the clay will yield to the cubic yard or foot. If not satisfied, make a trough 16 in. by 12 ft. and haul a few yards of the clay to water; wash it and get your estimates from that. You will be surprised at the amount of ore that a ton of apparently almost barren clay will yield, and when you figure the value of ore and the cost of treatment of a cubic yard of the clay, you will have a further basis of computation.

Do not be too sanguine as yet. Keep on prospecting and do not go to your friends or the public and induce the building of a plant which may ultimately prove a stumbling block against other possible investors. Fully satisfy yourself that you have a mine, and when you have done so, and have calculated your yardage to the known width and length and thickness, estimate the probable tonnage and build the washing plant to meet the requirements. If the indications are indefinite and uncertain, give up the operation at once. Do not spend another cent nor grieve over your loss, as it is nothing in comparison to what it would have been if you had not used due caution.

Now as to persistence of the ore at depth. That is an unknown quantity in practically the entire field. Except in rare cases where the ore lies in a basin and upon a bed of limestone, which in turn may be near the surface, there is little known in fact as to depth. The deepest hole I have ever seen sunk in a bed of manganese in this region went down 80 ft. and was bottomed on ore. But I have seen clay carrying manganese lying exposed in the bed of a creek, and have followed it to an elevation of 400 ft. above the water level and have found the ore in the clay there. I see no reason why the ore should not go as deep as does the clay.

Operators receive numerous inquiries by mail from would-be purchasers of manganese properties, but each inquirer wants a developed mine and the report of an engineer, analyses, etc. What is a developed manganese mine? It is a mine or section of ore-bearing clay which has undergone the above suggested examination, and since such an examination within my knowledge is seldom made unless the owner himself is going to operate I always say that there are no manganese mines upon which an engineer or a geologist can pass intelligently. All he can do is to report that he found float, pits, evidences of ore, etc., but he cannot truthfully give more than an opinion. He does not know; he cannot learn without the use of the pick and shovel, and, practically speaking, the only known value of a manganese deposit is when the ore is mined and ready for shipment. He can, though, if he understands his business, do the development work and approximate the tonnage available.

\*General manager, Maxwell Manganese Mining Co., Elizabethton, Tenn.



## Principal Consumers of Pyrite

BY THE WAR MINERALS COMMITTEE

William Young Westervelt, Chairman

The following tentative list of pyrite consumers in the United States has been prepared by the War Minerals Committee and is published for the benefit of producers:

### PRINCIPAL PYRITES CONSUMERS

Ame Manufacturing Co., Wilmington, N. C.  
 Alabama Chemical Co., Montgomery, Ala.  
 American Agricultural Chemical Co., Montgomery, Ala.;  
 Charleston, S. C.; Columbia, S. C.; Boston, Mass.; Alex-  
 andria, Va.; Baltimore, Md.; Buffalo, N. Y.; Carteret,  
 N. J.; Cincinnati, Ohio; Cleveland, Ohio; Detroit, Mich.;  
 Elizabethport, N. J.; Newark, N. J.; Pensacola, Fla.;  
 Savannah, Ga.; Wilmington, N. C.  
 American Alkali and Acid Co., Bradford, Penn.  
 Anderson Phosphate and Chemical Co., Anderson, S. C.  
 Armour Fertilizer Co., Atlanta, Ga.; Chrome, N. J.; Jack-  
 sonville, Fla.; Nashville, Tenn.; New Orleans, La.  
 Avery Chemical Co., Lowell, Mass.  
 Barker Chemical Co., Dunnellen, Fla.  
 Bergenport Chemical Works, Bayonne, N. J.  
 Blackshear Manufacturing Co., Blackshear, Ga.  
 Bower Chemical Co., Philadelphia, Penn.  
 Butterworth & Judson, Newark, N. J.  
 Buffalo Fertilizer Works, Buffalo, N. Y.  
 Baugh Chemical Co., Baltimore, Md.  
 Caroleigh Fertilizer Works, Raleigh, N. C.  
 Cleveland Cliffs Iron Co., Marquette, Mich.  
 Cochrane Chemical Co., Boston, Mass.  
 Commercial Acid Co., St. Louis, Mo.  
 Consolidated Rendering Co., Boston, Mass.  
 Contract Process Co., Buffalo, N. Y.  
 Cotton States Seed and Fertilizer Co., Macon, Ga.  
 Davidson Chemical Co., Baltimore, Md.  
 Detroit Chemical Works, Detroit, Mich.  
 Du Pont Powder Co., Wilmington, Del.  
 Empire State Chemical Co., Athens, Ga.  
 Etiwan Fertilizer Co., Charleston, S. C.  
 Eureka Fertilizer Co., Perryville, Md.  
 Farmers Fertilizer Co., Columbus, Ohio.  
 Federal Chemical Co., Nashville, Tenn.  
 Free State Fertilizer Co., Carrollton, Ga.  
 Furman Farm Implement Co., Atlanta, Ga.  
 General Chemical Co., New York, N. Y.; Bayonne, N. J.;  
 Buffalo, N. Y.; Cleveland, Ohio; Fairfield, Conn.; Newell,  
 Penn.; Pulaski, Va.; Chicago, Ill.; Marcus Hook, Penn.  
 Georgia Fertilizer and Oil Co., Valdosta, Ga.  
 Grasselli Chemical Co., Cleveland, Ohio; Chicago, Ill.;  
 Tremley, N. J.; Pittsburgh, Penn.; Selma, Ala.; Grasselli,  
 Ala.; Gadsden, Ala.  
 Griffith & Boyd, Baltimore, Md.  
 Gulfport Fertilizer Co., Gulfport, Miss.  
 Hampton Fertilizer Co., Hampton, Ga.  
 Harrison Brothers, Philadelphia, Penn.  
 Home Guano Co., Dothan, Ala.  
 Home Mixture Guano Co., Columbus, Ga.  
 International Agricultural Chemical Co., Macon, Ga.  
 Jackson Fertilizer Co., Jackson, Miss.  
 Jarecki Chemical Co., Sandusky, Ohio; Cincinnati, Ohio.  
 Jefferson Fertilizer Co., Birmingham, Ala.; Bessemer, Ala.  
 Kalbfleisch Chemical Co., New York.  
 Lancaster Chemical Co., Lancaster, Penn.  
 Lenning & Co., Charles, Philadelphia, Penn.  
 Mandeville Mills, Carrollton, Ga.  
 Martin White & Co., New York.  
 Maybank Fertilizer Co., Charleston, S. C.  
 Meridian Fertilizer Factory, Meridian, Miss.; Hattiesburg,  
 Miss.  
 Merrimac Chemical Co., Boston, Mass.  
 Morris Fertilizer Co., Atlanta, Ga.  
 Mutual Fertilizer Co., Savannah, Ga.  
 Naugatuck Chemical Co., Naugatuck, Conn.  
 New Jersey Zinc Co., Hazard, Penn.  
 New Orleans Acid Co., New Orleans, La.  
 Old Dominion Guano Co., Atlanta, Ga.  
 Painter Fertilizer Co., Jacksonville, Fla.  
 Parsons Pulp and Lumber Co., Parsons, W. Va.  
 Pelham Phosphate Co., Peiham, Ga.  
 Pennsylvania Salt Manufacturing Co., Philadelphia, Penn.;  
 Matrona, Penn.  
 Phosphate Mining Co., Savannah, Ga.  
 Planters' Chemical and Oil Co., Talladega, Ala.  
 Planters' Fertilizer and Phosphate Co., Charleston, S. C.  
 Raugh & Sons, E., Indianapolis, Ind.  
 Read Phosphate Co., Nashville, Tenn.; Charleston, S. C.  
 Reliance Fertilizer Co., Savannah, Ga.  
 Richmond Guano Co., Richmond, Va.  
 Riverside Acid Works, Warren, Penn.  
 Roanoke Guano Co., Roanoke, Va.  
 Robertson Fertilizer Co., Norfolk, Va.  
 Royster Guano Co., F. E., Norfolk, Va.; Baltimore, Md.;  
 Columbia, S. C.; Macon, Ga.  
 Savannah Guano Co., Savannah, Ga.  
 Scott Fertilizer Co., Elkton, Md.  
 Smith Agricultural Chemical Co., Columbus, Ohio.  
 Smith & Co., Springfield, Ill.  
 Southern Fertilizer and Chemical Co., Savannah, Ga.  
 Southern States Fertilizer Co., Savannah, Ga.; Augusta, Ga.  
 Standard Guano Co., Baltimore, Md.  
 Standard Guano and Chemical Co., New Orleans, La.  
 Standard Chemical and Oil Co., Troy, Ala.  
 Swift & Co., New Orleans, La.; Atlanta, Ga.; Wilming-  
 ton, N. C.  
 Talladega Mercantile Co., Talladega, Ala.  
 Tennessee Fertilizer Co., Albany, Ga.; Columbus, Ga.  
 Thomas & Son Co., I. P., Philadelphia, Penn.  
 Troup Co., La Grange, Ga.  
 Tupela Fertilizer Factory, Tupela, Miss.  
 Union Superphosphate Co., San Francisco, Calif.  
 Virginia-Carolina Chemical Co., Alexandria, Va.; Albany,  
 Ga.; Americus, Ga.; Atlanta, Ga.; Augusta, Ga.; Balti-  
 more, Md.; Birmingham, Ala.; Blacksburg, S. C.; Charle-  
 ston, S. C.; Charlotte, N. C.; Columbia, S. C.; Columbus,  
 Ga.; Durham, N. C.; Dothan, Ala.; Gainesville, Ala.;  
 Greenville, S. C.; Lynchburg, Va.; Macon, Ga.; Memphis,  
 Tenn.; Mobile, Ala.; Montgomery, Ala.; Newbern, N. C.;  
 Newman, Ga.; Norfolk, Va.; Opelika, Ala.; Petersburg,  
 Va.; Pon Pon, S. C.; Richmond, Va.; Rome, Ga.; Salis-  
 bury, N. C.; Savannah, Ga.; Sandford, Fla.; Social Circle,  
 Ga.; Staunton, Va.; Shreveport, La.; Wilmington, N. C.;  
 Winston-Salem, N. C.  
 West Virginia Pulp and Paper Co., Dovington, Va.  
 Wilson & Tooner, Jacksonville, Fla.  
 York Chemical Co., York, Penn.

## Pipe Corrosion in Buildings

Inasmuch as the rusting out of pipes is one of the prolific sources of trouble for the metal-mine operator, the following notes on corrosion from a bulletin of the A. M. Byers Co., of Pittsburgh, Penn., may be of interest:

An investigation of pipe corrosion was prompted in Pittsburgh by local agitation on the part of property owners who charged that chemicals were being used in the water-filtration plants which destroyed the piping to such an extent that not even brass was immune. This subject was taken up by the Pittsburgh Board of Trade, and a report rendered which showed that no chemicals were used which could in any way be held responsible for the trouble, but the opinion was expressed that the city should not be held responsible for the fact that pipe of inferior quality had in some cases been used. To determine the life of pipe under varying conditions of service, Thomas F. Payne, a sanitary engineer of Pitts-  
 burgh, was commissioned to make a house-to-house canvass of buildings, to ascertain all the pertinent facts which might aid in solving the rust question in the most efficient way. After several unsuccessful attempts to obtain accurate data from private residences and other buildings, 125 apartment buildings in Pittsburgh were investigated.

This investigation, it is stated, showed the corrosion to be most severe in the hot-water mains (exposed base-  
 ment piping) and the recommendation was therefore made that pipe one size larger than that used in regular practice be used for this purpose. The larger size, hav-  
 ing greater thickness and larger bore, would not so easily rust through or become stopped up with rust.

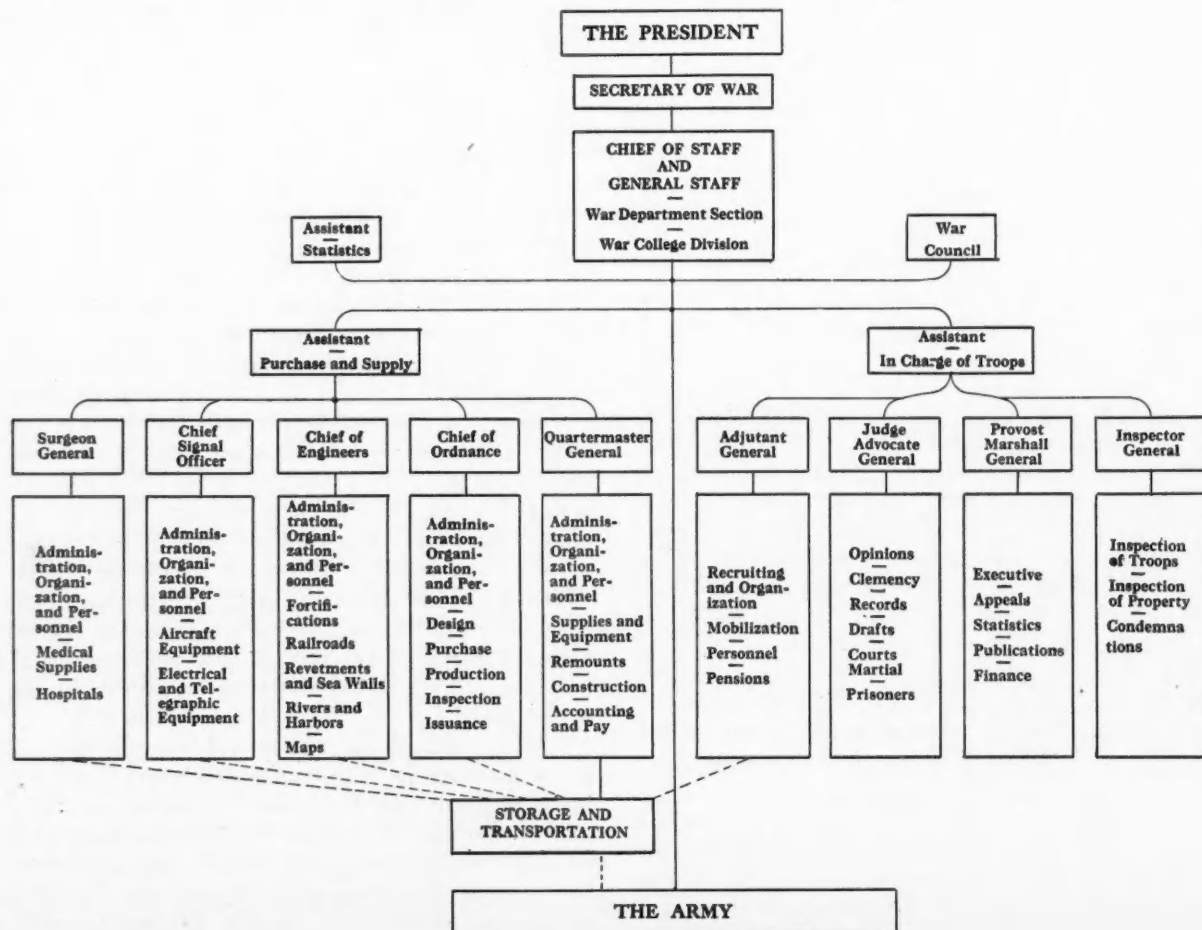
The hot-water risers, which are usually concealed, proved to have a longer life than the basement mains. It was therefore a question whether the practice of specifying brass pipe for risers, and iron or steel for mains, might not be reversed to advantage. Brass pipe in this investigation did not show up as well as might be expected, and many complaints were heard on that account. Wrought-iron pipe in 65 buildings, ranging in age from eight to 20 years, did not show a single failure when used for cold-water supply, and in only one or two of these buildings did the wrought-iron hot-water risers require any repairs in the same period of time. Lead pipe, for hot-water risers, seemed to have an average life of 18 years, one complete failure being recorded after 14 years' service.

It appeared from the investigation that the pipe lasted a little longer where an automatic water heater was used. This undoubtedly is due to the possibility of maintaining a lower temperature of the water than with a heater not having thermostatic control, for corrosion increases with the temperature, reaching its maximum between 140° and 170° F. Temperatures from 115° to 130° F. were therefore recommended wherever they will serve the purpose.

World's Stock of Platinum\* thus far produced and still available is estimated at 4,000,000 oz. by Dr. George F. Kunz, in an article in the November "Bulletin" of the Pan-American Union. Of this stock he allots 400,000 oz. as used for catalyzing, 1,000,000 oz. for dental purposes; 1,000,000 oz. for chemical apparatus; 500,000 oz. in electrical devices and 500,000 oz. in jewelry. Total platinum in the United States he estimates at 1,000,000 oz., besides about 400,000 oz. of other metals of the platinum group.

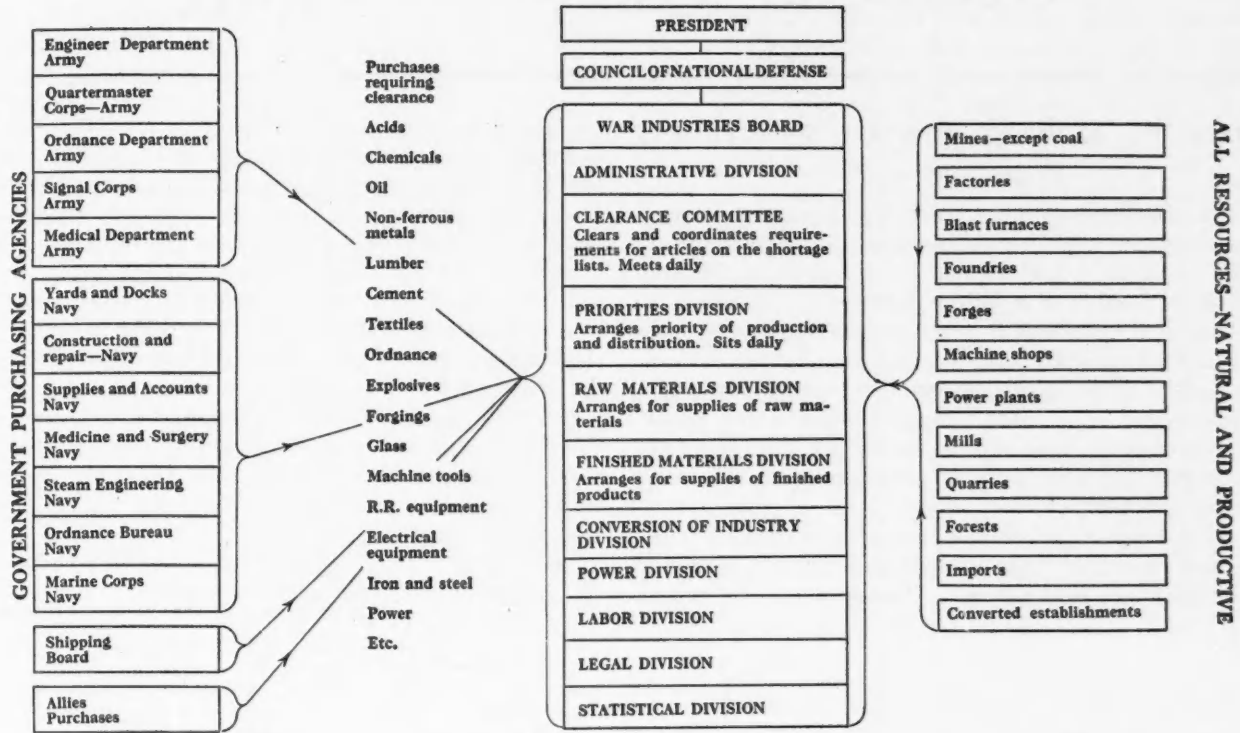
## Organization of War Department and War Industries Board

The organization of the War Department, the War Industries Board and of the Army Ordnance Department, which is a subdivision of the former, is illustrated in the accompanying charts. These will be found of interest in connection with the account of Secretary Baker's reorganization of his department, which was published in the *Journal* in the issue of Jan. 26, 1918. In the first chart is shown the general organization of the War Department. The supreme authority is shown to be vested in the President, as commander-in-chief of the Army in wartime, passing from him to the Secretary of War, who is responsible to him on all matters pertaining to the Army, and who supervises the activities of the various bureaus and divisions of the War Department through the medium of the General Staff. The War Industries Board is shown in the second chart as deriving its authority from the President through the Council of National Defense. On the one hand, it seeks to utilize to the utmost the natural and productive resources of the country, so that, on the other, the maximum benefit may be secured through it in purchasing supplies for the Army, the Navy, the Shipping Board and the Allies. The organization of the Ordnance Department, as recently effected, is shown diagrammatically in the last chart, which well illustrates the coördination in work contemplated. The four operating divisions are given in their relation to the sources of production, inspection, supply and procurement, and to the fighting forces, both in the United States and abroad.





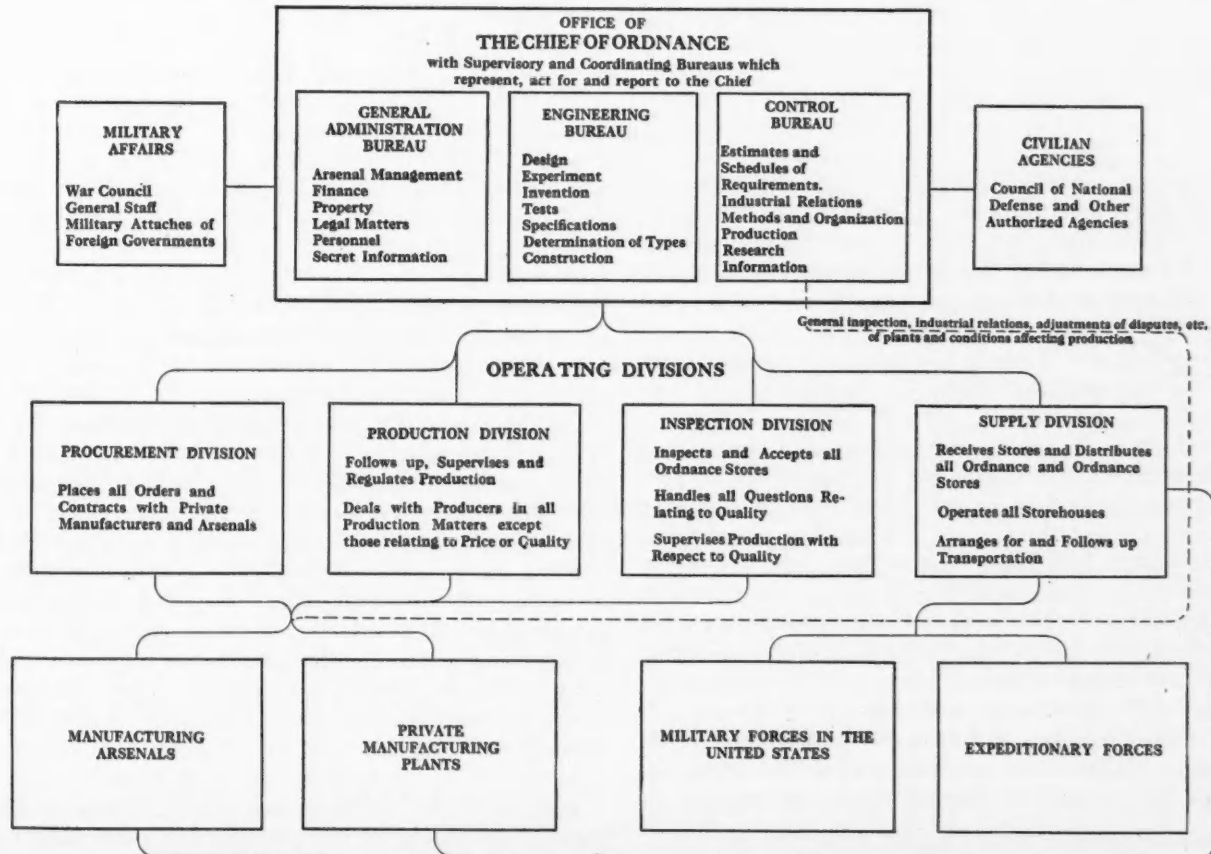
ORGANIZATION AND FUNCTIONS OF WAR INDUSTRIES BOARD



NOTE: A "war industry" is construed to mean any industry which cannot meet the war-time needs without abnormal expansion or conversion of facilities

Washington, D. C.  
January 9, 1918.

ORGANIZATION OF THE ORDNANCE DEPARTMENT



## Details of Practical Mining

### Safety in Making and Using Primers

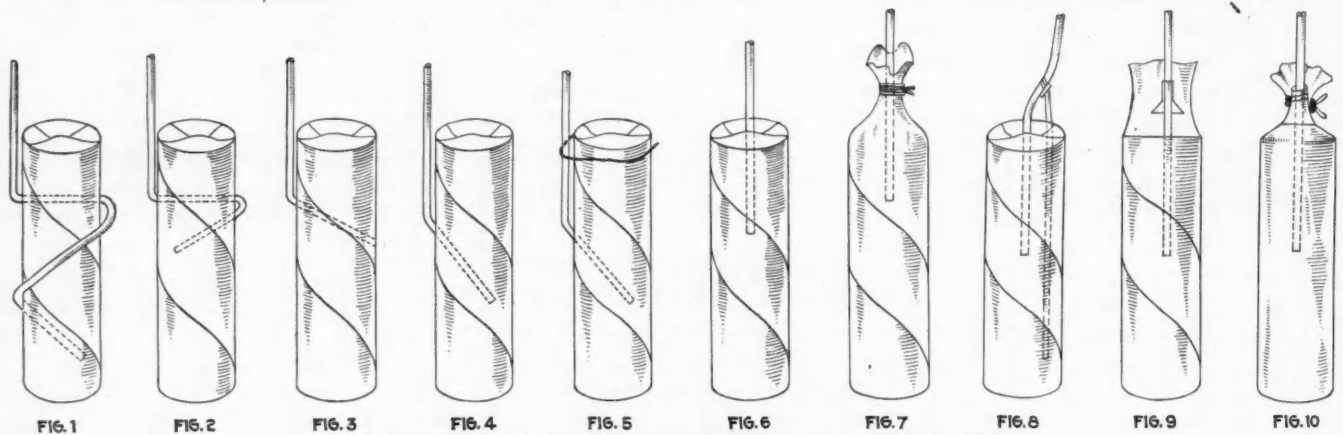
BY H. COMSTOCK\*

Up to the present time there has been no standard or satisfactory way of making dynamite primers. Many of the methods in use are unsafe, and each mining district usually employs a different method. Standardization has been proposed in some states, but as yet nothing has been done in this respect. If a convenient and safe method were adopted as standard, many serious accidents would be avoided. Many accidents are caused by the scraping of the cap on the sides of the borehole, and, with present methods of priming, there are many ways in which this might occur.

Drill-sharpening machines in use today make perfect bits, and in many cases a reduction in the diameter of the borehole is the result. Lower grades of explo-

the sketches. Fig. 1 shows the fuse laced through the cartridge and illustrates the method known as "double lacing." This is objectionable, for it increases the diameter of the primer and bends the fuse. If the fuse is bent, the powder train may become broken and cause a misfire, or the powder may burn through the covering, igniting the dynamite and causing an imperfect explosion. If the cap is thrust too far or if an exceptionally long one is used, it may penetrate the opposite side of the cartridge and be exposed by scraping against the rock. The same objection applies to the primers in Figs. 2, 3 and 4. The diameters of the primer and borehole may be such that the fuse will bind along the side of the hole, allowing the cartridge to be pushed ahead, thus detaching the cap.

The primer in Fig. 5 is not satisfactory, for the reason given above, as the cord on the outside is exposed to



METHODS USED IN PREPARING PRIMERS FOR BLASTING

sives are also used extensively, and they require stronger caps for detonation. Previously the No. 6 cap was commonly used, but this has not proved strong enough for the lower grades of explosives, and a No. 8, which is longer than the No. 6 cap, is now being used extensively. Recently a new cap, similar to No. 8 and 2½ in. long and one in which the explosive requires more space than the ordinary fulminate of mercury cap, has been placed on the market.

Primed from the side, the danger from the use of these long caps is increased, for the cap is apt to project through the cartridge, and if the angle is such that it does not project through it is readily detached from the cartridge. In either case a premature explosion may result, due to the scraping of the cap on the sides of the borehole. A fuse that will not burn through the side walls is difficult to manufacture, and this tendency is increased when the fuse is bent. The ideal condition is to keep the fuse straight and insert it in the top and center of the cartridge along the direction of its length. After being placed in this position, it should be anchored. Some of the methods commonly used are shown in

abrasion and may be readily cut or pulled off. Fig. 6 shows the cap in the proper position in the cartridge, as it is imbedded in the explosive and therefore protected from injury. Also, it points along the charge, so that the most efficient results may be obtained. The objection to this method is that no way of anchoring the fuse is provided. Fig. 7 shows a primer in which an attempt is made to remedy the trouble by opening the end of the shell and tying with a cord, as shown. But this does not overcome the difficulty, for the reason that the shell is made of paraffined paper, and no matter how taut the cord is drawn the fuse can be readily pulled through the paper. Fig. 8 shows a patented device which securely anchors the fuse. A double cord is imbedded in the explosive and is prevented from pulling out by means of a knot in the lower end. The opposite or loose end is fastened to the fuse by means of a clove hitch. From the standpoint of the user, this device is satisfactory, but manufacturers claim that it is both difficult and expensive to insert this cord when the paper shells are being filled with explosives.

Figures 9 and 10 show the application of a device which I have patented for overcoming these difficulties.

\*Wetherbee, Sherman & Co., Mineville, N. Y.



It consists of a ferrule of flared shape, made of copper or any other suitable material, and is crimped on the fuse with the regular cap crimper. The end of the cartridge is opened, the cap and fuse, with ferrule attached, are inserted in the open end, and the paper wrapping of the cartridge is tied around the ferrule with a cord. The ferrule may be made part of the cap or detached from it, but in either case a satisfactory anchor is formed. The detonator is in the proper position for the most efficient results, and there is little chance of its becoming detached from the cartridge. The cost of manufacture of the ferrule is exceedingly low and its use assures a safe and convenient method of priming.

### Positive Cutout for Trolley Lines

Power in trolley lines is a source of danger unless some positive method is used whereby the power may be cut off from certain sections of the line when not in use. Frank Huskinson in *Coal Age* describes an installation which is positive in action and such that the motorman could not go out and leave the power on the

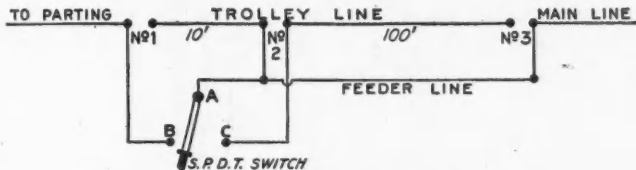


DIAGRAM OF POSITIVE CUTOUT SYSTEM

parting lines. The locomotive in going out of the parting was moving uphill. In the accompanying diagram the places marked 1, 2 and 3 are section insulators, or cutouts, that are inserted in the trolley line. No. 1 cutout is placed where the trolley should be dead, No. 2 cutout is placed about 10 to 15 ft. from No. 1, while No. 3 is placed about 100 ft. from No. 2.

A special single-pole double-throw switch is placed at a convenient point between No. 1 and No. 2 cutouts. This switch is so placed that with the locomotive coming out of the parting or side track with the loaded trip, the motorman will throw the switch lever just after the trolley wheel has passed over No. 1 cutout onto the line between cutouts Nos. 1 and 2.

From the main line on the other side of No. 3 cutout a feeder line is run to the blade part of the switch marked A, also a tap is taken off of this feeder line and connected to the short piece of trolley between cutouts Nos. 1 and 2. One switch contact is connected to the trolley line that goes to the parting, while the other is connected to the piece of trolley line between cutouts Nos. 2 and 3. This arrangement with the switch blade on one contact allows the power to be on the lines up to cutout No. 1.

The motorman, upon going into the parting, will throw the switch to the opposite contact. This puts the power into the trolley lines on the partings, but at the same time takes the power off the section of trolley line between cutouts Nos. 1 and 2. The section of trolley line between cutouts Nos. 1 and 2 has the power on at all times, regardless of the position of the switch.

The motorman, upon coming out of the parting with the loaded trip, must throw the switch from one con-

tact to the other before he can get any power on the line between cutouts Nos. 2 and 3. Thus it is impossible for the motorman to leave the switch on the wrong contact. This makes a safe arrangement for the protection of partings where mules are liable to come in contact with the trolley line. A lamp is also placed at the parting and connected to the trolley line and the rails. This light will burn when there is power on the line, but not if the power is cut off.

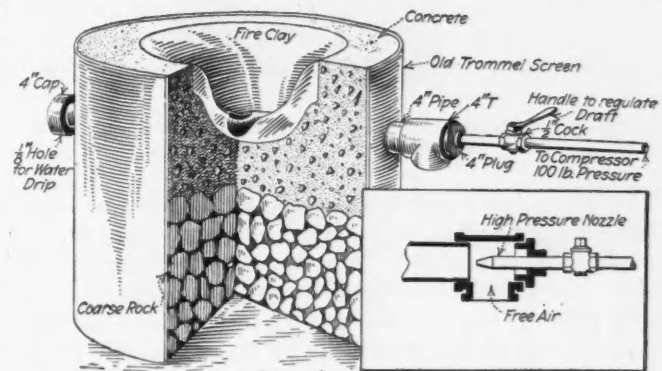
The special switch employed is reliable, safe and convenient. It is inclosed and considered safe by the mine and the insurance inspectors. I have several in use and they are entirely satisfactory in all respects. A triangular box of the desired dimensions is made of suitably treated wood. This is lined with sheet asbestos. The metal parts of the switch are mounted within this box, with only the three switch terminals and the handle on the outside. After the connections are made to the switch, the terminals are insulated. The switch handle moves in a slot in the bottom of the box, so that it is practically an inclosed switch. This switch is installed so as to be easily thrown by the motorman as the locomotive passes by. The connections are so arranged that the handle of the switch is always thrown in the same direction that the locomotives are traveling.

### Mine Forge for Heavy Work

BY W. L. ZEIGLER\*

A simple and inexpensive method of building a forge for heavy work is shown in the illustration. The shell is made of worn-out trommel screening or steel plate, coarse rock being used for filling the lower half. A 4-in. pipe is put in place and then filled around with concrete, so that the center is left saucer-shaped to permit the placing of a fireclay lining.

The blast is supplied by using a small amount of high-pressure air through the  $\frac{1}{8}$ -in. nozzle, which draws a



CONSTRUCTION DETAILS OF FORGE FOR HEAVY WORK

large volume of free air through the pipe, forcing it to the tuyere. By the sudden expansion at the nozzle the air pressure and the temperature are greatly lowered, thereby precipitating any contained moisture, which then drains from the  $\frac{1}{8}$ -in. hole in the cap at the end of the large pipe. When using compressed air alone, as for a large weld when a strong blast is needed, the entrained moisture in the air does not all drain and greatly interferes with the bottom of the fire.

\*Mill superintendent, Success Mining Co., Ltd., Wallace, Idaho.

## Details of Milling and Smelting

### Notes on the Use of Draft Gages

BY JAMES ROBERTSON

In the determination of flue drafts, velocity, head and other data which are necessary in the many calculations connected with experimental work at reduction plants, it is customary to use the Ellison differential draft gage, or gages of a similar type. Frequently, however, a plant is so isolated that several months may elapse before the required apparatus can be secured, and in such cases home-made gages must be used. Prof. C. E. McQuigg described<sup>1</sup> a differential gage for determining drafts and velocities, but without a knowledge of Professor

tubing is used to fasten the gage glass to the connection piece and takes up any strains due to differences in alignment between the two parts. A flat-bottomed bottle is often unavailable for use as the liquid reservoir, and if a bottle with a bottom having the least semblance of a bell shape is used (particularly where colored water is the liquid), changes in atmospheric temperatures encountered at the higher altitudes cause moisture to condense on the interior. This moisture collects at the bottom, or rather top, of the bell (at *B*), and when a drop is big enough it falls into the top of the open tube used in Professor McQuigg's gage, so that trouble and delay are experienced in clearing the glass tube. The im-

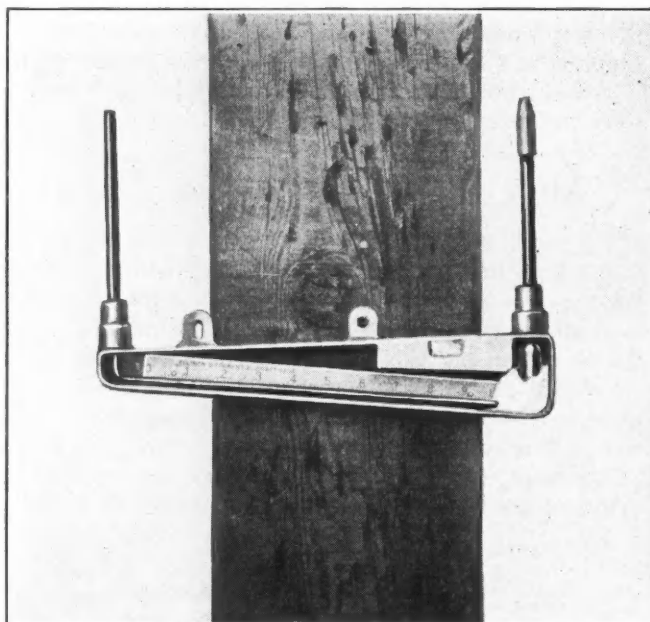


FIG. 2. TEMPORARY REPAIRS TO ELLISON DIFFERENTIAL DRAFT GAGE

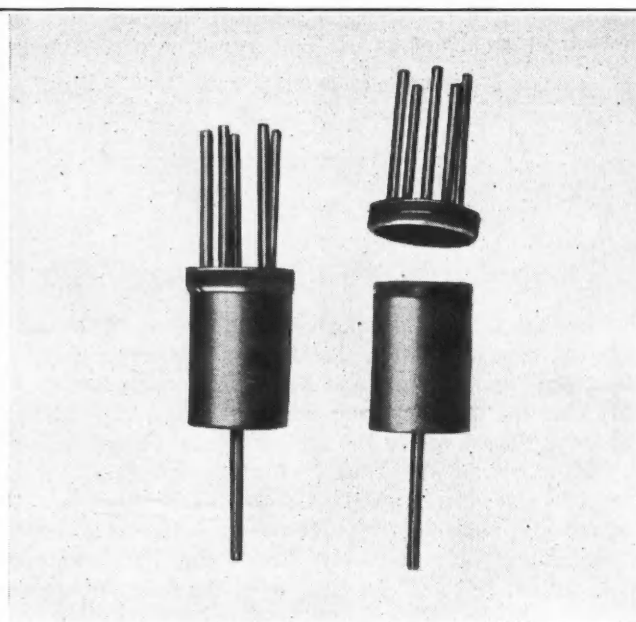


FIG. 3. IMPROVED AUTOMATIC AVERAGING DEVICE FOR DIFFERENTIAL DRAFT GAGES

McQuigg's apparatus a gage similar to his was made, improved somewhat, at a smeltry in South America.

Few bottles available for such use are perfectly suitable, and when incorporated in an apparatus, under such climatic and operating variations as were encountered at this South American plant, unless changed to suit conditions will give trouble in manipulation, for it requires careful handling to prevent glass tubing from being broken. Two important features were incorporated in the improvised gage shown in Fig. 1. The rubber tubing from the draft or Pitot tube is connected to a tapered brass sleeve fastened to the gage board by a copper or brass strap. By the use of this device, shown at *A*, it is possible to connect up the apparatus without danger of the operator breaking the glass of the gage and causing interruption in the work, which was the case when the rubber tubing was attached directly to the glass tubing. A short piece of rubber

proved gage overcomes this difficulty by bending the upper part of the tube, after it has been passed through the rubber stopper, in the form of a hook (as shown at *C*), and this simple expedient prevents any of the condensed liquid entering the glass and giving trouble.

The Ellison gage is undoubtedly one of the best for draft determinations. Fig. 2 shows a gage on which the glass tube was cracked at the point where it joins the oil reservoir. The gage was badly needed, and until another could be secured, temporary repairs were made on the tube by pouring plaster of paris around the cracked part. When this hardened and was saturated with oil, it was found that the gage worked satisfactorily; the only precaution required was that the zero readings should be taken more often than usual to insure against possible error.

An automatic device for securing average readings of different draft gages was described<sup>2</sup> some years ago.

<sup>1</sup>"Engineering and Mining Journal," Mar. 29, 1913.

<sup>2</sup>"Engineering and Mining Journal," Apr. 4, 1914.



This consisted of a brass cylinder having one opening at the bottom, which could be attached to the gage, and any number of openings at the top, depending on the number of Pitot tubes used. The device has been improved and is shown in Fig. 3. For this particular case,

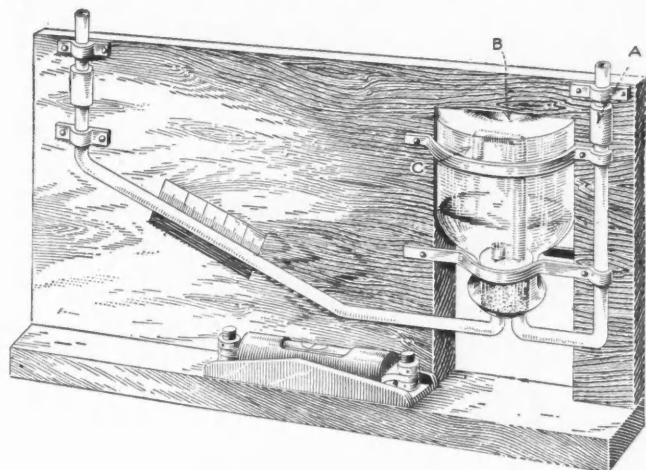


FIG. 1. IMPROVED DIFFERENTIAL DRAFT GAGE

the rubber tubes coming from the Pitot tubes were connected to pieces of 1/4-in. brass tubing at the upper part of the cylinder, and the gage was connected by a rubber tubing at the lower end. A positive pinch cock was placed on each tube, and in this manner it was easy to make individual or average readings, as desired. The screw cap top allows inspection and cleaning of the device when necessary.

### Riddell-Davison Self-Cleaning Grate for Dwight-Lloyd Machines

A self-cleaning patented grate for Dwight-Lloyd sintering machines has lately been devised at the Port Pirie plant of the Broken Hill Associated Smelters, Australia, which is automatic and positive in its action. This smeltery, which has been using standard straight-slot grates, is now adapting the new apparatus to its D.-L. plant of 11 machines.

The essential idea of the patent is a continuous, elevated 24-in. grate rib, the supporting cross ribs being dropped sufficiently below the tops of the grate bars to allow plowing and cleaning tools ample clearance in their travel. The peculiar position of the grate rib itself assists the release of the sinter at the discharge end of the machine to such an extent that on all charges yet tried at Port Pirie, both single and double roasting, the slots of the grate remain clean. For abnormally hot and sticky charges in which lead and slag might tend to close up the slots, an auxiliary cleaning tool, of novel design, is provided. The peculiar shape of the grate allows this device completely to remove all lead, slag and fused charge at one pass.

In recent tests at Pirie, the D.-L. machines have been run on charge mixtures particularly fusible in character—50% Pb, 20% raw matte, 13% limerock, etc.—in an effort to determine the extent to which the slots of the new grates could be clogged from metallic drippings, fused slag, etc. Ledy mixtures of this sort, when formerly handled over standard straight-slot grates, had invariably resulted in rapid plugging and clogging of

the slots to a degree requiring continuous extra labor at both feed and discharge ends of machine—one man punching slots and another barring off sinter. The new grates were found to discharge the sinter from these same fusible mixtures freely and completely, slots remaining open and clean. It thus appears that the occasion for using the auxiliary cleaning tool provided by the Riddell-Davison system rarely, if ever, occurs at Pirie. The peculiar shape of the grate rib, however, makes it easily possible to introduce a completely effective continuous cleaning device, on top of the grates, if the necessity should arise in the application of this system at other points.

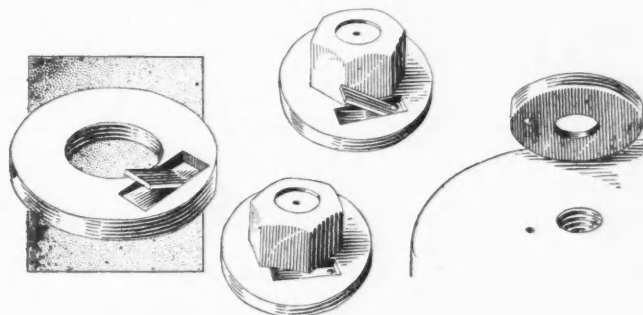
The tendency to breakage of pallets and grates arising from the sudden drop at the discharge end of the D.-L. machine is appreciably lessened by this new system, which does not require such a heavy jolt for the discharge of sinter.

It is reported that the new style of grate not only eliminates all labor in cleaning, but increases the general efficiency of the D.-L. operation to a marked degree. There is an actual increase of about 30% in air space over standard grates of same slot width, and this suction area is kept 100% effective by the unfailing duty of the new grates. In the long run, machines equipped with the new device show increased roasting speed and a better sulphur elimination than those using standard straight-slot or herringbone grates.

It is believed that the Riddell-Davison elevated grate is the final solution of what has been at some plants a considerable mechanical difficulty in the D.-L. operation—the persistent clogging of grates.

### A Successful Lock Washer

I have seen many devices for holding a nut or cap-screw in place, but most of them have their objections, writes T. O. Vickers in *Power*. The illustration shows a washer that I have made and used with success after several other devices had been tried, to hold a capscrew in a bearing cap on a vertical shaft. Although it is quite tedious to make without



NUT OR CAPSCREW LOCK WASHER

proper facilities, I believe the washer could be made in one operation with a suitably designed die or punch. As shown, a small spring-steel catch is riveted in a recess in the washer and projects above the surface when not depressed, which is done when the nut is removed. The under head of the rivet is cone-shaped, to be fitted into a suitable recess in the casting of the machine, made with center punch or with a small drill. If offered at a reasonable price, I think this lock would find a ready market.

## Construction and Equipment Costs of United Eastern Mill\*

The coarse-grinding department of the United Eastern mill at Oatman, Ariz., consists of two No. 64½ Marcy ball mills each direct-connected to 100-hp. Allis-Chalmers motors, automatically fed by an 18-in. steel apron conveyor. Each mill operates in closed circuit with a duplex Callow screen, the oversize of which is returned to the mill by an 18-in. belt-and-bucket elevator, and the undersize (—30-mesh) goes to a combined distributor and sampler. The fine-grinding department is composed of three Allis-Chalmers tube mills, 5 ft. in diameter by 6 ft. long, each direct-connected to 75-hp. motors, operating in closed circuit with a Dorr duplex classifier. The classifiers overflow into a launder to a Callow 8-ft. sloughing-off tank where additional settling is expected to take place. The various items of the cost of constructing and equipping these two departments, as well as the cyanide and clarifying departments, may be seen in the accompanying table.

CONSTRUCTION COST OF MAIN MILL AT UNITED EASTERN PLANT

	Labor	Material	Power	Miscellaneous	Total
Excavation.....	\$10,897.04	\$2,203.52			\$12,100.56
Concrete.....	5,473.74	4,411.18	\$21.54	\$945.85	\$10,852.31
Machinery, f. o. b. Oatman*		57,487.02			57,487.02
Machinery, erection..	4,022.18	862.36	114.27	390.75	5,389.56
Building lumber.....		7,411.87			7,411.87
Lumber framing and erection.....	5,205.89	538.02		420.96	6,164.87
Building covering in place.....	821.50	2,302.77			3,124.27
Doors and windows in place.....	183.06	75.16			258.22
Wood tanks, f. o. b. Oatman		7,811.06			7,811.06
Wood tanks, erection	939.27	122.80		3.62	1,065.69
Piping, f. o. b. Oatman		2,864.93			2,864.93
Piping, erection.....	1,329.63				1,329.63
Electric wiring, f.o.b. Oatman		2,906.89			2,906.89
Electric wiring, erection.....	1,483.04				1,483.04
Belting in place.....	18.06	722.22			740.28
Launder lumber.....		71.57			71.57
Launders, erection.....	412.14	22.87			435.01
Engineering, Los Angeles office.....				9,050.99	9,050.99
Engineering, field.....	749.05	182.80		51.99	983.84
Tailings dump and fences.....	330.87	24.89			355.76
Furniture and fixtures	6.50	51.50			58.00
Painting.....	221.87	132.30			354.17
Small tools and equipment.....	117.24	122.31			239.55

Total mill construction..... \$32,211.08 \$90,328.04 \$135.81 \$10,864.16 \$133,539.09

\* Includes \$9,015.20 for precipitation presses and zinc feeder that should properly be charged to the refinery.

Continuous counter-current decantation is the cyanide process used. The cyanide plant has five Dorr thickener tanks 40 x 12 ft. and four Dorr agitators 24 x 14 ft. Each thickener has a Campbell and Kelly diaphragm pump located above the tank to pump the pulp into the following tank. Three centrifugal pumps handling the clear solution are each connected to a fourth pump acting as a standby. Each pump is direct-connected, motor-driven, and equipped with automatic float switch at the priming tank to shut off the motor should the priming tank be drained. A small compressor is installed to supply air to the agitators at 20 lb. pressure.

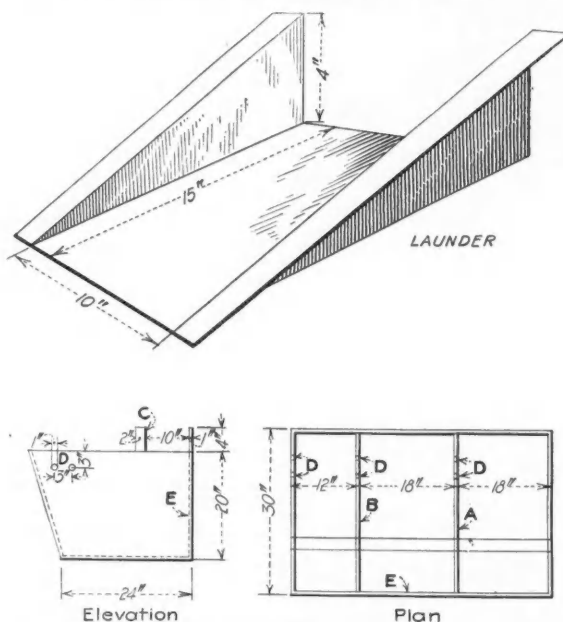
The solution from the first thickener after entering the press-solution tank is pumped by a centrifugal pump through a 3½ x 3½-ft., 28-frame Merrill clarifying press, the clarified solution going by gravity to a 20 x 10-ft. gold tank. From here a 7 x 8-in. Platt Iron Works pump

sends the pregnant solution through two Merrill 36-in. 32-frame precipitation presses in the refinery, zinc dust having been added by means of a feeder and emulsifier to the pipe from the gold tank to the triplex pump. Duplicate triplex and centrifugal standby pumps are installed. The buildings are all timber-framed and covered with corrugated iron. The grinding and cyanide departments have concrete floors sloping ¼ in. per ft. where possible and all draining into a sump.

## A Well-Constructed Concentrates Box

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

Attention given to the saving of concentrates and the proper separation of heads, tailings and middlings is of as much importance in small milling operations as in large ones, and the impression that any kind of a box is good enough to catch concentrates from the tables,



PROPERLY CONSTRUCTED CONCENTRATES BOX

especially in a small mill, is wrong. The type of concentrates box shown in the diagram was primarily for use with James' tables, but can be used equally well with the Wilfley, Butchart or other makes of concentrating tables. The position of the intermediate partitions, A and B, is determined somewhat by the ratio of the products formed during the operation and will differ for various substances, the dimensions shown being found satisfactory for a pyritic tungsten ore. By means of tin launders (which are shown in detail) sliding on the guide (C) and the back (E), the separation may be made accurately and the material deflected to the proper compartment. The holes (D) are 1 in. in diameter and placed 3 in. below the top to drain off the water. When the compartments are full, the concentrates are shoveled out. This box requires 40 sq.ft. of 1-in. T. and G. and 4 ft. of 2 x 4-in. lumber and can be built easily in one day by a carpenter. The back (E) is placed at the discharge end of the table.

\*Excerpted from a paper entitled "The United Eastern Mining and Milling Plant," by Otto Wartenweiler, to be presented at the February, 1918, meeting of the American Institute of Mining Engineers at New York.

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## Events and Economics of the War

Half a million American troops will be in France early this year, and if transports are available a million more will cross the water before Dec. 31. This was the sensational statement made by Secretary Baker on Jan. 28, when in a three-hour speech he defended himself and the War Department against Senator Chamberlain's charges of inefficiency. Suspension of the Monday closing order, now in effect in the Eastern half of the country, is under consideration by Dr. Garfield; though freight congestion is still bad, the fuel situation is steadily improving, especially in the matter of coaling ships. A proclamation was issued by President Wilson on Jan. 26 calling for greater food saving. A bill to create a half-billion-dollar "War Finance Corporation," favored by Secretary McAdoo, was introduced in the House. The Senate Committee on Interstate Commerce proposed to terminate Government control of railways 18 months after the end of the war.

Abroad, the supreme Allied war council convened at Versailles. American troops were reported to be holding a small sector on the Lorraine front. Air raids were made on London and Paris. Three Austrian mountain positions, with 2600 prisoners, were taken on the Asiago heights by the Italians. Extensive strikes are reported to have occurred in various parts of Germany. Bolsheviks took the Russian towns of Odessa and Orenburg.

### War Finance Corporation Proposed by Secretary McAdoo

Creation of a War Finance Corporation by the Government to afford financial assistance, either directly or indirectly, to persons, firms, corporations and associations whose operations are necessary or contributory to the prosecution of the war, was asked of Congress on Jan. 28 by Secretary of the Treasury McAdoo. This aid is to be furnished "where such persons . . . shall be unable to procure funds on reasonable or practicable terms from the general public or through the regular banking channels." The corporation is to have \$500,000,000 capital stock, all of which is to be subscribed by the United States. It may make advances to any bank, banker, or trust company which has extended financial aid to persons or corporations to aid in prosecuting the war. Advances may also be made to savings banks or other banking institutions which receive savings deposits. In all such cases, advances are to be secured by the deposit of collateral. Similar advances may in exceptional cases be made direct to individuals or corporations engaged in war work.

The War Finance Corporation is to be empowered to issue its own notes or other obligations, to an extent of eight times its capital stock, running for not less than one year or more than five years. These obligations may be sold, publicly, and are also to be eligible for purchase or rediscount by the Federal Reserve banks, which may, in turn, issue their circulating notes against them. Another section of the act provides for the control by the

corporation of private security issues. It is to have the power of licensing, or refusing to license, any individual issue in excess of \$100,000. The corporation is to have five directors, one of whom is to be the Secretary of the Treasury, in whose hands will be placed this immense measure of control over all private financial operations.

A. Barton Hepburn, banker, author and economist, when asked his opinion in regard to the wisdom of the corporation, said in part:

"The proposed board is to regulate all issues of securities that equal \$100,000 in amount. That would include the activities of small villages and towns. Our officials at Washington are staggering under enormous and laborious responsibilities. Is it prudent to enlarge their labors by this sweeping responsibility? Is it prudent to send every locality to Washington for permission to manage its local affairs? And members of the Supreme Court, of the Interstate Commerce Commission, of the Federal Reserve Board—in short, nearly all important United States officials—are appointed by the President by and with the advice and consent of the Senate. The proposed board is given very unusual powers, perhaps necessary in this war crisis, and is composed of the Secretary of the Treasury, who appoints four additional men, approved by the President, to act with him. Is so much autocracy necessary to preserve democracy?"

There is a feeling in Congress, says the *Times*, that giving the Government control over money will grant a closer power over nonessential industries, through a certain priority of loans, than is possible even in its authority over the raw products of manufacture. Chairman Kitchin believes that the Government will be able to restrain issues of gilt-edged securities which would compete with successive Liberty loans.

### Labor Department to Regulate Wages

The special labor advisory committee which was appointed by order of President Wilson has drafted a so-called war-labor plan which it is said has the approval of the Secretary of Labor. Under the new program, a reorganization of the Labor Department is under way that includes within its scope the following movements:

To prevent strikes, a special committee made up of men named by the National Industrial Conference Board, which contains representatives of America's industrial associations—one man to represent the public and six men named by the American Federation of Labor—will meet in Washington within a few weeks and draw up an ironclad agreement by which a definite plan for regulating wages during the war will be enforced. Eight new bureaus will bring about a reorganization of the entire administrative plan of the Department of Labor. The ordnance, aircraft, shipbuilding and other production divisions of the Government will receive all the help they may require by reporting their needs to the Department of Labor.

The closing paragraph of the advisory committee's report states plainly that unless a centralized administration of production is effected the whole labor plan as organized will be insufficient to meet the nation's great war emergency. This, in effect, is a decision by the labor experts of the country that a munitions chief or a munitions department is essential if the war materials are to be produced. The memorandum says:

"Labor matters do not stand by themselves. They are phases of production, and no centralized administration of labor can be adequate which does not go hand in hand with the centralization of administration of production. How this latter centralization is to be accomplished is not for your council to consider, but its judgment is clear that failure to secure such centralization spells failure to secure a sound situation in labor and failure to prosecute the war vigorously."

So great is the emergency of taking up the labor problem of the country at once and obtaining agreements and guarantees in order that the necessary workmen can be mobilized for the war work, that the advisory committee points out that no problems can be left to work themselves out.

### Intermountain Rate Case Decided

In deciding the intermountain rate case on Jan. 30, the Interstate Commerce Commission authorized transcontinental railroads to increase rates from Eastern points to Pacific seaport cities to the level of the rates now prevailing to intermountain points. The order becomes effective on Mar. 15. Simultaneously, the commission refused to allow railroads to cancel existing commodity rates on shipments of less than a carload and apply higher class rates.

The commission found that the former reasons for maintaining lower through rates to Pacific ports from Eastern territory than to the mountain territory were removed when ships formerly in service between the Atlantic and Pacific seaboard, by way of the Panama Canal, were taken over for transatlantic service. After analyzing the figures presented by the railroads, the commission decided that rates to the coast were abnormally low, considering service rendered and transportation expenses. For that reason the petition of commercial interests of Pacific points that the intermountain rates be lowered was refused.

### Government Railway Control

Director General McAdoo declares erroneous the statement that he was about to appoint state directors for the operation of railroads; no such measure is being considered. He puts into effect, however, a new system of Government railroad administration, dividing the country into three sections—East, South and West—and placing a railroad executive at the head of each. Mr. McAdoo has appointed the following men as members of the Railroad Wage Commission: Franklin K. Lane, Secretary of the Interior; Charles C. McChord, of the Interstate Commerce Commission; Chief Justice J. Harry Covington, of the Supreme Court; and William R. Willcox, of New York. Mr. Willcox has resigned as chairman of the Republican National Committee.

The duties of the commission are to make general investigation of railroad wages of the United States with

the view to determining the wages of the different classes of labor on railroads. Work will be begun at once and a report giving recommendations in general terms as to changes that are necessary will be made to the Director General, who will then make a decision upon it. The powers of the commission are broad and it will consider not only the compensation of railroad employees, but the relation of railroad wages to those in other industries, conditions in different parts of the country, the special emergency existing owing to war conditions, the high cost of living, and the relation between different classes of railroad labor.

### The Labor Power of the United States

The available labor power of the United States totals 29,650,000 men, according to a survey made by the public service reserve of the Department of Labor. The total labor power is estimated at 40,100,000 persons. This includes 8,750,000 women who are engaged in gainful occupations. Two million of these women are engaged in the mechanical and manufacturing industries, and therefore are fitted for machine and other work on munitions of war, on shells, on clothes and shoes. All of the women, however, were deducted from the total figures given by the reserve of available labor power. There was also a deduction of 1,700,000, estimated as the total requirements for the National Army. This leaves the estimated total 29,650,000 as the available labor supply.

These figures show that there are 1,500,000 men engaged in domestic and personal service in the United States. The other general classifications show 11,000,000 men and 2,000,000 women engaged in agricultural, forestry and animal husbandry, 1,000,000 men engaged in mining of all kinds, 9,000,000 men and 2,000,000 women engaged in the mechanical and manufacturing industries, 2,600,000 men and 200,000 women engaged in transportation, 3,400,000 men and 600,000 women engaged in trade, buying and selling, 550,000 men and 50,000 women engaged in the unclassified public service, 1,000,000 men and 70,000 women engaged in the professions, 1,500,000 men and 2,500,000 women engaged in domestic and personal service and 1,300,000 men and 700,000 women in clerical occupations. It is estimated that 225,000 men will be needed in France in staff corps work for each 1,000,000 fighting men or men in the line. This means that one man behind the lines will be required to care for the needs of each four fighting men. For the most part they must be skilled men—engineers, building trades mechanics, machinists and blacksmiths.

"High wages mean high prices. Fresh cycles of wage advances succeed one another. Each one results in further increases of prices or in preventing a reduction of prices. The producers are raising prices against themselves as consumers. We are deeply impressed with the seriousness of the situation, and are convinced that if the process continues the result can hardly fail to be disastrous to all classes of the nation." This is the summing up of a report just given to the House of Commons by the committee on national expenditure into the rising cost of necessities of all kinds in Great Britain. "The whole thing is a vicious circle of rising wages followed by rising prices."



## Industrial News from Washington

BY PAUL WOOTON, SPECIAL CORRESPONDENT

### May Export Certain Metals to Norway

After long study, the War Trade Board has decided upon the quantities of certain commodities which may be exported to Norway. The negotiations were conducted with Dr. Fridtjof Nansen. Under the agreement, Norway will receive 1000 tons of lead, 80 tons of tin, 12 tons of antimony and 350 tons of asbestos. The amount of copper which is to be allowed has not yet been determined, as is also the case with bismuth, manganese, mica, nickel, titanium, wolfram, chrome and all their ores and alloys. These latter, however, together with tin, may not be exported from Norway to the Central Powers.

Copper may be exported by Norway to the Central Powers, under certain conditions, which are set forth in the following excerpt from the War Trade Board's statement:

The exportable surplus of copper controlled by the United States and its associates is not sufficient to meet all demands. But so far as the war needs of the United States and its associates permit, the board will assist in every way in supplying the copper needed by Norway. The board agrees to Norway's export of copper to the Central Powers only in compensation for copper received from those powers in manufactured form, plus 5% to cover wastage. The United States cannot concede the right of Norway to export compensation copper to the Central Powers in the form of the copper contents of ores, which, with the exception of purple ore, are lean in copper but rich in sulphur. The sulphur contents of these ores greatly exceed in value their copper contents. Sulphur is a commodity of prime importance in the manufacture of explosives, and is of the greatest value as well to the United States and its associates as to the Central Powers. Its export in this form would, therefore, result in granting to the Central Powers, under guise of compensation for copper, a large amount of valuable war material, which has nothing whatever to do with the principle of compensation. This board is unwilling to permit such a result. No pyrites has in fact been exported by Norway to the Central Powers for a considerable period of time. The compensation copper exported to the Central Powers should be in the form of crude or refined copper.

With regard to certain other mineral products, the board's statement says:

In our negotiations Norway has attempted to reserve the right to export from Norway to the Central Powers all other articles than those mentioned above without any limitation whatever as to kind or quantity. If we were to accept this proposition we would be consenting to the export freely by Norway to the Central Powers of many of the commodities which we are asked to furnish to Norway as well as all forms of nitrate, of which Norway produces many, besides calcium nitrate. Iron ore, iron, steel, zinc and aluminum would pass freely to the Central Powers.

The board, of course, assumes that the Norwegian government will consult with the United States and its associates as to the sources from which Norway shall from time to time obtain her supplies, and if this be done the board feels warranted in assuring Norway that, in case an agreement shall be reached, the reasonable requirements of Norway can and will be met, and that the United States and its associates will use all their efforts to this end.

### First Potash Land Permit Issued

Twenty-five hundred and sixty acres of alkaline marsh land in Inyo County, Calif., is covered by the first permit for leasing potash lands under the new law, which was issued on Feb. 2 by the Secretary of the Interior. Others

will be issued in the near future, the applications having been practically approved. Under the recently enacted statute, exploration permits, good for two years, may be issued covering tracts of land not exceeding 2560 acres. In case potash of commercial value is discovered on public lands, the permittee will be given a patent for one-fourth of the land covered by his permit. The remainder may be leased by the Government to others.

### Is a Mineral Administrator Wanted?

Basing their view on the belief that the country, as a whole, regards the conduct of the Food and Fuel administrations favorably, despite the drastic application of authority made by Dr. Garfield, the friends of the bill providing for a mineral administrator are much encouraged. When Dr. Garfield's order was first announced and met with such manifestation of disapproval, it was thought that any chance that the mineral bill might have had was lost. All had agreed that its failure or success would depend on the manner in which the public received the closing-down order.

### I. C. C. Asked To Change Classification of Minerals in West

Applications have been filed with the Interstate Commerce Commission to change the Western freight classification of minerals as follows: Increase from 40,000 to 50,000 lb. in the carload minimum weight on lead ore concentrates; increase from 30,000 to 36,000 lb. in carload minimum weight on zinc wire; increase from 30,000 to 36,000 lb. in the carload minimum weight of blast-furnace accessories; change in package requirement restricting movement of arsenic trioxide so as to provide for shipment only in tight barrels, to prevent sifting and the possible contamination of foodstuffs; increase from 40,000 to 50,000 lb. in carload minimum weight on zinc concentrates; increase from 40,000 to 50,000 lb. in the carload minimum weight on lead or zinc mine refuse (chats); increase from 40,000 to 50,000 lb. in the carload minimum weight on copper or lead bullion in pigs or slabs.

### May Divert Imports of Manganese to Florida and Gulf Ports

The U. S. Shipping Board is again surveying the shipping situation, in so far as it pertains to manganese ore, in the hope of finding a way of diverting some of the ships in this service to other trade. A saving in tonnage is expected to result from the plan of allotting imports of manganese ores to ports other than those through which they customarily enter. By using Florida and Gulf ports, steaming distance will be shortened and congestion at Baltimore and Philadelphia avoided. Most of the manganese received from abroad has come through the two ports mentioned.

## Editorials

### The Roots of the Trouble

SENATOR HITCHCOCK in his great speech in the Senate on Feb. 4 hit the nail squarely on the head when he said that nothing but the genius of perfection and the power of omniscience could enable one man to look after the vast interests involved in our successful prosecution of the war. "President Wilson," he said, "cannot at one time design and conduct our difficult and delicate foreign policy, perform the duties of Commander-in-Chief of the Army and the Navy, act as his own prime minister, design all the legislation for Congress to pass, dictate all the industrial, financial, and political activities of the country, and look after the expenditure of \$250,000,000 a week." And we may add that he cannot do all those things and attend to such details as fixing the price for copper. Amazing as it may appear, he has undertaken to consider and decide upon such details.

The present turmoil in the affairs of the United States, especially the industrial and financial affairs, results, in our opinion, from three fundamental causes, as follows:

1. The adoption by the Administration of the economic fallacy that repudiates the law of supply and demand. Nonessential production that would naturally be extinguished by high prices is but imperfectly checked by the arbitrary rulings of boards that in the nature of things cannot be omniscient and omnipotent.

2. The impossibility of one man being able to do what he has undertaken, and the ideas and policies that have stood in the way of the development of a proper organization and the coördination of plans.

3. The attitude of labor, which, regardless of wages and all other conditions, causes it to perform less than full-time work at average maximum efficiency.

The first trouble may be cured by abandonment of the whole price-fixing policy; the second may be corrected by opening the eyes of the President. In both of these matters the decision is squarely up to the President. As to labor, nobody can make it work if it does not want to. After it has got the high wages to which it is entitled, and after it has obtained correction of such evil working conditions as may rarely exist here and there (we cannot believe there is any general evil)—if, after it has secured those things, it is still unwilling to work and work hard, nothing but patriotism will induce it to do so.

### The Proposed Mines Administration

A BILL fathered by the War Minerals Committee has been drafted but not yet introduced in Congress, the purpose of which is to provide for an administration of the metal mines of the country similar to the administration of the fuel and food supplies. Regarded more narrowly, the purpose is to provide for the supply of a few essential minerals whereof we are short,

e.g. pyrites, manganese ore, graphite, etc. In support of the bill it is argued that unless there be a proper control of these things there are likely to be developments of crises similar to that resulting from the present shortage of coal. On the other hand, the bill is meeting with a public reception that ranges from opposition, through suspicion and coolness, to lukewarmness. Outside of Washington we do not hear of anybody who is enthusiastic about it. The mining public is highly suspicious respecting the broad powers for interference in the mining industry that are written into the bill. We have been slow in expressing our opinion of it, refraining from doing so until after mature reflection. Our opinion is as follows:

1. There is a danger of crises in certain mineral supplies, but to avert them there is need rather for a supreme board of directors, coördinating all industrial policies, rather than any more confusing legislation, which we think this would be.

2. The great metal industries—iron, copper, lead, zinc, etc.—are well able to take care of themselves, and any legislation that would afford ground for further tampering with them should be resisted most strenuously.

3. There is a need for an advisory and administrative minerals and metals board, executing details of policy under a supreme board of directors. As examples of the functions of such a board, we may mention these: We are confronted by a shortage of sulphur, especially in the form of pyrites, but we possess a considerable supply of brimstone that ought to be used most advantageously, which the proposed board should direct. Similarly as to the use of zinc blende. Such a board would also look into the augmenting of our scant tin supply, which might be done by facilitating the completion of the tin smelteries now under construction by private concerns, by promoting the importation of ore from Bolivia, by reducing the wastes by junk smelters, etc. These and numerous others that might be mentioned would be valuable functions, that would justify the creation of such a board.

4. The terms of the pending bill that give the board economic and price-fixing powers should be rigorously pruned out. While we do not lack confidence in the exercise of such powers by the War Minerals Committee and the Bureau of Mines as constituted at present, we should fear the possibility of such powers, necessarily written broadly in the bill, falling into other hands. We think that the result of a price-fixing policy in blighting production has already been amply demonstrated, and there should be no more of it.

5. We are aware that the purpose of the framers of the bill is to *stimulate* the production of certain things, and therefore they contemplate *minimum* prices rather than *maximum*, but the power to fix one kind implies the other and should not be conferred, for the reason previously given. If there be need for some commodity, natural high prices will stimulate the production of



it, just as we are now witnessing the development of a graphite industry in Alabama. If the natural development be not sufficiently rapid, owing to the reluctance of private capital to embark in enterprises of uncertain life, let the minerals and metals board be authorized to form a mining corporation with national capital. Such a corporation could enter into contracts for mineral supplies upon terms that would insure private adventurers and accomplish the same purpose as minimum prices without introducing the evils of general price-fixing.

In brief, therefore, we favor the general idea of the bill of the War Minerals Committee, but we think that it should be very severely amended, so as to preclude all danger of further tampering with our great, self-reliant and efficient mining industry. And there should not be left in the bill anything that might be used as a pretext for "taking over" any mine or any part of the mining industry.

### Some Things To Wonder About

OUR naval men began to prepare for war in 1915, they say. Therefore, in 1917 they were ready. What puzzles us is why the Army staff, observing the new features in warfare that were being developed in Europe, did not begin to think how they affected their profession. We should have thought that it would be a matter of professional interest for the general staff to sketch out the plan for a modern army of one million men, its equipment, the quantity of material, etc. If it had done so it would have been more nearly ready; but instead of doing so it appears to have been satisfied to read the newspapers as a reflection of current history in the same vague way that Tom, Dick and Harry were doing.

Another thing that amazes us is why, when the Allies had so efficiently coördinated their munitioning through the purchasing agency of J. P. Morgan & Co., was not that organization immediately adopted by the U. S. Government instead of relegating it to the side lines and trying to create a new one?

And still another thing. Why is it that the shell, shrapnel, gun and rifle factories, the explosives works, and all the rest that were so smoothly supplying the Allies in 1915 and 1916, became so helpless when the United States wanted their assistance?

In our issue of Feb. 2 we published an article on the heap-leaching of copper ores by George D. Van Arsdale, of the Phelps Dodge Corporation. Mr. Van Arsdale states, incidentally, that it is unwise to publish reports of experimental work before final results are obtained. Be this as it may, the fact remains that the paper is a clean-cut and valuable one, dealing with a subject which has an important bearing upon the future production and treatment of low-grade copper ores. Mr. Van Arsdale places the low limit of copper in milling ores at 1½%. It is evident that in mining the enormous tonnages of porphyry ores the present much lower grade copper rock will be either mined and waste piled or else left underground in a state of partial development. Heap-leaching, as proposed and carried out experimentally on Copper Queen and Burro Mountain ores,

offers promise of rendering available the copper in what has hitherto been considered waste. The method has the merit of simplicity and directness, both in the plant required and in its operation. The weakest points are low extraction, length of time and the possibility of large and uncertain leakage losses due to seepage. Mr. Van Arsdale discusses the chemical, physical, engineering and economic factors in a way that is illuminating and thorough.

The reason why any price-fixing discourages production is in no way mysterious. Take the case of copper, for example. Before the "fixing" the price was about 26c. (not the 35c. that the authorities adopt in estimating the millions they saved the public). Even at 26c. there was some copper produced at no profit. Such production is checked immediately, for there is no longer the incentive to those producers to keep going in anticipation of a higher price that natural market conditions might establish. The industry adjusts itself to a basis of 23½c., with another group of producers simply getting a new dollar for an old one. But that condition does not last. The prices for labor and material, which are not fixed, go up, the cost of producing copper goes up, and each rise blows out some more producers just as surely as if the price for copper were falling.

Elsewhere in this issue we publish the regulations of the Bureau of Internal Revenue governing the collection of the income tax, dated Jan. 2, 1918, but issued Feb. 2, in so far as they relate to the important subject of depletion and depreciation of mines. In view of the great interest in this matter, we hurried these provisions into print, and present them without having had any opportunity to examine them carefully and comment upon them. The first reading, however, inclines us to the opinion that in the main the regulations are fair. There is no doubt that they are founded on a sound theory.

The absence of team-work is constantly cropping up in Washington. Some parts of the Administration now seem to be scared by the realization of how the political policy has checked industry. Mr. McAdoo is working to speed up production. Dr. Garfield is working to retard it. Verily the Administration needs a board of directors to decide what it wants to do. Newspaper dispatches imply that the President is not so averse to the idea as he is to having Congress force it on him.

There was some hope that the President's taking over the railways was going to confer upon the country the inestimable blessing of the disappearance of the Interstate Commerce Commission, but alas! a compromise in Congress has decreed that it is to remain with us. In business such a bungler is fired, but not in politics. There is but faint hope that we may lose the Federal Trade Commission.

Senator Hoke Smith bubbles to the surface, says the *Evening Post*, to reveal the economic laughability of fixing the price of cotton. "Price-fixing, if applied to cotton," he points out, with terrific logical force, "should also be extended to the pay of the laborers. When price-fixing they should not single out cotton unless they

go all the way down the line to every manufactured product of cotton." How true! And of course, Senator Smith pointed out, when prices were being fixed for steel and copper, how the Government must also fix the price of locomotives, and scissors, and automobiles, and coffee percolators.

### BY THE WAY

In December, 1917, the amount of Utah stock held in France was 106,251 shares, against 259,153 in July, 1914. The corresponding figures for Chino were 45,838 (96,204), and for Ray, 30,113 (42,411).

On request of Senator Calder, the Senate on Jan. 31 ordered printed in Congressional Record the speech of Col. W. B. Thompson, delivered in New York recently, in which he described conditions in Russia growing out of the Bolsheviki movement. This speech was published in full in the *Journal*.

"When I came back from Russia a few days ago," said Col. W. B. Thompson, "and began to talk about what I had seen and learned and how I felt about it, my friends said, 'What! Have you been dyed red, too?' And I replied, 'Well, if to feel sympathy for 170,000,000 people who are struggling for liberty and fair living is to be dyed red, then I have.'" Russia's principal needs from America, he declared, are sympathy first—and shoes. There will be 50,000,000 Russians without shoes by spring. It is impossible to get shoes in Russia now.

In its last monthly circular the American Exchange National Bank remarks: "'Win the war' is the chief business of the day. All else is subordinate to that, but killing other business will not achieve victory. Only by sustaining the production of real wealth and keeping labor employed can we get money for prosecuting a long war. We cannot have 'business as usual' in the midst of such a struggle, but it is dangerous to disregard those natural laws which exist and control the distribution and sale of all products. Price regulation is an invasion of the law of supply and demand that cannot be indulged in as freely as many profess to believe."

### The Real Red-Tapers\*

Congressional investigators, now having their fling in Washington, make a guileless exhibition of themselves. They come forward with impatient demands that "red tape" be cut. But the moment they discover a Food Administrator, or a member of the Council of National Defense, who has actually slashed through the red tape and got things done, they level at him an accusing finger and sternly exclaim: "That was illegal." They go on to inform the gentleman who has proceeded vigorously, but irregularly, that he really ought to be put in jail for what he has done. This is the pretty Congressional way of "encouraging the others." Bold initiative is rebuked; and then the safely routine and stodgy official is furiously asked why he does not display bold initiative. Thus we have the pleasing spectacle of the chief

authors and worshippers of red tape vehemently arraigning both those who live in awe of it and those who flout it. The farce of inconsistency could no further go.

Who is it that has insisted upon swathing Government business in red tape? Congress. By minute statutes, jealously guarding the expenditure of every dollar, by rules and regulations spun out into a spider-web, by immemorial custom acquiring the force of law, administrative agents have been for years cabined, cribbed, confined. They cannot stir a step without first looking out of the window, reading the temperature, taking a survey of sun, moon, stars, and asking 10 assistants what they think of the prospects of rain. If the step they take is, according to the red tape duly provided, a misstep, some auditor will hold up their accounts and stop their pay. And it is under the dead weight and terror of such a system that officials are expected to exhibit the highest qualities of energy, dash, and disregard of conventionalities, with the noble "get-there" spirit. It is Congress that has established the fettering checks and restraints under which official initiative is suffocated. It is Congress that has gone upon the theory that every disbursing officer, every purchasing agent of the Government, is presumptively dishonest, and will steal or pilfer or graft unless an elaborate system of paper espionage and regulative detail is placed before him like a barbed-wire entanglement. And now Congress looks upon its own creation and sees that it is *not* good.

There is nothing new in the disclosures of choking red tape now being made. The results brought out are only what have steadily been predicted by experts who have looked carefully into the Government Circumlocution Office. In recent years there have been many reports in the interest of economy and efficiency in the Government service. Several of these have struck at this very matter of needless red tape. They have shown the incredible and fantastic piling up of petty maneuvers in order to get the smallest thing done. If a clerk in the Treasury wants a new stick of sealing wax, the process of getting it requires two or three days of requisitions and initialling and O. King. An official in the War Department may run short of letter paper. The supply may be stored just across the hall from him. But can he step across and get it and go on with his correspondence? Not he. A blank application must be filled out, half a dozen signatures secured for it, messengers dispatched here and there, the whole sent, it may be, to the War College for a final *visé*, and in the end, it is probable, the wrong paper will appear!

We would not lay the blame exclusively upon Congress. There has been a general popular inertia and indifference in all this affair of Government red tape. But now that the glare of war has thrown the defects and dangers of the old system into high relief, the opportunity to press for a reform ought not to be lost. Congress is evidently stirred by what has come out; but what is to be feared is that it will legislate against red tape by providing a lot of new red tape. Trouble with ordnance and munitions, it will be said by some, can be cured by creating a new member of the Cabinet, and surrounding him with a network of restrictive statutes. The true hope of improvement lies in the fact that the country is now looking on and getting a vivid sense of who are the real Government red-tapers.

\*From the *Evening Post*, Jan. 4, 1918.



## Federal Income Tax on Mines

The regulations governing the collection of the income tax imposed by the act of Sept. 8, 1916, and its amendment of Oct. 3, 1917, are, in so far as they apply to mines and mining corporations, reproduced from Regulations No. 33 (revised) of the U. S. Internal Revenue Department, as follows:

Art. 171. Paragraphs "seventh" and "eighth" of section 5 (a) and paragraph "second" of section 12 (a) of Title I of the act of Sept. 8, 1916, authorize individuals and corporations to deduct from gross income "a reasonable allowance for exhaustion, wear and tear of property, and . . . . (b) in the case of mines, a reasonable allowance for depletion thereof not to exceed the market value in the mine of the product thereof which has been mined and sold during the year for which the return and computation are made"; provided, that when the sum of the annual allowances for depletion equals the capital originally invested, or in case of purchase prior to Mar. 1, 1913, the fair market value as of that date of the mineral "in place," no further allowance on this account shall be made.

Ownership of the mine content at the time for which computation is made is an essential prerequisite to an allowable deduction for depletion.

The deduction in the case of a lessee will be limited to an amount equal to the capital actually invested in the lease, without regard to value as of Mar. 1, 1913, or any other date.

The paragraphs of the title above referred to authorize in the case of mine owners two classes of deductions to take care of the wasting of assets, namely (a) depreciation, (b) depletion.

### DEDUCTIONS AND VALUATION

Art. 172. If the property was acquired by purchase or otherwise (other than by lease) prior to Mar. 1, 1913, the amount of invested capital which may be extinguished through annual depletion deductions from gross income will be the fair market value of the mine property so acquired, as of Mar. 1, 1913. The value contemplated herein as the basis for depletion deductions authorized by this title must not be based upon the assumed salable value of the output under current operative conditions, less cost of production, for the reason that the value so determined would comprehend the profits to be realized from operation of the property.

Neither must the value determined as of Mar. 1, 1913, be speculative, but must be determined upon the basis of the salable value *en bloc* as of that date of the entire deposit of minerals contained in the property owned, exclusive of the improvements and development work; that is, the price at which the natural deposits or mineral property as an entirety in its then condition could have been disposed of for cash or its equivalent.

The *en bloc* value having been thus ascertained, an estimate of the number of units (tons, pounds, etc.) should be made. The *en bloc* value divided by the estimated number of units in the property will determine the per unit value, or amount of capital applicable to each unit, which, multiplied by the number of units mined and sold during any one year, will determine the sum which will constitute an allowable deduction from the gross income of that year on account of depletion.

Deduction computed on a like basis may be made from year to year during the ownership under which the value was determined, until the aggregate *en bloc* value as of Mar. 1, 1913, of the mine or mineral deposits shall have been extinguished, after which no further deduction on account of depletion with respect to this property will be allowed to the individual or corporation under whose ownership the *en bloc* value was determined.

### FAIR MARKET VALUE MAR. 1, 1913

The precise detailed manner in which the estimated fair market value of mineral deposits as of Mar. 1, 1913, shall be made must naturally be determined by each individual or corporation interested and who is the owner thereof, upon such basis as must not comprehend any operating profits, the estimate in all cases to be subject to the approval of the Commissioner of Internal Revenue.

In any case in which a corporation uses for purposes of its income return an estimate of the value of mines or of mineral lands or properties as of Mar. 1, 1913, as the basis of computing amounts to be deducted for depletion or return

of capital, this department in passing upon the accuracy and fairness of such estimate will attach due weight to the market value of the stock of the corporation on Mar. 1, 1913, and also to sworn statements as to the value of capital stock of the corporation filed at any time thereafter for purposes of the special excise tax on corporations based on value of their capital stocks imposed by Title IV of the act of Sept. 8, 1916.

In any case in which any depletion deduction is computed on the basis of the cost or price at which any mine, mineral lands or properties were acquired, the corporation will be required upon request of the Commissioner of Internal Revenue to show that the cost or price at which the property was bought was fixed for purposes of a *bona fide* purchase or sale by which the property passed to an owner in fact as well as in form, different from the vendor. No fictitious or inflated cost or price will be permitted to form the basis of any calculation of a depletion deduction, and in determining whether or not the price or cost at which any purchase or sale was made represented the actual market value of the property sold, due weight will be given to the relationship or connection existing between the party or parties selling the property and the buyer thereof.

### RECORDS TO BE KEPT

Every individual or corporation claiming and making a deduction for depletion of natural deposits shall keep an accurate ledger account, in which shall be charged the fair market value as of Mar. 1, 1913, or the cost, if the property was acquired subsequent to that date, of the mineral deposits involved. This account shall be credited with the amount of the depletion deduction claimed and allowed each year, or the amount of the depletion shall be credited to a depletion reserve account, to the end that when the sum of the credits for depletion equals the value or cost of the property no further deduction for depletion with respect to this property will be allowed. The value determined and set up as of Mar. 1, 1913, or the cost of the property if acquired subsequent to that date, will be the basis for determining the depletion deduction for all subsequent years during the ownership under which the value was fixed, and during such ownership there can be no revaluation for the purpose of this deduction if it should be found that the estimated quantity of the mineral deposit was understated at the time the value was fixed or at the time the property was acquired.

In cases wherein the quantity of the mineral deposit in the mine prior to Mar. 1, 1913, cannot be estimated with any degree of accuracy, it will be necessary, if depletion deductions are to be taken, for the individual or corporation owning the deposits, with the best information available, to arrive at the fair market value of the property as of Mar. 1, 1913; that is, its fair cash value *en bloc*, if such value is believed to be other than its original cost, which value, during the period of the ownership under which it was determined, shall be final and shall be charged to the property account as hereinbefore indicated, and then, on the basis of the most probable number of units in the property, the per unit value shall be determined as the basis for computing annual depletion allowances, this method and allowances to be continued until, but not beyond, the time when the value as of Mar. 1, 1913, shall have been extinguished.

### WHEN TO USE ORIGINAL COST BASIS

The original cost of the mineral deposit may be taken as the basis for computing annual depletion deductions if the fair market value as of Mar. 1, 1913, as hereinbefore required, cannot be ascertained otherwise, allowance being made for minerals which may have been removed prior to that date.

In cases wherein a mineral property was acquired subsequent to Mar. 1, 1913, the same rule for computing the annual depletion deduction will apply, except that in such case the basis of the computation will be the actual cost rather than the value as of Mar. 1, 1913.

A lessee corporation is not entitled to any depletion deduction as such, but if such lessee, in addition to royalties, pays a stipulated sum for the right to explore, develop and operate a mine, such sum may be spread ratably over the estimated number of units in the mine, and thus ascertain the amount of invested capital or bonus payment applicable to each unit. The per unit cost thus ascertained will be multiplied by the number of units removed from the mine during any one year and the result will be the amount that may be deducted from the gross income of that year as a return of the capital invested. In the case of both mine owner and lessee no deduction for depletion or return of capital will be allowed when the invested capital has through the aggregate of all such deductions been extinguished.

## Foreign Trade in Copper

Exports of copper from the United States in October, November and the first 11 months of 1917 are reported by the Department of Commerce as follows:

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Ore and concentrates, contents.....	573,241	48,740	4,922,473
Unrefined, in bars, pigs, etc.....	4,256,707	6,784,621	17,205,965
Refined, bars, etc.....	81,316,090	76,553,151	947,299,546
Old and scrap.....	60,542		950,276
Plates and sheets.....	9,442,509	2,505,643	35,883,189
Pipes and tubes.....	523,007	564,994	(a) 6,730,575
Wire, except insulated.....	2,008,119	1,617,244	22,642,689
Composition metal, copper chief value.....	11,829	4,718	(a) 1,204,543
<b>Total.....</b>	<b>98,191,954</b>	<b>88,079,111</b>	<b>1,036,839,256</b>

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Robert I. Kerr.....	5.00
Engineers of Washoe Smeltery, Anaconda Copper Mining Company.....	205.00
Harry C. Graham.....	25.00
Utah Copper, Nevada Consolidated, Ray Consolidated and Chino copper companies.....	1000.00
A Friend, Jan. 23.....	5.00
John Gillie.....	25.00
C. N. Houser.....	5.00
C. K. Lipman.....	50.00
Theodore Sternfeld.....	50.00
Clinton H. Crane.....	500.00
T. Wolfson.....	10.00
William H. Hampton.....	10.00
W. E. Merriss.....	10.00
J. Parke Channing.....	100.00
Miami Copper Co.....	250.00
J. H. Means.....	10.00
C. W. Goodale.....	25.00
P. G. Beckett.....	50.00
<b>Total.....</b>	<b>\$7695.00</b>

We are also providing the regiment with reading material. Friends were asked during the week to donate detective stories, books of adventure, war books, etc., from their libraries. Those who have so far responded are Mrs. W. H. Aldridge, Mrs. William Young Westervelt, A. R. Ledoux, H. H. Knox, F. F. Sharpless, J. Parke Channing, J. F. A. Clark and W. R. Ingalls. The McGraw-Hill Book Co. donated a \$24 set of mining books. Altogether, 113 books were packed this week for shipment to camp.

The "Association of the 27th Engineers" has now been formally organized to administer the affairs of the Comfort Fund. Lieut. Col. O. B. Perry, commanding officer of the regiment, is president of the organization; Arthur J. Baldwin, vice president; and Walter Renton Ingalls, secretary and treasurer. Donors to the fund that is being raised may now obtain the benefit of exemption of their gifts up to the limit provided in the law,



namely, to the extent of 15% of the net taxable income. Checks may now be drawn to the order of W. R. Ingalls, treasurer.

Thus things that to many have seemed to exist largely on paper are assuming tangible form. The mining regiment is taking shape, the need of contributions to the fund is real, and the gifts thus far received are doing actual good and affording great pleasure to all. Who is there among mining men who will hold back his hand from such work?

### Imports of Ores and Metals in 1917

WASHINGTON CORRESPONDENCE

The Bureau of Foreign and Domestic Commerce reports imports of the metalliferous ores, metals, cyanides and nitrates for 1917 as follows. For purposes of comparison, import figures for 1916 are included in the table.

	1916	1917
Zinc ore, lb.	296,293,168	142,494,169
Lead, lb.	59,348,535	144,957,846 (a)
Manganese ore, tons	576,321	629,972 (b)
Iron pyrites, tons	1,244,519	967,340
Tin, lb.	133,073,293	143,687,037
Antimony matte, regulus or metal, lb.	19,749,830	35,649,113
Cyanide of sodium, lb.	483,811	1,604,117
Nitrate of soda, tons	1,218,423	1,555,839
Iron ore, tons	1,325,736	971,663
Tungsten ores, tons		4,357

(a) Increase comes principally from Mexico.  
(b) From Brazil, British India, Cuba, Japan. From Brazil 512,517 tons were imported in 1917.

### Chronology of Mining for January

Jan. 7—Offices and laboratory at the Omaha plant of the American Smelting and Refining Co. destroyed by a fire that threatened the entire plant.

Jan. 9—A premature explosion of 3000 lb. of blasting powder on Sacramento Hill, Bisbee, Ariz., killed two, fatally injured two, and seriously hurt eight men.

Jan. 10—Resolution passed by the New York Metal Exchange placing on the purchaser of tin the burden of all risks attendant on railroad and shipping delays or losses.

Jan. 14—Disastrous fire at the plant of the Chemical Products Co., at Denver, incurring a loss of from \$50,000 to \$75,000.

Jan. 14—Resumption of operations of the High Ore and Lawrence mines, in the Butte district, after a prolonged shut-down for repairs.

Jan. 14—Temporary injunction granted by U. S. District court at Portland, Me., upon request of the American Smelting and Refining Co., against the smelting of certain Bunker Hill & Sullivan ores in the latter's new smeltery at Kellogg, Idaho.

Jan. 16—U. S. Fuel Administrator Garfield issued an order closing factories, offices, theaters and all public buildings east of the Mississippi during the five days, Jan. 18 to 22 inclusive, and on the nine consecutive Mondays thereafter, in order to relieve the congested traffic of the railroads and the coal shortage in the East.

Jan. 19—Announcement by Secretary Lane of the Department of the Interior, that the work of surveying and dividing into leasing units the more accessible part of the Nenana coal field of Alaska has been completed.

Jan. 22—Copper price of 23½c. extended to June 1, 1918, following conferences of producers and War Industries Board.

Jan. 23—Director General McAdoo ordered an embargo upon all new shipments of freight on the Penn-

sylvania lines east of Pittsburgh, the Baltimore & Ohio lines east of the Ohio River, and on the Philadelphia & Reading system. Fuel, food and certain war necessities were the only exceptions made.

Jan. 24—Price of 12c. per lb. for high-grade spelter agreed upon by producers and the War Industries Board for U. S. Government, Allied and domestic requirements until June 1, 1918.

### Foreign Trade in Lead and Zinc

Imports of lead during October, November and the first 11 months of 1917 are reported by the Department of Commerce as follows:

Articles and Countries	October Contents, Lb.	November Contents, Lb.	Jan.-Nov. Contents, Lb.
<b>Lead Ore:</b>			
Canada	57,600	332,144	8,384,066
Salvador		41,801	44,918
Mexico	1,237,969	576,679	14,115,495
Chile	728,000	1,615,805	3,538,554
Peru	21,573	31,318	400,963
Italy			46,719
England			8,609,804
German Africa			4,405,145
France			120,101
Panama		18,320	24,401
Others	3,888		6,377
<b>Totals</b>	<b>2,049,030</b>	<b>2,616,067</b>	<b>39,696,549</b>
<b>Lead—Base Bullion and Bullion:</b>			
Dutch East Indies			837,028
Peru	11,711	182,391	258,545
Canada	7,329	278,825	1,591,118
Mexico	2,703,244	15,409,525	80,654,146
<b>Totals</b>	<b>2,722,284</b>	<b>15,870,741</b>	<b>83,340,837</b>
<b>Lead—Pigs, Bars, etc.:</b>			
Panama			61,076
Barbados	326	183	3,323
Colombia			3,155
Haiti			39,133
Canada	1,685		332,099
Guatemala		6,688	59,088
England			80,188
Mexico	1,079,243	3,143,275	9,287,790
Peru			18,948
France			89,086
Chile			8,769
British West Indies			27,313
Others	5,925	105	15,421
<b>Totals</b>	<b>1,087,179</b>	<b>3,150,251</b>	<b>10,025,389</b>

The gross weight of lead ore imported in November was 10,417 long tons.

The actual tonnage of zinc ore imported in November amounted to 8756 long tons. The countries of origin and the metal contents were as follows:

Countries:	October Contents, Lb.	November Contents, Lb.	Jan.-Nov. Contents, Lb.
Canada	1,333,925	496,000	9,220,714
Australia	1,578,675		25,005,837
Mexico	4,702,033	4,776,904	88,480,887
Spain			12,166,840
French Africa			1,245,000
Italy			4,822,400
<b>Totals</b>	<b>7,614,633</b>	<b>5,272,904</b>	<b>140,941,678</b>
<b>Zinc in Blocks, Pigs, etc.:</b>			
Costa Rica	264	2,125	9,704
Panama	1,202	2,211	52,143
Cuba	12,311	12,570	280,420
Mexico			3,318
Ecuador			7,580
Canada		17,972	49,777
Brazil			5,513
Colombia			6,000
Jamaica			2,165
Others	1,670		5,705
<b>Totals</b>	<b>15,447</b>	<b>34,878</b>	<b>422,325</b>

Imports of zinc dust in November, 1917, amounted to 15,320 lb., all from Japan.

Exports of lead and zinc were as follows:

	October Contents, Lb.	November Contents, Lb.	Jan.-Nov. Contents, Lb.
<b>Lead:</b>			
Pigs, bars, etc., produced from domestic ore	5,329,408	14,688,767	97,224,047
Pigs, bars, etc., produced from foreign ore	21,039,360	2,128,313	35,617,954
<b>Zinc:</b>			
Pigs, etc., produced from domestic ore	10,208,889	12,255,998	245,034,896
Pigs, etc., produced from foreign ore	4,901,762	2,495,615	113,418,571
Sheets, etc.	1,905,783	3,777,189	29,002,476

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C. K. Lipman.....	50.00
Theodore Sternfeld.....	50.00
Clinton H. Crane.....	500.00
T. Wolfson.....	10.00
William H. Hampton.....	10.00
W. E. Merriss.....	10.00
J. Parke Channing.....	100.00
Miami Copper Co.....	250.00
J. H. Means.....	10.00
C. W. Goodale.....	25.00
P. G. Beckett.....	50.00
<b>Total.....</b>	<b>\$7695.00</b>

We are also providing the regiment with reading material. Friends were asked during the week to donate detective stories, books of adventure, war books, etc., from their libraries. Those who have so far responded are Mrs. W. H. Aldridge, Mrs. William Young Westervelt, A. R. Ledoux, H. H. Knox, F. F. Sharpless, J. Parke Channing, J. F. A. Clark and W. R. Ingalls. The McGraw-Hill Book Co. donated a \$24 set of mining books. Altogether, 113 books were packed this week for shipment to camp.

The "Association of the 27th Engineers" has now been formally organized to administer the affairs of the Comfort Fund. Lieut. Col. O. B. Perry, commanding officer of the regiment, is president of the organization; Arthur J. Baldwin, vice president; and Walter Renton Ingalls, secretary and treasurer. Donors to the fund that is being raised may now obtain the benefit of exemption of their gifts up to the limit provided in the law,



namely, to the extent of 15% of the net taxable income. Checks may now be drawn to the order of W. R. Ingalls, treasurer.

Thus things that to many have seemed to exist largely on paper are assuming tangible form. The mining regiment is taking shape, the need of contributions to the fund is real, and the gifts thus far received are doing actual good and affording great pleasure to all. Who is there among mining men who will hold back his hand from such work?

### Imports of Ores and Metals in 1917

WASHINGTON CORRESPONDENCE

The Bureau of Foreign and Domestic Commerce reports imports of the metalliferous ores, metals, cyanides and nitrates for 1917 as follows. For purposes of comparison, import figures for 1916 are included in the table.

	1916	1917
Zinc ore, lb.	296,293,168	142,494,169
Lead, lb.	59,348,535	144,957,846 (a)
Manganese ore, tons	576,321	629,972 (b)
Iron pyrites, tons	1,244,519	967,340
Tin, lb.	133,073,293	143,687,037
Antimony matte, regulus or metal, lb.	19,749,830	35,649,113
Cyanide of sodium, lb.	483,811	1,604,117
Nitrate of soda, tons	1,218,423	1,555,839
Iron ore, tons	1,325,736	971,663
Tungsten ores, tons		4,357

(a) Increase comes principally from Mexico. From Brazil 512,517 tons were imported in 1917.

### Chronology of Mining for January

Jan. 7—Offices and laboratory at the Omaha plant of the American Smelting and Refining Co. destroyed by a fire that threatened the entire plant.

Jan. 9—A premature explosion of 3000 lb. of blasting powder on Sacramento Hill, Bisbee, Ariz., killed two, fatally injured two, and seriously hurt eight men.

Jan. 10—Resolution passed by the New York Metal Exchange placing on the purchaser of tin the burden of all risks attendant on railroad and shipping delays or losses.

Jan. 14—Disastrous fire at the plant of the Chemical Products Co., at Denver, incurring a loss of from \$50,000 to \$75,000.

Jan. 14—Resumption of operations of the High Ore and Lawrence mines, in the Butte district, after a prolonged shut-down for repairs.

Jan. 14—Temporary injunction granted by U. S. District court at Portland, Me., upon request of the American Smelting and Refining Co., against the smelting of certain Bunker Hill & Sullivan ores in the latter's new smeltery at Kellogg, Idaho.

Jan. 16—U. S. Fuel Administrator Garfield issued an order closing factories, offices, theaters and all public buildings east of the Mississippi during the five days, Jan. 18 to 22 inclusive, and on the nine consecutive Mondays thereafter, in order to relieve the congested traffic of the railroads and the coal shortage in the East.

Jan. 19—Announcement by Secretary Lane of the Department of the Interior, that the work of surveying and dividing into leasing units the more accessible part of the Nenana coal field of Alaska has been completed.

Jan. 22—Copper price of 23½c. extended to June 1, 1918, following conferences of producers and War Industries Board.

Jan. 23—Director General McAdoo ordered an embargo upon all new shipments of freight on the Penn-

sylvania lines east of Pittsburgh, the Baltimore & Ohio lines east of the Ohio River, and on the Philadelphia & Reading system. Fuel, food and certain war necessities were the only exceptions made.

Jan. 24—Price of 12c. per lb. for high-grade spelter agreed upon by producers and the War Industries Board for U. S. Government, Allied and domestic requirements until June 1, 1918.

### Foreign Trade in Lead and Zinc

Imports of lead during October, November and the first 11 months of 1917 are reported by the Department of Commerce as follows:

Articles and Countries	October Contents, Lb.	November Contents, Lb.	Jan.-Nov. Contents, Lb.
<b>Lead Ore:</b>			
Canada	57,600	332,144	8,384,066
Salvador		41,801	44,918
Mexico	1,237,969	576,679	14,115,495
Chile	728,000	1,615,805	3,538,554
Peru	21,573	31,318	400,963
Italy			46,719
England			8,609,804
German Africa			4,405,145
France			120,101
Panama		18,320	24,404
Others	3,888		6,379
<b>Totals</b>	<b>2,049,030</b>	<b>2,616,067</b>	<b>39,696,549</b>
<b>Lead—Base Bullion and Bullion:</b>			
Dutch East Indies			837,028
Peru	11,711	182,391	258,545
Canada	7,329	278,825	1,591,118
Mexico	2,703,244	15,409,525	80,654,146
<b>Totals</b>	<b>2,722,284</b>	<b>15,870,741</b>	<b>83,340,837</b>
<b>Lead—Pigs, Bars, etc.:</b>			
Panama			61,076
Barbados	326	183	3,323
Colombia			3,155
Haiti			39,133
Canada	1,685		332,099
Guatemala		6,688	59,088
England			80,188
Mexico	1,079,243	3,143,275	9,287,790
Peru			18,948
France			89,086
Chile			8,769
British West Indies			27,313
Others	5,925	105	15,421
<b>Totals</b>	<b>1,087,179</b>	<b>3,150,251</b>	<b>10,025,389</b>

The gross weight of lead ore imported in November was 10,417 long tons.

The actual tonnage of zinc ore imported in November amounted to 8756 long tons. The countries of origin and the metal contents were as follows:

Countries:	October Contents, Lb.	November Contents, Lb.	Jan.-Nov. Contents, Lb.
Canada	1,333,925	496,000	9,220,714
Australia	1,578,675		25,005,837
Mexico	4,702,033	4,776,904	88,480,887
Spain			12,166,840
French Africa			1,245,000
Italy			4,822,400
<b>Totals</b>	<b>7,614,633</b>	<b>5,272,904</b>	<b>140,941,678</b>
<b>Zinc in Blocks, Pigs, etc.:</b>			
Costa Rica	264	2,125	9,704
Panama	1,202	2,211	52,143
Cuba	12,311	12,570	280,420
Mexico			3,318
Ecuador			7,580
Canada		17,972	49,777
Brazil			5,513
Colombia			6,000
Jamaica			2,165
Others	1,670		5,705
<b>Totals</b>	<b>15,447</b>	<b>34,878</b>	<b>422,325</b>

Imports of zinc dust in November, 1917, amounted to 15,320 lb., all from Japan.

Exports of lead and zinc were as follows:

	October Contents, Lb.	November Contents, Lb.	Jan.-Nov. Contents, Lb.
<b>Lead:</b>			
Pigs, bars, etc., produced from domestic ore	5,329,408	14,688,767	97,224,047
Pigs, bars, etc., produced from foreign ore	21,039,360	2,128,313	35,617,954
<b>Zinc:</b>			
Pigs, etc., produced from domestic ore	10,208,889	12,255,998	245,034,896
Pigs, etc., produced from foreign ore	4,901,762	2,495,615	113,418,571
Sheets, etc.	1,905,783	3,777,189	29,002,476

## Personals

Have you contributed to the Comfort Fund for the 27th Engineers?

**I. H. Johnston** is chief chemist, Continental Motor Corporation, Detroit, Michigan.

**A. N. Cole** is now connected with H. Koppers Co., care of National Tube Co., Lorain, Ohio.

**Alexander Neil Mackay** is mining engineer for Tracey Bros., Ltd., Apartado 184, Barranquilla, Colombia.

**E. Cooper Wills** has been appointed superintendent of the Nagle Steel Co.'s plant at Rahway, New Jersey.

**Thomas Neilson**, metallurgist, of Los Angeles, Calif., recently returned from a professional visit to the Philippine Islands.

**Donald D. Fraser**, formerly of the Highland Valley Mining Co., is assistant superintendent, Tertiary Mining Co., Quesnel, B. C., Canada.

**Roswell H. Johnson**, of the University of Pittsburgh, has been appointed member of the topographic and geologic survey commission of Pennsylvania.

**Murray M. Duncan**, vice president and general manager of the mines department of the Cleveland-Cliffs Iron Co., has gone to Florida for a month's rest.

**William G. Mather**, president of the Cleveland-Cliffs Iron Co., Cleveland, Ohio, transacted business on the Marquette range during the last week of January.

**P. St. John Dixon** is mining engineer and metallurgist in the engineering department of Sulfurn Co., Papacolera manganese mine, Rio de Janeiro, Brazil.

**A. K. Knickerbocker**, formerly connected with the Arthur Iron Mining Co., has accepted the position of chief engineer of the Great Northern Iron Ore Properties.

**Arthur Todd Kennedy**, formerly mining engineer for the Republic Iron and Steel Co., is in command of a company of the 23rd Engineers, now in service in France.

**A. N. Detweller** has resigned his position as superintendent of the National Zinc Co. and is now advisory engineer, Powdered Coal Engineering and Equipment Co., Chicago.

**Frank Samuel**, member of the firm of Frank Samuel, Philadelphia, has been appointed a member of the subcommittee of ferroalloys of the American Iron and Steel Institute.

**C. G. Ballantyne**, president and general manager of the Montana Bingham Consolidated Mines Co., arrived in Salt Lake City recently to undertake direction of the property.

**H. J. Underhill**, superintendent of the Great Northern Power Co., which furnishes power to the mines on the Mesabi range, has been made general superintendent of that company, with headquarters at Duluth.

**John Seward** has returned to New York from Venezuela, where he had been engaged for two months in the examination of coal and copper properties in the vicinity of Carubano for Gen. J. V. Gomez, president of Venezuela.

**Charles S. Arms** has been commissioned captain, Ordnance Department, and assigned to active duty at the Watertown arsenal, where he has charge of the heat-treating, annealing and taking out of test specimens in the new gun-forging plant.

**Daniel C. Jackling** will be director of the United States Smokeless Powder Factories, with Major Seeley W. Mudd, U. S. R., as assistant director. The two plants will be situated near Charleston, W. Va., and Nashville, Tenn. Negotiations for their construction were conducted by Benedict Crowell, Assistant Secretary of War, and Mr. Jackling.

**J. F. Wolff**, mining engineer and geologist, who has been connected for the last nine years with the Duluth, Minn., office of John U. Sebenius, mining engineer for the Oliver Iron Mining Co., recently examined the Section Four mine, near Eveleth on the Mesabi range, for a group of stockholders. This property was worked a few years ago by a stock company, but mining operations have been suspended indefinitely.

**Walter A. Barrows, Jr.**, president and general manager of the Thomas Iron Co., of Easton and Hokendauqua, Penn., was recently elected president of the Eastern Pig Iron Association. He was born in Cold Spring, N. J., in 1865, and studied chemistry at Rutgers College at New Brunswick, N. J., and was first employed as chemist by the Sharpville Furnace Co., Sharpville, Penn. In 1897, he became

superintendent of the blast furnace department of the Mahoning Valley Iron Co., Youngstown, Ohio, and in 1899 was made superintendent at the Everett furnace, Everett, Penn. From 1900 to 1908 he was general manager for the Shenango Furnace Co., Sharpville, Penn., and then became metallurgist for the Northern Pacific Ry. Co., which position he filled until his appointment in August, 1916, as president of the Thomas Iron Company.

**O. C. Davidson**, of Iron Mountain, Mich., general superintendent of the Oliver Iron Mining Co., was elected to the American Iron and Steel Institute on Jan. 16. Other newly elected members are as follows: J. Heber Parker, Reading, Penn., vice president and metallurgist of the Carpenter Steel Co.; Milford Wortham, Temple, Penn., vice president and superintendent of the Seaboard Steel and Manganese Corporation; Samuel Osborne Hobart, Pottstown, Penn., manager of blast furnaces, Eastern Steel Co.; Edwin T. Wood, Steubenville, Ohio, metallurgist, La Belle Iron Works; Douglas S. Thropp, Everett, Penn., general manager of quarries, ore and coal mines for J. E. Thropp; Harris K. Masters, head of ore department, W. R. Grace & Co., New York; Alfred Stansfield, professor of metallurgy, McGill University; Louis H. Winkler, metallurgist, Cambria Steel Co.; Charles B. Ellis, secretary to the president, American Vanadium Co., New York.

## Obituary

**Henry Elliot Sprague**, at one time president of the Colorado Coal and Iron Co., now the Colorado Fuel Co., died at his home in New York on Jan. 29, aged 82 years.

**Edward McKim Hagar**, president of the American International Steel Corporation, died suddenly at his home in New York, on Jan. 19, of pneumonia, at the age of 44 years. He was graduated from the Massachusetts Institute of Technology in 1893 and from Cornell in 1894. He organized and conducted the business of Edward M. Hagar & Co., manufacturers' representatives in machinery lines in Chicago. From 1906 to 1915 he was president of the Universal Portland Cement Co., and later of the Wright-Martin Aeroplane Co. For two years he was president of the Association of American Portland Cement Manufacturers, and was the organizer and a past president of the Cement Products Exhibition Co. Mr. Hagar was a member of the American Society of Mechanical Engineers, the American Society for Testing Materials, the American Society of Civil Engineers, the Western Society of Engineers, the American Institute of Mining Engineers, the Illinois Society of Engineers and Surveyors, the Engineers' Club, New York, other clubs in Chicago and Pittsburgh, and of the Phi Kappa Psi fraternity.

## Societies

**American Society for Testing Materials** has notified its members that any of them who have entered the active military service of the Government will have his dues suspended during the period of such service, and still retain all the privileges of the society, including the receipt of its publications.

**Mining and Metallurgical Society of American**, New York Section, will hold a meeting at the Columbia University Club, 10 West 43rd St., New York, on Feb. 14, 1918. It is to be noted particularly that the meeting will be held at the new clubhouse on 43rd St. It will be preceded by an informal dinner, which will be served promptly at 7 o'clock. The speaker of the evening will be Simon Lake, one of the original inventors of the submarine. Mr. Lake will use moving pictures and lantern slides to illustrate the development of the submarine, will discuss some of its more intricate features, and point out its future possibilities, both as a naval machine and as an adjunct to the commercial marine.

**American Association of Engineers**—The New York chapter was organized on Jan. 16, the charter being presented by President Edmund T. Perkins at the installation meeting, held at the McAlpin hotel. R. H. Vanderbrook was elected chairman. The keynote of the meeting was sounded by Mr. Perkins in his address on the "Engineer's Relation to Society." He urged the men to broaden their social and civic activities, paying more attention to the human equation of engineers, and to assume greater responsibility for the

profession. Alexander Potter, consulting engineer of New York, complimented the Association on its national success with the problems relating to the human and business side of the engineering profession. E. J. Mehren, editor of "Engineering News-Record," S. J. Stone, A. C. Davis and others presented valuable suggestions toward increasing the service to individual members. It is thought that the activity of national distribution of technical service will be greatly advanced with the establishment of this Eastern branch.

**Colorado Metal Mining Association** and the Colorado Chapter of the American Mining Congress held a joint meeting in Denver, on Jan. 22-24, in the Assembly room of the State Capitol. The meeting was attended by five or more delegates from each mining county in Colorado and by numerous delegates from Nevada, Utah and Wyoming. The following officers were elected by the directors for the ensuing year: George M. Taylor, Colorado Springs, president; George O. Argall, Leadville, first vice president; R. M. Henderson, Breckenridge, second vice president; E. N. Funston, Silverton, third vice president; M. B. Tomblin, Denver, secretary; and A. M. Collins, Creede, treasurer. Addresses were made by William J. Galligan, Federal fuel administrator for Colorado; Hiram E. Hiltz, chairman of the Industrial Board; James R. Noland, and Fred Carroll, commissioner of mines. Dr. V. C. Alderson, president of the Colorado School of Mines, was unable to be present, but his address was read by the chairman. The chief questions discussed were "silver" and the "excess-profits war tax." The following conference committee on silver was appointed: E. N. Funston, chairman; L. A. Ewing, Jesse F. McDonald, Bulkeley Wells, Charles Anderson, and George L. Nye. The following conference committee on the excess-profits tax was likewise appointed: George E. Collins, chairman; Fred Carroll, H. S. Shakerd, O. L. Patterson and D. W. Strickland.

## Industrial News

**Goldschmidt & Forbes, Inc.**, New York, dealers in metals, announce that Edgar S. Fassett, general manager of the United Traction Co., Albany, N. Y., became associated with the company on Feb. 1, as director and secretary.

**Driver-Harris Co.**, Harrison, N. J., suffered the loss by fire of its insulated wire and electrical cord departments on the night of Jan. 31. The buildings in which they were housed were completely destroyed. The company announces that its production of resistance materials, castings, cold-rolled strip, nickel sheet and other products is not interfered with in the least and that business will continue as usual.

## New Patents

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

**Alumina**—Process for purifying clay and other siliceous and aluminous earths and ores. Frank Langford, Eureka, Calif. (U. S. No. 1,251,057; Dec. 25, 1917.)

**Concentration**—Rotary Gravity Machine for Separating and Concentrating Precious Metals. Edmund Randolph, Portland, Ore. (U. S. No. 1,247,717; Nov. 27, 1917.)

**Electrical Separation of Suspended Particles from Gases**, Apparatus for. Walter A. Schmidt and George C. Roberts, Los Angeles, Calif., assignors to International Precipitation Co., Los Angeles, Calif. (U. S. No. 1,252,183; Jan. 1, 1918.)

**Hoist**—Safety Cross Head for Mine Hoists. Samuel Jewell, Negaunee, Mich. (U. S. No. 1,252,122; Jan. 1, 1918.)

**Iron Sulphide**, Method of Manufacturing. Napoleon G. Petinot, New York, N. Y., assignor to United States Alloys Corp. (U. S. No. 1,252,024; Jan. 1, 1918.)

**Ore Separator**. Thomas C. Cole, Russellville, Ark. (U. S. No. 1,248,267; Nov. 27, 1917.)

**Process of Manufacturing Sulphuric Acid**. Marion L. Hanahan, Dothan, Ala. (U. S. No. 1,253,238; Jan. 15, 1918.)

**Rock Drill**—Drill Sharpener. William A. Smith, Denver, Colo., assignor to the Denver Rock Drill Manufacturing Co., Denver, Colo. (U. S. No. 1,253,291; Jan. 15, 1918.)



## Editorial Correspondence

SAN FRANCISCO—Jan. 30

**Manganese and Chromium** form the subject matter of preliminary report No. 3 issued by the State Mining Bureau, by E. S. Boalich, direction of Fletcher Hamilton, State mineralogist. Mr. Boalich has condensed in a space of 32 pages some useful information relating to the occurrence of manganese and its uses, prices, freight rates, and lists of owners and operators in California and manganese consumers and also U. S. Geological Survey list of purchasers. The chapter on chromium contains a note on occurrence and concentration of the ore and its uses, prices, freight rates, lists of owners and operators in California and chrome buyers and consumers. Both chapters contain letters from dealers and consumers of the two products. An appendix gives a list of available publications of the bureau.

**A Comstock Dividend Has Been Declared** by the Union Consolidated, the chief producer in the Northend district. The dividend is 5c. a share payable on Feb. 1 to stockholders of record on Jan. 26. The action of the directors was a surprise to market operators, as it was believed that no dividend would be declared until further shipments of bullion. But the recent development and extraction of medium and high-grade ore, making an average weekly yield of more than \$10,000, and the indications of a large amount of payable ore in prospect, induced the declaration of the dividend at the present time. November and December made fine showings and the steady production in those months still continues. In the week ended Jan. 19 the yield, exclusive of the ore sent to the storage pile, was \$10,842, the ore averaging \$17.71 per ton. In the year 1916 the total yield was \$171,842. The weekly yield steadily advanced during the last half of the year. A large proportion of the payable ore came from the stopes and raises between the 2300 and the 2400 levels, in the east side of the lode. The present operations are extended to 2700 level and the water stands below the 2900 level, and the Mexican work is in progress for mining on the 2900.

**The Mine Output of Gold in California** in 1917, according to estimate of Charles G. Yale of the U. S. Geological Survey, was \$21,098,915, a decrease of \$311,826, which is but a slight decline in view of conditions brought about by the war. These conditions affected the deep mines more seriously than the placer mines. Some of the smaller gold mines have closed down, and it is not unlikely that a number of the large producers may be obliged to curtail production and devote the labor to development during the winter. The season is late and for that reason the present year shows some small improvement, though it is too early to form an idea of the outlook for 1918. The silver, copper, lead and zinc production in 1917 totaled \$20,358,777, making the total for the five metals, gold, silver, lead, copper and zinc, \$41,457,692, an increase over 1916 of \$1,708,429. The deep mines are producing about 60% of the gold, the remainder coming chiefly from the dredges. The silver output is estimated at 2,144,196 oz., a decrease of 420,158 oz. from 1916. The price of silver in 1917 increased the total value of the production by \$58,030. The advance in the price of silver encouraged the undertaking of new and resumption of old work, but the silver producers, like the gold producers, were largely handicapped by high costs of materials and freights and slow delivery, so that the additional undertakings in the year did not add greatly to the production. Copper mining advanced, both in production and the installation of improved methods. The production increased from 55,897,118 lb. in 1916 to 57,591,195 lb. in 1917. The price also advanced, showing an increase in total value of \$1,914,114. Labor troubles curtailed production to some extent in Shasta County, but did not cause the complete closing down of any of the mines. The estimated output of lead in 1917 was 23,189,474 lb., an increase of 10,782,481 over 1916. Most of the lead comes from Inyo and San Bernardino Counties. The estimated production of zinc in 1917 was 9,158,851 lb. as compared to 15,266,485 lb. in

1916. The zinc comes from the copper mines of Shasta County and the silver-lead mines of Inyo County. The larger companies reduced the production in 1917.

DENVER—Jan. 29

**American Institute of Mining Engineers**, Denver section, held its annual dinner and meeting at the University Club, Denver, on Jan. 25. The following officers were elected for 1918: chairman, Charles McNeill; vice chairman, George M. Taylor; secretary, Fred Carroll; executive committee, Herbert Colbrun and Willis Case.

**Oil Shale in Colorado** is attracting considerable serious attention. It is claimed that the future of the oil industry is in the immense deposits of oil shale in western Colorado and eastern Utah. The oil may be extracted from this shale by simple processes. It is estimated that a plant for the efficient handling of oil shale can be put up for about \$100,000. Active development and several plants are under advisement by capitalists. The Government has regarded the shale deposits of sufficient importance to create a reserve of 145,000 acres in Colorado and Utah for the future use of the Navy. The oil shale is tough and hard to mine, but it is probable that Colorado mine operators will be able to satisfactorily solve the problem. Where the overburden is not great, steam shovels will probably be used.

**An Ore Sales Committee** is advocated by Fred S. Caldwell, delegate from Gilpin County to the convention of the Colorado Metal Mining Association, who addressed the meeting on the subject, "What Concessions Are Due the Metal Mining Industry of Colorado Upon the Basis of the Smelter Investigating Committee's Report, and How to Get Them." A resolution was offered which urges the appointment of seven delegates to form an ore-sales committee, which shall negotiate with the smelters and ore reduction plants for the marketing of metaliferous ores and products on the following basis: An initial settlement for ore purchased shall be made upon receipt of the same at smeltery or reduction plant, in accordance with the practice which now obtains and upon the schedules now in force, but the smeltery or reduction plant receiving the ore shall keep a metal account for every metal found in commercial quantities in the ore, each of which said metal accounts shall be closed every three months and, thereupon, and as soon as the ores are treated and the metals refined and marketed, the business for the period shall be closed and the gross profits disbursed as follows: (1) The actual cost of treatment, refining and marketing shall be determined and paid; (2) an interest charge of 5% on working capital shall be deducted; (3) all taxes, insurance, etc., for the period, together with plant depreciation at the rate of 10% per annum, shall be determined and deducted; (4) a net profit of 15% on plant investment shall be computed and allowed; (5) the surplus, if any, shall be apportioned among the several metal accounts according to their respective gross profits, and, thereupon, the sum falling to each metal account shall be disbursed to the producers of that metal in proportion as their settlement sheets show they contributed to the production of the same.

SALT LAKE CITY—Jan. 30

**Emmett D. Boyle, governor of Nevada**, was entertained by the executive committee of the Utah chapter of the American Mining Congress at dinner at the Alta Club on the evening of Jan. 20, stopping en route to the Western mine operators' congress at Denver. With him as guests of honor were Governor Bamberger and Henry M. Rives. R. C. Gemmel was toastmaster and Governor Bamberger made a speech of welcome. Speaking in the interest of silver mining particularly, Governor Boyle expressed confidence that the bill fixing the price of silver at \$1 per oz., soon to come before Congress, would become a law. In this connection he explained the provision of the bill calling for the melting of silver dollars stored in the Treasury, to supply bullion for export to the Allies and to pay trade balances. He also touched on the excess-profits tax measure, pointing out the difficulties of mine taxation and the fact that mines are a wasting asset.

BUTTE, MONT.—Jan. 28

**The Coal Situation in Montana** is gratifying to the people. The state has an abundant coal supply, and while a famine was prevailing in the East some of the coal mines in Montana were considering the question of closing down for a time on account of an oversupply on hand. The Bear Creek Coal Co. sent word to State Fuel Administrator Swindlehurst that unless conditions as to weather changed it would be necessary to close down some of the mines of the company owing to the quantity on hand. This message was given out in reply to an inquiry as to slack coal. The message stated that the Anaconda Coal and Iron Co. was producing 125 tons of slack coal daily, the Bear Creek Co. 100 tons daily, the Smokeless and Sootless Co. 50 tons daily and the International Coal Co. 50 tons daily. This coal has sold at prices ranging from 25c. to \$1.60 per ton, and the telegram stated that any reasonable price would be accepted. The jobbers have been authorized to contract for the whole output for a year at 50c. a ton net at the mine. This action will relieve the mines of much of their stock and at the same time put the slack coal on the market at a reasonable price.

**Labor Agitation Is Still Brewing** in Butte and, as can be surmised from a small weekly paper now issued, agitators are only awaiting the opportune moment to start trouble again among the miners. What is known as the Metal Mine Workers' Union was organized last summer and demands were made upon the companies which were beyond all reason. This organization was declared at the time to be affiliated with the I. W. U., but the leaders immediately rushed into print with a denial, hoping to pull the wool over the eyes of those who would not become affiliated with that organization. In the last issue of this weekly an appeal was made to the miners of Butte to relax in their efforts in producing copper, to slow down and resort to sabotage. The article was signed "Butte Metal Mine Workers' Union No. 800, I. W. U." This should be evidence sufficient that this union is associated directly with the I. W. U. While the union has at present practically no membership among the workers, the leaders are still enjoying a life of luxury with money in their pockets ready to spend on the unsuspecting miner as an inducement for him to quit work. There is a strong suspicion that German money is still being used in this district in another effort to curtail the production of copper.

**Federal Troops Continue to Patrol** All Roads leading to the mines and no attempt is made to molest any man going to or returning from work; but judging by the utterances of the I. W. U. faction, if the soldiers were withdrawn, it would be only a short time before they would be assaulting and threatening men who persisted in working.

**The Reopening of the Butte-Detroit Mine** and Mill by Freeman I. Davison of Boston, who is in the city and has made arrangements for strong Eastern financial backing. Mr. Davison says that he proposes to remain here at least one month to see it personally that the property is placed on a producing and paying basis. Additional equipment is being added to the mill, which is up-to-date and was built for the old Butte Central Copper Co. which was taken over by the Butte-Detroit. He says that altogether between silver-zinc and manganese ores there will be treated 650 tons of ore a day just as soon as the mill is finally equipped. Contracts have been made with the Davis-Daly, the Norwich, the Hibernia and other properties for the treatment of their ores, and other contracts are expected to be closed in the course of the next few weeks. The contracts so far made are on quite favorable terms. Arrangements have been made with Minerals Separation for the use of their process. Sam McConnell, formerly superintendent of the Butte Central, has been engaged as mine superintendent and has already a large force of men at work getting the mine in readiness. For the present this mine is expected to produce at least 100 tons of silver-zinc mill ore each day. It is also intended to mine daily 100 tons of pink manganese ore and ship it direct to the Miami Metals Co. of Chicago.

Shipments of manganese to other Eastern points are being arranged. The order for additional crushing and fine grinding equipment has been placed and no time will be lost in raising the capacity to 650 tons per day. The Ophir mill is expected to be ready to start in the course of a week, but it will not be in a position to work to the capacity contemplated for possibly a month. Assurances have come from big steel concerns and those directly interested that all the manganese that can be produced will be taken at the highest market price. This has made quite a difference to the mines that have manganese and every effort is being made to increase production.

#### WALLACE, IDAHO—Jan. 31

The Mineral Output of the State of Idaho in 1917 is valued at \$56,698,884. This valuation is obtained by taking the production of the state as estimated by Robert N. Bell, state mineral inspector, and the average prices of the metals for the entire year as published by the Engineering and Mining Journal. In his review of the mining industry with the returns from the state incomplete, on Jan. 1 Mr. Bell estimated the value of the mineral production at \$50,000,000. Subsequent returns, however, evidently brought the total far above his original estimate, and on Jan. 12 he revised his figures, which are: Gold, 41,000 oz., value, \$820,000; silver, 12,500,000 oz.; value, \$10,155,125; copper, 7,168,000 lb.; value, \$1,932,489; lead, 401,000,000 lb.; value, \$35,235,870; and zinc, 98,000,000 lb.; value, \$8,555,400; making a total of \$56,698,884. Inspector Bell estimates that 95% of the silver, lead and zinc, 20% of the copper and 10% of the gold was produced in Shoshone county (Coeur d'Alene district). From this it is apparent that Shoshone county continues to maintain its prestige as the great center of mining activity in Idaho. The year witnessed the exhaustion of the Green Hill-Cleveland, formerly the Standard-Mammoth, and the Last Chance at Wardner will probably soon be abandoned by the Federal company, passing into the possession of the Bunker Hill & Sullivan, which will no doubt extract much ore from the ground below the present workings. It is also probable that the Caledonia will end its career during the current year. As an offset to these, the National Copper, near Mullan, seems to be entering upon a long period of production. The Sherman, near Burke, is expected to become a steady producer this year. The Amazon-Manhattan, on Beaver creek, has just started shipping and has a large orebody developed, and the Ray-Jefferson, near by, should be a regular shipper in the early spring. The completion of the railroad on Pine creek will be followed by increased shipments from the Douglas, Highland-Surprise, Nabob and Constitution. In

addition to this new tonnage, the old producers as a rule have more ore in sight than ever before.

#### JOPLIN—Jan. 29

Revival of Operations in the Missouri section of Joplin looks promising for reason of the steadily rising premiums for leases in Oklahoma. It is no longer possible for an individual or company with only a few thousand dollars to attempt to mine in that field now. For this reason owners have recently received many solicitations for promising lands where soft-ground deposits may possibly exist. It is believed a revival of development work in this section will result in the discovery of a number of rich mines. The country surrounding the city of Joplin has never been prospected with the thoroughness of the Oklahoma fields.

Another Big Mining Deal in which the consideration was in excess of \$1,000,000, has just been announced in this district. T. F. Lennan, of Joplin, and associates of New York have sold 250 acres with three operating mills, in the Oklahoma field, to W. H. Tylee, of New York, and associates of Oklahoma City. The mines included in the deal that are now operating are located at Commerce, and are the Miami Zinc and Lead, the Quapaw, and the Lennan Lead and Zinc. They have been operated for some time and are good producers. The workings of the Lennan are the deepest in the district, being 380 ft. This property also has the largest steam pump in the field, being a triple-expansion Prescott pump having a capacity of 2500 gal. per minute. Each of the three mines has a mill with a capacity of 500 tons in 20 hours. The remainder of the acreage in the transaction is made up of four 40-acre tracts, two of which are only a short distance south of Picher and two a short distance to the north, across the state line in Kansas. Each tract has been drilled and has a shaft in ore. The new owners announce that they will start the immediate construction of a mill on each property. Mr. Tylee is president of the new company, which will be known as the Miami Zinc and Lead Co. Mr. Lennan retains an interest and is vice president and general manager.

#### TORONTO—Jan. 30

The Canadian Government will fix a royalty as a basis for the mining companies to pay the claims of the Minerals Separation North American Corporation for the use of the oil-flotation process, the government to hold the money in trust while the validity of patents is being investigated. The corporation has given notice that it will enforce its patent rights and stop all infringements, but will grant licenses for the right to use its processes. It adds

that a settlement for previous infringement must precede the granting of licenses for future use. The operators are not likely to attach any serious importance to this notification until the rights of the corporation have been established by the government inquiry.

#### WASHINGTON, D. C.—Jan. 30

Sulphur Deposits of Popocatepetl, Mexico, are to be exploited again, according to an announcement by the semi-official Mexican news bureau here. These deposits have been worked intermittently since the time of the Spaniards when Cortez obtained the sulphur necessary for his powder from this deposit. Several unsuccessful efforts to exploit this sulphur have been made during the past 30 or 40 years, but the difficulties of transportation from so lofty a height and the disadvantages of working at an altitude of more than 18,000 ft. have made it impossible to compete with imported sulphur. At present, however, with the absorption by the Allies of practically all the sulphur produced in the United States, Latin America, it is said, is looking to Mexico for badly needed supplies of sulphur.

The ancient crater of Popocatepetl, which is several hundred feet in diameter, apparently was choked by a flow of sulphur. Excavation must be taken up at a depth of 300 ft. within the crater and hoisting machinery erected on the rim of the crater.

#### BENDIGO, AUSTRALIA—Dec. 28

A Review of the Bendigo Goldfield for 1917 shows that although statistically the period was the most unsatisfactory for many years, there is still ground for optimism regarding the future. The production for the 12 mo.: Tons crushed, 195,000; gold won, 68,000 oz.; calls, £57,000; dividends, £6451. During the year nearly 40 companies were incorporated into the Bendigo Amalgamated Goldfields Co., Ltd., and their leases grouped in order to centralize operations and ensure more economical control. The surface equipment and treatment plants are being reorganized and modernized to reduce working expenses. This has meant the closing down of a number of the mines for the present but the men have been placed elsewhere. It is worthy of note that with one exception, namely the South New Moon mine, which a few years ago was the premier of the field, all the dividends paid were by companies since merged into the B. A. G.

The development of the parallel lines of reef has lately attracted some attention, and several companies have been formed with the object of testing the resources of these lines, which have hitherto been almost neglected. It is anticipated that developments will be met with early in the new year.

## The Mining News

### ARKANSAS

PRODUCTION OF NORTH FIELDS in ZINC and lead ores for 1917 show a total of 48,867,000 lb. of all ores. 1,164,000 lb. of this was lead. Approximately 5% was zinc sulphide, and the remainder silicate and carbonate ores. The production was made in Boone, Baxter, Marion, Newton and Searcy counties, by approximately 100 operators, the greater number operating on a small scale. Of the grand total, 3,800,000 lb. are in the mine bins or on the platforms at shipping points.

#### Baxter County

SILVER RUN (Rush)—Jos. P. Bussey and associates completed overhauling mill and are ready to operate as soon as weather permits.

MICHIGAN (Buffalo)—The Michigan mine formerly held under lease by the J. C. Shepherd Mining Co. was taken over by a Tulsa, Okla., company. Development will start at once and sufficient proof of ground mill will be constructed.

#### Boone County

EVERTON MINING AND DEVELOPMENT CO. (Everton)—Moving mill from Big Joe mine to Jones lease, where they have opened up good body of jack and carbonate.

CONTINENTAL (Harrison)—Installing new pumping station at the K. and M. mine, one of the Continental group.

ZINC CAMP (Zinc)—Zinc and lead shipments in 1917, compiled by L. L. Brown, ore buyer at that point, show a total of carbonates and silicates of 4,614,620 lb.; lead 30 tons. At the mine a 25 carload tonnage is in the bins awaiting shipment.

#### Independence County

BATESVILLE GAS AND OIL (Batesville)—Sinking a prospect hole near Batesville, for oil and gas. V. G. Richardson reports 8 ft. of high-grade manganese ore at 54 ft. Probably the deepest ore ever discovered in this field. Most of the production made from much higher deposit. Hole is in a low bottom close to White river.

#### Marion County

DIXIE QUEEN (Buffalo)—Some copper ore coming in with the zinc.

MARKLE (Dodd City)—Taken over this week by Oklahoma interests. Will remodel and increase capacity of small mill now on property.

SILVER QUEEN (Rush)—Taken over by Oklahoma interests. Development work to start at once under direction of Ed. Zimmermann, of Yellville.

### ARIZONA

#### Cochise County

DENN ARIZONA (Warren)—Pumps covered in at 1430 ft. and ready to raise water from 1600 level. Water now at 1500 level.

CALUMET & ARIZONA (Warren)—Driving on 1600 level to Denn line, where promising ore was recently found on 1400 level.

COPPER QUEEN (Douglas)—December production at smeltery from ores from company's mines in Warren district, 9,000,000 lb. copper.

#### Gila County

MAZATZAL MINING CO. (Globe)—Rock drills, hoist and a small pumping plant for further development are contemplated. R. S. H. Bradley is manager.

PORPHYRY COPPER CO. (Globe)—Preparations under way to cut shaft stations at 530 ft. and 630 ft. points from shaft and to start level drifting to block out ore.

ARIZONA COMMERCIAL (Globe)—Opening by new stopes between 1400 and 1500 levels and developing energetically on 800, 1000, 1200 and 1500 levels. Water level lowered to between 1200 and 1400 levels.



**Maricopa County**

**KAY COPPER** (Phoenix)—George W. Long, vice president of the United Eastern, and associates recently acquired control of the Kay Copper Co. property in the Tip Top district about 45 miles north of Phoenix. Considerable development has been done on the property and some shipments of high-grade copper ores have been made. The new owners will begin operations at once.

**Pima County**

**NEW CORNELIA** (Ajo)—Plans for erection of smelters are being considered. Plans do not contemplate erection in 1918 unless a marked decline in the cost of materials takes place. Underground development by New Cornelia is well under way at property of Ajo Consolidated. Ores from shovel pits and underground workings higher in grade than indicated by drill records.

**Yavapai County**

**VERDE COMBINATION** (Jerome)—Ore discovery on 600 level is near Gadsden line and is encouraging.

**DEL MONTE** (Jerome)—Shut down apparently for an indefinite period, although additional equipment was received and in course of installation when closing order came.

**JEROME VICTOR EXTENSION** (Jerome)—Expecting to unwater the 1200 level and resume development. Although this level has not been opened extensively, the showing is considered encouraging.

**UNITED VERDE EXTENSION** (Jerome)—New blower has greatly improved working conditions underground. The fire is under control. Smelting plant construction progressing satisfactorily.

**DUNDEE ARIZONA** (Jerome)—Closed down pending completion of arrangement by which it will use the new Verde Extension traffic tunnel to gain entrance and raise from 900 level to connect with its shaft thereby eliminating cost of pumping and hoisting, necessary when sinking.

**CALIFORNIA****Amador County**

**INJUNCTION SUITS** brought by farmers on Dry Creek against Mother Lode mines may result in the filing of suits by the mine owners against the farmers for violation of their recorded agreement made at the time former injunctions were obtained in the courts. This agreement provides that no further suits will be brought against the mines and that the farmers will not aid or encourage such suits and will arbitrate all claims.

**CENTRAL EUREKA** (Sutter Creek)—Survey and mapping of underground workings in progress. Good ore development on 2500, 2700, 3350 and 3425 levels continues. At present 30 stamps out of 40 are dropping.

**Butte County**

**BUMBLEBEE** (Oroville)—High-grade orebody reported. Expect to start new mill in February. Electric hoist being installed. This property and the old Josephine, situated in Morris Ravine, are operated by Charles C. Vaughn and B. T. Hickman.

**Calaveras County**

**MOKELUMNE HILL** district attracting attention as producer of quartz gold, but placer mining not so encouraging. Easy Bird running mill steadily, and recent developments at depth encouraging. The Fischer being unwatered and preparations in progress for extensive work. Shaft being unwatered and retimbered. Main orebody followed to the bottom of shaft and reported 4 ft. wide, assaying \$9 per ton. Stockton Ridge and other placers in district being dismantled of equipment.

**Eldorado County**

**PLACERVILLE REGION** continues active in development and production of chrome and copper.

**Fresno County**

**COALINGA EMPIRE OIL CO.** (Coalinga)—Permit to pay cash dividend of \$281,902, this amount being withdrawn from assets. Company recently sold most of its property to the Shell Oil Co. The Empire, Republic and De Luxe companies have also been permitted to withdraw and pay to the stockholders shares of capital stock of the Coalinga Empire held by them. These shares constitute all the assets of the companies, which will be dissolved as soon as distribution is completed.

**Glenn County**

**OIL PROSPECTS** on the McKinsey place near Orland reported to be still encouraging. Water pumped from the 45-ft. well said to be of milky color and warm temperature, having a thick scum of oil after settling. Samples have been sent to the University of California for testing.

**Nevada County**

**CALIFORNIA** (Rough and Ready)—Shaft deepened 250 ft. To prospect lower points of the property to determine if the ore shoots persist to great depth in form of permanent orebodies. King C. Gillette is owner.

**Plumas County**

**MCCARTY** (Quincy)—Chrome deposit recently examined by L. C. Stephens said to be one of best so far examined. Reported that a one-mile tramway will be built for getting the ore out to wagon road, which will be lengthened from present terminal to point of delivery from the tramway. Will require 10 miles of new road.

**Shasta County**

**MAMMOTH COPPER CO.** (Kennett)—Copper smelted in December estimated at 1,640,000 lb.

**Tuolumne County**

**MT. JEFFERSON** (Groveland)—Mine and improvements sold at public sale by county tax collector; bought by Ernest W. Harker for \$2550. Property consists of quartz mining claim, mill site, 20-stamp mill, two hoists and headframes.

**FORTUNA** (Sonora)—Including the Indiana, Bella Italia, Sirius, Minot and Comet quartz claims, optioned by S. B. Eaton. Purchase price \$40,000, payable in three installments by Feb. 1921. Property now owned by McCormick Co. and associates.

**EAGLE-SHAWMUT** (Shawmut)—Electric hoist installed on third level used in development and mining lower levels. Ore goes to 60-stamp mill through main working adit 2800 ft. long. Mine and mill employ 175 men. Controlled by Belmont Development Co., of Nevada.

**COLORADO****Boulder County**

**POTOSI** (Caribou)—Several sets of lessees at work in this property, and high-grade silver ore being produced. Recent shipment of two carloads has a grade of about 300 oz. per ton.

**Clear Creek County**

**LITTLE GIANT MILL** (Lawson)—Mill completed.

**WALDORF** (Georgetown)—Operations will be resumed.

**TREMONT** (Idaho Springs)—Making regular shipments through Argo tunnel.

**NEW ERA** (Freeland)—Two shifts working in mill and regular production made.

**PAYROCK** (Georgetown)—Worked by three sets lessees. Shipments high-grade lead-silver ore made.

**ONE-FORTY LEASING CO.** (Georgetown)—Shipping lead and zinc concentrates from lease on Seven-Thirty.

**BALD EAGLE** (Idaho Springs)—Bagley Leasing Co. developing this property for last month, and has opened a shoot of good ore. Test run of 125 tons shipped to Jackson mill. Considerable milling grade ore developed.

**Gilpin County**

**HOMER** (Central City)—Shaft being sunk from 200 level. Both shipping- and milling-grade ores opened.

**GILPIN-EUREKA** (Central City)—Shoot lead-copper ore 3 ft. wide opened recently on 700 level. Milling plant operating steadily.

**FRONTENAC** (Central City)—Lessees shipping smelting-grade ore from 600 and 700 levels. Considerable milling ore placed on dumps for future treatment. Water prevents operations at present below 700 level.

**Park County**

**SOUTH LONDON** (Alma)—Shipments ore being made.

**HIGHLAND MARY** (Silverton)—Operated by leasing company. Making regular production.

**NORTH STAR MILL** (Silverton)—Running continuously on custom ore. Louis Bastian, superintendent.

**San Juan County**

**LACKAWANNA** (Silverton)—Tunnel in 1400 ft. Large shoot ore opened recently.

**PRIDE OF THE WEST** (Silverton)—Mine and mill operating steadily. Both crude ore and concentrates being shipped.

**ARIADNE** (Silverton)—Crosscutting to strike at depth. Former producer of good-grade, lead-silver-copper ore from upper workings.

**VENUS** (Silverton)—Being worked by lessees. Preliminary shipment of lead-silver ore gave satisfactory results. Mine will be operated all winter.

**San Miguel County**

**WILD BOY** (Telluride)—Entire property, located in Gold King Basin, sold at sheriff's sale recently.

**TOMBOY** (Telluride)—Considerable ore from Sydney group, which has been under development by this company for some time, being treated in milling plant.

**Summit County**

**EXCELSIOR** (Frisco)—New mill running steadily and making good saving.

**KITTIE INNIS** (Frisco)—Lease taken, and shipments of lead ore expected in near future.

**TONOPAH PLACERS CO.** (Breckenridge)—Dredges will shut down in January for annual repairs. No. 1 dredge will work Magnum Bonum placer, on Blue River, next spring. This ground thoroughly tested by drilling.

**Teller County**

**GRANITE** (Cripple Creek)—Working Bonanza lode through Dillon shaft; shipping good-grade ore.

**OCEAN WAVE** (Cripple Creek)—Ore opened on 400 level of Hurst shaft. Mine worked by lessees.

**KING SOLOMON** (Frisco)—Main tunnel being driven further to cut vein system of Royal Mountain.

**HIAWATHA** (Cripple Creek)—Shipments good-grade ore made recently by lessees. Mine on Beacon Hill.

**TRAIL** (Cripple Creek)—Belongs to United Gold Mines Co., and operated by lessees making large production.

**FOREST QUEEN** (Cripple Creek)—Regular shipments being made to Golden Cycle mill. New shoot opened on 600 level.

**SHOO FLY** (Cripple Creek)—Rich discovery made recently. This mine is on Womack Hill, where first discovery of gold was made in Cripple Creek district by Bob Womack.

**IDAHO****Shoshone County**

**MORNING** (Mullan)—Repairs in the shaft will be completed in February, which will permit the mine to resume operations.

**AMAZON-DIXIE** (Wallace)—Property in Montana just across state line ready to award a contract to sink the shaft from the 900 to the 1100-ft. level.

**SUNSHINE** (Wallace)—Consolidation of mining ground in Beaver district announced and includes the Sunshine, Portland, Idora, Toughnut, Tuscumbia and Parrot. The consolidation was accomplished by the Sunshine Mining Co. The Day interests are said to be financially back of the enterprise.

**MARSH** (Burke)—Milling operations suspended Jan. 15 upon exhaustion of all ore available. Work in mine is now limited to development on 900 level, where a promising ore shoot is being followed. Mill has been running jointly with the Hecla company, the Marsh running one-third of each month and Hecla two-thirds. Hecla now running full time, having mill under lease.

**MICHIGAN****Copper**

**WINONA** (Winona)—Shipping 360 to 370 tons daily.

**AHMEEK** (Ahmeek)—Daily output 4000 tons in January.

**HANCOCK** (Hancock)—Shipped 1100 tons daily in January.

**WYANDOT** (Houghton)—Just shipped 750 tons from stock pile to Winona mill.

**ISLE ROYALE** (Houghton)—Production increased to 2900 tons daily in January.

**OSCEOLA** (Osceola)—Average output now over 5000 tons of ore daily, with frequent records of 5500 tons made.

**WOLVERINE** (Kearsarge)—Output in January, 1917, was 32,179 tons and 501,473 lb. of copper. Yield was 16.25 lb. of copper per ton, as compared with 15.16 lb. for November.

**LA SALLE** (Laurium)—Shipping to Calumet & Hecla mills about 600 tons daily. Working two shafts on Kearsarge lode; stopping to 17th level at No. 1, and developing 12th to 20th levels, inclusive, at No. 2; rock low grade, about 10 lb. of copper per ton.

**CALUMET & HECLA** (Calumet)—Production of copper for the year 1917 was: Ahmeek, 27,919,812 lb.; Alouez, 8,892,915; C. & H., 77,495,283; Centennial, 2,002,857; Isle Royale, 13,480,921; La Salle, 1,919,775; Osceola, 16,084,958; Superior, 2,201,672; Tamarack, 1,202,595; White Pine, 4,067,529 lb.

**MICHIGAN (Rockland)**—Operating nine drills on development and opening four stopes. One stope on Butler lode at fifth level, one on Evergreen and two on Ogimah at sixth level.

**FEDERAL SYNDICATE (Calumet)**—Managing Director H. E. Murray returned from Chicago, having induced Sheridan & Co. to take over control. Company taking over lands of Longyear Michigan Development Co., 1200 acres, on same strike as Bear Lake Pool. Will start at once to diamond drill on Sec. 3 of the Extension group.

**MOHAWK (Mohawk)**—December production of ore 52,930 tons, compared with 46,298 tons for November; production of copper 1,061,000 lb., as compared with 879,516 lb. for November; yield, 20.44 lb. refined copper per ton, as compared with 19 lb. for November. Shafts 4, 5 and 6 showing better grade. Average for all at present 21 lb. copper per ton. Motor haulage has been ordered, but deliveries not expected for months.

#### MINNESOTA

##### Mesabi Range

**OLIVER IRON MINING CO. (Virginia)**—Important preparations and additions of equipment for stripping operations. A substantial order has just been placed for cars for this work. Part of the order has been given to the Western Wheeled Scraper Co., which will make a delivery in March or seventy 20-cu.-yd. automatic air-dump cars.

**BUTLER BROS. (Nashwauk)**—Mine offices which were headquarters for the range, situated at the Quinn Harrison mines, completely destroyed by fire, Jan. 22. The loss will amount to several thousand dollars. Partly covered by insurance. Greatest loss was destruction of all records and books.

#### MISSOURI

##### Joplin District

**ST. REGIS (Duenweg)**—Has new shaft at No. 2 property in Joplin in ore.

**BETHEL (Miami)**—Has started seven drills on leases north of Commerce.

**KATY (Granby)**—Power changed from steam to electricity, recently installing 75-hp. motor to operate mill.

**SILVER CROWN (Vinita, Okla.)**—Started several drills developing leases near Peoria, Okla., and recently took over Gebo mine for \$30,000.

**PLEASANT VALLEY (Carthage)**—At annual meeting re-elected J. M. Millard, president, and William S. Pitt, general manager. Small mill under course of construction.

**CHANUTE SPELTER (Joplin)**—Delayed in starting mill construction on Hartley land at Baxter, Kan., by bad weather. Drilling underway.

**AMERICAN Z. L. & S. (Carterville)**—T. P. Donahoe has resigned as manager of Granby properties. Succeeded by L. H. McColgin. Donahoe was with Granby M. & S. Co. for 30 years. George L. Kenny, superintendent of company's Klondyke mine at Granby, also has resigned and has been succeeded by Burley Hatcher.

#### MONTANA

##### Fergus County

**BARNES KING DEVELOPMENT CO. (Kendall)**—Operations during December were: North Moccasin, ore treated, 1852 tons, assaying \$8.80 per ton; bullion production, \$14,184; Glover and Shannon, in Marysville district, Lewis and Clark County, total ore treated, 4480 tons; bullion production, \$62,339; shipped from Glover, 1567 tons, assaying \$8.46 per ton; shipped from Shannon, 3070 tons, assaying \$13.35 per ton.

##### Lewis and Clark County

**THOMAS CRUSE DEVELOPING (Helena)**—Gold, silver, lead ore from 600 east level. New officers elected.

**HELENA (Helena)**—Annual meeting of stockholders in Helena Jan. 14; new officers elected by Helena Mining bureau, which controls the property.

##### Silver Bow County

**EAST BUTTE (Butte)**—Smeltery production for January was 2,574,140 lb. of copper and 82,175 oz. of silver.

**BUTTE-DETROIT (Butte)**—Investigations being conducted with view to reopening Ophir mill to treat manganese ores of the district.

**ANACONDA (Butte)**—To comply with request of War Board to buy as little new equipment as possible during war and postpone improvements. Butte Electric Ry. Co. forced to change schedule in taking the thousands of miners to and from the mines every day and has reached an agreement with the Anaconda company by which the

latter's mines were divided into three groups with equal numbers of men in each group. The hours for starting the morning shifts are 7, 8 and 9 o'clock, and the night shifts now go on duty at 5, 6 and 7 o'clock. This will materially relieve the congestion on street cars and obviate the purchase of new equipment.

#### NEVADA

##### Storey County

**SIERRA NEVADA (Virginia)**—Placed 1040 ft. compressed-air line on 2500 level.

**OPHIR (Virginia)**—Sent to Mexican mill from 2100 level 147 cars, assaying \$18.33 per ton.

**ALPHA AND EXCHEQUER (Virginia)**—Joint west crosscut advanced 10 ft. through quartz and porphyry.

**JACKET (Gold Hill)**—Surface sent 100 tons to mill from gloryhole. Surface tunnel finished installing winze hoist. Extracted 119 cars low-grade ore. Mill working with new equipment; west side mills, tables and old cyanidation plant operated; 368 tons of mine ore put in mill bins; 3 bars bullion shipped to smeltery.

**UNION CON. (Virginia)**—Increased amount of pay ore extracted from 2500 level. Sent to mill 140 tons, sampling \$28.07. Vein worked 20 ft. north and 10 ft. south. Drift started on vein 85 ft. in east crosscut on 2600 level. Mine sent to Mexican mill 337 tons, averaging \$24.95, and 275 tons wedge rock, sampling \$8.85. Exclusive of ore sent to storage pile, the yield for the week was \$10,800 of ore.

#### SOUTH DAKOTA

##### Lawrence County

**FIRST SHIPMENT OF MANGANESE** ore made from this district by J. F. Street of Lead. Ore is of a good grade and low in phosphorus and silica.

**GOLDEN REWARD (Deadwood)**—An Oliver filter is being installed.

**GOLDEN CREST (Deadwood)**—Arrangements completed for reopening of property. Unwatering main shaft to start soon, followed by active mine work. The cyanidation mill will soon be placed in commission.

**MOGUL (Terry)**—Aerial tramway from portal of main working tunnel to mill bins completed and placed in commission. Working tunnel driven below ore zone and the ore now drawn from all the workings through raises and chutes.

#### UTAH

##### Juab County

**EIGHTY-EIGHT (Tintic Junction)**—Work being done on small scale during winter preparatory to more active work in shipping season. Shipped four cars in 1917.

**DESERET MOUNTAIN (Tintic Junction)**—Shaft down 350 ft., where body of low-grade copper ore has been opened. Four cars shipped in 1917. Transportation problem not yet solved.

**IMPERIAL LEAD (Lucerne)**—Five cars shipped in recent months and stated capable of regular shipments with ore teams available. Incline down 110 ft. in ore about 10 ft. wide and 5 ft. high.

**TINTIC CENTRAL (Silver City)**—Report for 1917 shows a slight deficit. During 1917, 485 ft. of drifting, 137 ft. of raising and 89 ft. in winzes was done. Work on 870-ft. level has been abandoned. Drifting from 1700 level of Iron Blossom has reached Tintic Central ground about 200 ft. east of shaft, where quartz fissures have been cut.

##### Summit County

**DALY WEST (Park City)**—Effort to change management continued. Denial of rumor of possible purchase by Ontario.

**IOWA COPPER (Park City)**—Shaft down 120 ft. in quartzite, carrying streaks and stringers of silver-lead-copper ore of shipping grade. Ore being mined in winze not far from shaft improving with depth in quality and amount.

**PARK-UTAH (Park City)**—Development to be resumed in south drift, which branches from Ontario drain tunnel about 10,000 ft. from portal to prospect new ground in Hawkeye, McHenry and Glencoe sections in eastern part of camp. Possibility of finding faulted easterly continuation of Ontario vein here.

**DALY WEST (Park City)**—Stockholders owning 25,000 shares have started movement against present management, which it is alleged owns only small part of stock. Notices sent to stockholders, asking that following men be elected to directorate: H. Otto Hanke, president Judge Mining and Smelting Co.; G. O. Brooks, Scranton, Penn.; G. W. Lambourne, general manager

Judge Mining and Smelting Co.; O. M. Friendly, superintendent, Judge Mining and Smelting; Harry M. Stonemetz, of J. W. Bowen & Co., 53 State St., Boston, Mass. Stated that no intention of bringing about consolidation with Judge Mining & Smelting Co., and believe that company should be paying dividends. Rumored that purchase by Ontario is in contemplation.

#### Tooele County

**GARRISON MONSTER (Gold Hill)**—Working 12 men at Deep Creek property. Uncle Sam tunnel in 540 ft.

**WESTERN UTAH COPPER (Gold Hill)**—New body of lead during week ended Jan. 12 furnished about 100 tons of ore, and shipments of copper ore reduced to about 125 tons, following beginning of lead shipments. Lead orebody opened on both 300 and 400 level.

#### CANADA

##### Ontario

**BURNSIDE (Kirkland Lake)**—Operations have been started on this property, which is under option to the Cobalt Aladdin.

**MINING CORPORATION (Cobalt)**—Sinking shaft on property in Rickard township on which it has option, and results are stated to be excellent.

**TEMISKAMING (Cobalt)**—Annual report shows net earnings \$544,342, and cash on hand Dec. 31, \$507,157. Production of 958,669 oz. at cost of 31.56c. per oz.

**NIPISSING (Cobalt)**—Has discarded Callow flotation and will concentrate and cyanidize. Reason given is on account of difficulty of treating cyanidation product by flotation.

**DOME (Porcupine)**—Has decided to sink main shaft from 800 to 1500 level on company account and not let contract. Rumors of change of control are current, but nothing definite has developed.

**LAKE SHORE (Kirkland Lake)**—Important strike made on 400-ft. level under Kirkland Lake, where vein has been penetrated for 8 ft. in crosscutting. Width and grade have not yet been determined.

**McINTYRE (Porcupine)**—Report for last six months of 1917 shows that 89,807 tons of ore, averaging \$10.48, were treated, as compared with 86,086, averaging \$10.46, the previous period. Recovery for second period was \$865,498, operating costs were \$453,476, or \$5.04 a ton, and profit was \$412,022, or \$4.58 a ton, compared with \$4.87 for previous period. Development was 3796 ft. and 4739 ft. of diamond drilling was done. Option on Plenaureum has been extended till Dec. 31, 1918.

#### MEXICO

##### Baja California

**COMPAGNIE DU BOLEO (Santa Rosalia)**—Copper production for the month of December is 1,785,840 pounds.

##### Coahuila

**AMERICAN METAL CO. (Higuera)**—Serious cave has occurred in the Paloma mine.

**MAZAPIL COPPER CO. (Saltillo)**—Lead smeltery operating on ores from San Eligio in the Mazapil district, Zacatecas.

**REFORMA MINE (Cuatro Ciénegas)**—Operations continue. Recent uprising of the Gutierristas has not materially interfered with work.

**CONSTANCIA (Sierra Mojada)**—Operations to be resumed upon completion of repairs now being made to Mexican Northern Railroad.

**AMERICAN SMELTING AND REFINING CO. (Sierra Mojada)**—Panuco mine now under lease. Shipping to Monterrey plant. John Russell is assistant superintendent.

##### Zacatecas

**NAZARENO y ALICANTE (Concepcion del Oro)**—Doing a small amount of work.

**CONSUELO (Concepcion del Oro)**—Investigations made by California interests. Owner, F. R. Varela.

**AMERICAN SMELTING AND REFINING CO. (Concepcion del Oro)**—Work at the Bonanza mine going on under the supervision of W. B. Gates, superintendent of the Sierra Mojada unit.

**MAZAPIL COPPER CO. (Concepcion del Oro)**—One copper furnace being operated on ores from Aranzazu mines. Coke shortage prevents more extensive operations. R. H. Jeffrey is general manager.

**SOCAVON DE PROVIDENCIA (Concepcion del Oro)**—This property and the Albarradon are developing, but not producing, on account of the shut down of the smeltery at Torreón. J. W. Williams is superintendent.



# The Market Report

## SILVER AND STERLING EXCHANGE

Jan. Feb.	Sterling Exchange	Silver		Feb.	Sterling Exchange	Silver	
		New York, Cents	London, Pence			New York, Cents	London, Pence
31	4.7525	86½	43½	4	4.7525	86½	43½
1	4.7525	86½	43½	5	4.7525	86½	43½
2	4.7525	86½	43½	6	4.7525	86½	43

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

Jan. Feb.	Copper Electrolytic	Tin Spot	Lead		Zinc St. L.
			N. Y.	St. L.	
31	*23½	†	6½	6.70	7½
1	*23½	†	@6½	@6.80	@7½
2	*23½	†	6½	6.75	7.60
4	*23½	†	@6½	@6.80	@7.70
5	*23½	†	6½	6.75	7.60
6	*23½	†	@6½	@6.80	@7.70

\* 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 17.5c. per 100 lb. above St. Louis.

Some current freight rates on metals per 100 lb. are: St. Louis-New York 17c.; St. Louis-Chicago, 6.3c.; St. Louis-Pittsburgh, 13.1 cents.

## LONDON

Jan. Feb.	Copper		Electrolytic	Tin		Lead	Zinc
	Standard Spot	3 Mos.		Spot	3 Mos.		
31	110	110	125	298	296	29½	54
1	110	110	125	296½	294½	29½	54
2	110	110	125	299½	296½	29½	54
4	110	110	125	299	296½	29½	54
5	110	110	125	300½	299	29½	54
6	110	110	125	300½	299	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. £291 = 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—Feb. 6, 1918

All of the markets have been reduced to such a situation that week after week there is scarcely anything to be said except that "there is nothing to report."

**Copper**—The requisitions for copper continue unabated, except that for the moment there is a lull in shipments to Europe, most of the ships that were tied up here having

been supplied with coal and being now on their eastward voyage. The refiners in the vicinity of New York are having great difficulty either in getting coal or crude copper, or both, to their works, and several plants are in imminent danger of being obliged to suspend production. The situation from this end is much more dangerous than it was a year ago, for not only is the impediment to traffic worse, but also manufacturers in Connecticut, who now rely upon Government supply, do not carry in their yards the reserve stocks that they used to.

**Copper Sheets** are quoted at 31½c. per lb., f.o.b. mill, for hot rolled, and 1c. higher for cold rolled. Copper wire is quoted at 27c. f.o.b. mill, carload lots.

**Tin**—There is still no market. Talk about a few small sales of Banka at 85c. indicates what the market might be if there were any supplies to be had.

**Lead**—Although the market continues firm the situation is easier, chiefly owing to freer deliveries by the railways. In local centers where there are still scarcities of prompt lead and delays in receiving shipments fancy prices are still realized, but even on such local and relatively trifling business premiums are less than they were a little while ago. With respect to the refineries, the bases of supply, the situation differs, some having lead to supply, while others are distinctly short in their ability. We are inclined to think that the latter condition is the predominant one. On the other hand, there is no doubt of there being an immense quantity of lead in transit, and the fears of consumers having been allayed, inquiry during the last week was not very brisk. Features of interest were some sales to Canada and some considerable inquiries from China and Japan.

**Zinc**—The market continued dull and uninteresting, with moderating sales around 7.65c., St. Louis.

**Zinc Sheets**—Price of zinc sheets has not been changed. Demand is strong and the market continues at \$19 per 100 lb. f.o.b. Peru, less 8% discount.

## Other Metals

**Aluminum**—This market is inactive at 36@38c. per lb. for No. 1 ingots at New York, though some dealers are asking a higher price for spot delivery.

**Antimony**—A little Government business was done, the market being otherwise quiet. It is overstocked and is naturally inclined to weakness on that account. We quote spot at 14c., and futures at 12½@13c. c.i.f., in bond. Chinese houses report that the market is higher in China than here.

**Bismuth**—Unchanged at \$3.50 per lb. for the pure metal.

**Cadmium**—This metal is quoted at \$1.50 @1.75 per lb., depending on the quantity.

**Nickel**—Steady at 50c. per lb., premium of 5c. per lb., for electrolytic.

**Quicksilver**—The demand has slackened on account of shut-down of manufacturing plants, and the market is easier. We quote \$125. San Francisco reports, by telegraph, \$117.50, easy.

## Gold, Silver and Platinum

**Silver**—This metal has declined slightly owing to more liberal offerings in the London market. The closing quotation in London was 43d. and in New York 86½c. Cable reports show a reduction in the Indian currency figures which are now stated to be under 15 crores.

Mexican dollars at New York: Jan. 31, 68½c.; Feb. 1, 69c.; 2, 69c.; 4, 69c.; 5, 69c.; 6, 68½c.

**Platinum**—Unchanged at \$106@108; demand good.

Government purchase of about 21,000 oz. of crude platinum recently imported from Russia, through the cooperation of the U. S. Department of Commerce and American mining engineers resident in Russia and the Russian-English Bank of London. Petrograd and Moscow, was stated in the daily papers to have been made at \$90 per oz. This, however, is only a tentative

price. The ultimate adjustment, it is assumed, will correspond to the current market prices of the period. The exact content of the shipment, which consisted of sponge, grain and nugget platinum, is not yet known, as the assaying and refining have not been completed.

**Palladium**—Unchanged at \$135; strong.

## Zinc and Lead Ore Markets

**Joplin, Mo., Feb. 2**—Blende, per ton, high \$69.10; basis 60% Zn, premium \$67.50; medium to low \$60@50; calamine, per ton, 40% Zn, \$33@30; average selling price, all grades of zinc, \$52.86 per ton.

Lead, high \$86.80; basis 80% Pb, \$85@80; average selling price, all grades of lead, \$75.54 per ton.

Shipments the week: Blende 8675, calamine 312, lead 1213 tons. Value, all ores the week, \$576,030.

Several more mills in the Oklahoma field closed down Jan. 31, following the embargo order of the Frisco lines, that no more cars would be supplied for ore shipments for an indefinite period. Continued cold, extreme cold for this section, greatly retards mill operations, and, in addition, many miners of the Oklahoma field are under treatment for smallpox. The mining section has been quarantined by Oklahoma state authorities. The Joplin section has been practically frozen up since Dec. 1.

**Platteville, Wis., Feb. 2** (By telegraph)—Blende, basis 60% Zn, \$61 base for premium grade down to \$53 base for second grade. Lead ore, basis 80% Pb, \$80 per ton. Shipments reported for the week are 1189 tons of zinc ore, 34 tons of lead ore and 315 tons of sulphur ore; for the year to date, the figures are: 10,463 tons of zinc ore, 177 tons of lead ore and 2661 tons of sulphur ore. Shipped during week to separating plants: 2124 tons of zinc ore.

## Other Ores

**Manganese Ore**—Unchanged at \$1.20 per unit.

**Molybdenum Ore**—Quoted at \$2.15 per lb. of molybdenum sulphide for the 90% grade. This ore being forwarded by express to a large extent, the railway congestion has not interfered with shipments, and arrivals have lately increased in volume, but so far the trade has easily absorbed them.

**Pyrites**—Spanish lump is quoted at 15½c. per unit, on basis of 10s. ocean freight, buyer to pay excess freight and war risk, except that, depending on conditions, concession of 2% of war risk may be allowed. Ocean rates remain at 35s. for Northern, 40s. for Southern and 42s. 6d. for Gulf ports, but recent charters have exceeded these rates in several instances. December chartered tonnage less than expected; shortage about 50%.

**Tungsten Ore**—Scheelite, \$26 per unit; wolframite quotations ranged from \$26 down to \$20, according to grade. Beginning Feb. 1, tungsten, molybdenum, vanadium, manganese and chrome ores came under the licensing authority of the American Iron and Steel Institute, in so far as those ores are imported from abroad. Importers, dealers and consumers are now required to give a guarantee before material is released to them.

## Iron Trade Review

### PITTSBURGH—Feb. 5

A further curtailment in steel production has been forced by the inability to ship finished product. Scarcely any steel is now being shipped from mills except on Government orders, and shipment is sometimes impossible even of Government steel. There are embargoes against shipment to nearly all points, and permits are almost impossible to secure for shipment of ordinary commercial steel. Shipments from the Pittsburgh and valley mills during January were equal to between 50 and 60% of mill capacity, nearly all this being Government steel, while in the last 10 days the shipments have been at not over 50%.

Two months ago steel began accumulating at mills, through the insufficiency of transportation, and recently these accumulations have become so great that many departments are operating only to the extent that they can ship. While the insufficient movement of coke was for a long time the limiting influence in the production of pig iron, and therefore of steel, the regulating influence now is rather the ability to ship steel, even though pig-iron production has been forced down to a lower rate than ever.

Under the circumstances there is no steel market. Buyers show no inclination to buy and sellers have no incentive to sell, when they cannot fill orders already on books. Consumers show no anxiety about shipments and evidently are suffering from the transportation situation as much as are the producers. How a general loosening up in transportation matters would affect consumers and producers respectively is really the only market question at present. If it did not greatly increase demand, steel in many forms would become a drug on the market.

The trade has got into a rather lethargic condition and is simply waiting until the progress of the season brings milder weather and better transportation. Meanwhile nothing can be done. There is no discussion as to what Washington will be disposed to do in the matter of price revision, the prices originally set having been extended to Mar. 31 by the announcement of Dec. 29. Before the subject comes up again conditions in the industry may be altogether different, for steel may possibly be plentiful.

**Pig Iron**—Connellsville coke shipments last week were the smallest in this whole period, and the movement to furnaces was also poor, the result being that the furnaces depending on Connellsville coke are producing about 25% of their normal pig iron. The furnaces having byproduct ovens are doing about 75%. There is no pig iron available in the market for early delivery, but some contract business is done for the second half of the year, the contracts carrying a clause providing for price revision in the event of new Government prices. Many of the steel works would buy pig iron for early deliveries if it could be had. Foundries, however, are not so much interested, their business having in many cases fallen off greatly. The market remains quotable at the set prices: Bessemer, \$36.30; basic and foundry, \$33; malleable, \$33.50; gray forge, \$32, f.o.b. furnace, freight from valleys to Pittsburgh being 95c. Messrs. W. P. Snyder & Co. report their computation of average prices realized in transactions in January at \$36.30 for bessemer and \$33 for basic, only a very small tonnage entering into the computations. The averages have now stood at the Government prices for four months.

**Steel**—There is no soft steel to be had in the market, producers being behind in making deliveries on contracts. The market is quotable at the set prices: Billets, \$47.50; small billets, \$51; slabs, \$50; sheet bars, \$51; rods, \$57. There is a moderate inquiry for discard steel, which is in fairly good supply at \$2@3 under the set prices for soft steel.

**Ferroalloys**

**Ferromanganese**—While the market is far from active the tone is very strong, \$250, delivered, being the minimum quotation for prompt or forward. There is no scarcity thus far, but the supply of Brazilian ore is threatened further by the shortage of coal in Brazil.

**Coke**

**Connellsville**—Last week's coke shipments were the poorest on this movement and this week promises no better. There was a car supply Monday slightly better than 40%, but this was due to mild weather on Sunday, the temperature passing above 40°, but in the night it dropped nearly to zero and further cold weather seems to be in prospect. Additional congestion has resulted from last week's weather conditions, the Pennsylvania refusing to take coke through the Greensburg gateway at Latrobe, while at the other end of the region there is a congestion of over 1000 cars on the Monongahela railroad, waiting to get on the Pennsylvania tracks. Many coke interchanges have been made at the instance of the Fuel Administration and these comprise practically all the business that is being done at the set prices, which remain \$6 for furnace, \$7 for 72-hour selected foundry and \$7.30 for crushed over 1-in., per net ton at ovens.

**STOCK QUOTATIONS**

Table with columns for N. Y. EXCH.† Feb. 5 and BOSTON EXCH.\* Feb. 5. Lists various stocks like Alaska Gold M., Alaska Juneau, Am. Sm. & Ref. com, etc.

Table with columns for N. Y. CURB† Feb. 5. Lists various commodities like Big Ledge, Butte & N. Y., Butte & Detroit, etc.

Table with columns for BOSTON CURB\* Feb. 5. Lists various stocks like Alaska Mines Corp., Bingham Mines, Boston & Mont., etc.

Table with columns for SALT LAKE\* Feb. 2. Lists various stocks like Bannack, Cardiff, Colorado Mining, etc.

Table with columns for SAN FRAN.\* Feb. 5. Lists various stocks like Alta, Andes, Best & Belcher, etc.

Table with columns for TORONTO\* Feb. 2. Lists various stocks like Adanac, Bailey, Beaver Con., etc.

**STOCK QUOTATIONS—Continued**

Table with columns for COLO. SPRINGS Feb. 5 and LONDON Jan. 18. Lists various stocks like Cresson Con., Doctor Jack Pot., Elkhon Con., etc.

**MONTHLY AVERAGE PRICES OF METALS**

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

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

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

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

(c) No average computed.

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

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

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

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

† As reported by W. P. Snyder & Co.



# Current Prices—Materials and Supplies

## IRON AND STEEL

**SHEETS**—Quotations are in cents per pound in various cities from warehouse, also the base quotations from mill:

No.	Large Mill Lots, St. Pittsburgh		Chicago	San Francisco	New York— Feb. 1, 1918	
	Feb. 1, 1918	One Year Ago			Feb. 1, 1918	One Year Ago
No. 10	4.25	5.52	5.45	6.00	5.45	4.80
No. 12	4.30	5.57	5.50	6.05	5.50	4.85
No. 14	4.35	5.62	5.55	6.10	5.55	4.90
<b>Black</b>						
Nos. 18 and 20	4.80	6.32	6.25	6.90	6.25	5.30
Nos. 22 and 24	4.85	6.37	6.30	6.95	6.30	5.35
No. 26	4.90	6.42	6.35	7.00	6.44	5.40
No. 28	5.00	6.52	6.45	7.10	6.45	5.50
<b>Galvanized</b>						
No. 10	5.25	6.97	6.80	7.70	6.70	6.50
No. 12	5.35	6.97	6.80	7.70	6.80	6.60
No. 14	5.35	6.97	6.80	7.70	6.80	6.65
Nos. 18 and 20	5.65	7.17	7.10	7.70	7.10	6.95
Nos. 22 and 24	5.80	7.32	7.25	7.90	7.25	7.05
No. 26	5.95	7.02	7.40	8.05	7.40	7.20
No. 28	6.25	7.77	7.70	8.35	7.70	7.50

**STEEL RAILS**—The following quotations are per ton f.o.b. Pittsburgh and Chicago for carload or larger lots. For less than carload lots 5c. per 100 lb. is charged extra:

	Pittsburgh		Chicago*	
	Feb. 1, 1918	One Year Ago	Feb. 1, 1918	One Year Ago
Standard bessemer rails	60.00-65.00	38.00	60.00-65.00	38.00
Standard openhearth rails	63.00-65.00	40.00	63.00-65.00	40.00
Light rails, 8 to 10 lb.	*3.125	53.00	*3.125	47.00
Light rails, 12 to 14 lb.	*3.125	52.00	*3.125	46.00
Light rails, 25 to 45 lb.	*3.125	50.00	*3.125	44.00

\*Government price per 100 lb. for rails rolled from billets.

**TRACK SUPPLIES**—The following prices are base per 100 lb. f.o.b. Pittsburgh for carload lots, together with the warehouse prices at the places named:

	Pittsburgh		Chicago	St. Louis	San Francisco
	Feb. 1, 1918	One Year Ago			
Standard railroad spikes, 3/4-in. and larger	\$3.90	\$3.50	\$5.00	\$6.45	\$7.25
Track bolts	4.90	4.85	6.25	Premium	8.80
Standard section angle bars	3.25	2.25-2.75	4.50	Premium	4.65

**STRUCTURAL MATERIAL**—The following are the base prices f.o.b. mill, Pittsburgh, together with the quotations per 100 lb. from warehouses at the places named:

	Mill, Pittsburgh	New York		St. Louis	Chicago	San Francisco	Dallas
		Feb. 5, 1918	One Year Ago				
Beams, 3 to 15 in.	\$3.00	\$4.195	\$3.95	\$4.27	\$4.20	\$4.75	\$5.50
Channels, 3 to 15 in.	3.00	4.195	3.95	4.27	4.75	4.20	5.50
Angles, 3 to 6 in., 1/4 in. thick	3.00	4.195	3.95	4.27	4.75	4.20	5.50
Tees, 3 in. and larger	3.00	4.195	3.95	4.27	4.75	4.25	5.50
Plates	3.25	4.445	4.75-5	4.52	5.00	4.45	6.00

**STEEL SHEET PILING**—The following price is base per 100 lb. f.o.b. Pittsburgh with a comparison of a month and a year ago:

Feb. 5, 1918	One Month Ago	One Year Ago
\$4.00 to \$5.00	\$4.00 to \$5.00	\$3.00

**RIVETS**—The following quotations are per 100 lb.:

	Warehouse		San Francisco	Dallas
	Mill, Pittsburgh	New York, Feb. 5, 1918		
1/4 in. and larger	\$5.25	\$7.00	\$5.25	\$5.50
<b>CONE HEAD BOILER</b>				
1/4 in. and larger	5.35	7.10	5.35	5.60
3/8 in. and larger	5.50	7.25	5.50	5.75
1/2 in. and larger	5.85	7.60	5.85	6.10

Lengths shorter than 1 in. take an extra of 50c. Lengths between 1 in. and 2 in. take an extra of 25c.

**WIRE ROPE**—Discounts from list price on regular grades of bright and galvanized are as follows:

	New York	St. Louis
Galvanized iron rigging	List + 20%	+ 20%
Galvanized cast steel rigging	Net List	30%
Bright plow steel	17 1/2%	17 1/2%
Bright cast steel	17 1/2%	17 1/2%
Bright iron and iron tiller	5%	5%

**HORSE AND MULE SHOES**—Warehouse prices per 100 lb. in cities named:

	Mill, Pittsburgh	Cincinnati	Chicago	St. Louis	Denver	Birmingham
Straight	\$4.75	\$6.30	\$6.50	\$6.00	\$7.50	\$6.25
Assorted	4.90	6.30	6.50-7.00	6.25	7.75	6.50

**SWEDISH (NORWAY) IRON**—This material per 100 lb. sells as follows:

	Feb. 5, 1918	One Year Ago
New York	\$14.00	\$6.00
Cleveland	15.00	6.30
Chicago	13.50	5.50

In coils an advance of 50c. usually is charged.

Note—Stock scarce generally.

**COAL BIT STEEL**—Warehouse price per pound is as follows:

New York	Cincinnati	Birmingham	St. Louis	Denver
\$0.12	\$0.16 1/2	\$0.16	\$0.15	\$0.16

**DRILL STEEL**—Warehouse price per pound:

	New York	St. Louis
Solid	14c.	16c.
Hollow	24c.	25c.

**PIPE**—The following discounts are for carload lots f.o.b. Pittsburgh, basing card of Nov. 6, 1917, for steel pipe and for iron pipe:

Inches	Steel		Inches	Iron	
	Black	Galvanized		Black	Galvanized
3/4, 1 and 1 1/2	44%	17%	3/4 to 1 1/2	33%	17%
1 1/2 to 3	48%	33 1/2%			
	51%	37 1/2%			
<b>LAP WELD</b>					
2	44%	31 1/2%	2	26%	12%
2 1/2 to 6	47%	34 1/2%	2 1/2 to 4	28%	15%
			4 1/2 to 6	28%	15%
<b>BUTT WELD, EXTRA STRONG PLAIN ENDS</b>					
3/4, 1 and 1 1/2	40%	22 1/2%	3/4 to 1 1/2	33%	18%
1 1/2	45%	32 1/2%			
3/4 to 1 1/2	49%	36 1/2%			
<b>L.P. WELD, EXTRA STRONG PLAIN ENDS</b>					
2	42%	30 1/2%	2	27%	14%
2 1/2 to 4	45%	33 1/2%	2 1/2 to 4	29%	17%
4 1/2 to 6	44%	32 1/2%	4 1/2 to 6	28%	16%

Note—National Tube Co. quotes on basing card dated Apr. 1.

From warehouses at the places named the following discounts hold for steel pipe:

	Black		St. Louis
	New York	Chicago	
3/4 to 3 in. butt welded	38%	42.8%	40.1%
3 1/2 to 6 in. lap welded	18%	38.8%	36.1%
<b>Galvanized</b>			
New York Chicago St. Louis			
3/4 to 3 in. butt welded	22%	27.8%	25.1%
3 1/2 to 6 in. butt welded	List	18.8%	22.1%

Malleable fittings, Class B and C, from New York stock sell at list price. Cast iron, standard sizes, 15 and 5%.

## MISCELLANEOUS

**FLOTATION OILS**—Prices of oils for flotation, in cents per gallon, in barrels:

	New York	Chicago	Denver
Pure steam-distilled pine oil	\$0.50 1/2	\$0.45	\$0.30
Pure destructively distilled pine oil	.40	.43	.30
Pine tar oil	.28 1/2	.30	.24 1/2
Crude turpentine	.37	.40	.44
Hardwood creosote	.19 1/2		.34 1/2

\*F.o.b. Cadillac, Mich.

**SODIUM CYANIDE**—New York price is 37c. per lb.; Denver, 44c.; in Chicago, 45c.; in St. Louis, 40c.

**SODIUM SULPHIDE**—In New York the price per pound is 4c. to 4 1/4 c. for concentrated, 2 1/4 c. to 2 1/2 c. for crystals. The Denver price for crystals is quoted at 9c.; the St. Louis price, 8c.; the Chicago price is 3 1/2 c. Concentrated comes in 500-lb. drums, the crystals in 440-lb. bbl.

**ZINC DUST**—New York price is 18c. per lb. in 1600-lb. barrel; Chicago, 18c.; in Denver, 16c.; in St. Louis, 25c.

**ALUMINUM DUST**—Chicago price is \$1 per lb.

**CALCIUM CARBIDE**—Price f.o.b. cars at warehouse points east of Mississippi River (except in Alabama, Georgia and Florida) is \$97.50 for Cameo \$102.50 for Union miners' carbide. In territory between Mississippi River and the Rockies and in Alabama, Georgia and Florida, add \$5; west of Rockies, add \$10 to \$15.

**LINOLEUM**—In 50-sq.-yd. rolls in carload lots the price is 96 3/4 c. per square yard, for concentrating tables.

## HOSE

	Fire		
	50-Ft. Lengths	75c. per ft.	
Underwriters' 2 1/2-in.		40%	
Common, 2 1/2-in.		40%	
<b>Air</b>			
	First Grade	Second Grade	Third Grade
3/4-in. per ft.	\$0.55	\$0.30	\$0.25

Steam—Discounts from list

First grade... 30% Second grade... 30-5% Third grade... 40-10%

**RUBBER BELTING**—The following discounts from list apply to transmission rubber and duck belting:

Competition	50%	Best grade	20%
Standard	35%		

**LEATHER BELTING**—Present discounts from list in the following cities are as follows for cut lengths:

	Medium Grade	Heavy Grade
New York	40%	35%
St. Louis	45%	40%
Chicago	30-10%	40-5%
Birmingham	35%	40%
Denver	40%	40%

MILLER—FEBRUARY 6  
RAWHIDE LACING—40%.

MANILA ROPE—For rope smaller than 5-in. the price is 1/2 to 2c. extra; while for quantities amounting to less than 600 ft. there is an extra charge of 1c. The number of feet per pound for the various sizes is as follows: 5-in., 8 ft.; 3-in., 6; 4-in., 4 1/2; 1-in., 3 1/2; 1 1/2-in., 2 ft. 10 in.; 1 1/4-in., 2 ft. 4 in. Following is price per pound for 5-in. and larger, in 1200-ft. coils:

Table with 4 columns: City, Price, City, Price. Rows include Boston, New York, Cincinnati, Chicago, St. Paul, Denver, Kansas City, New Orleans, Los Angeles, Seattle.

PACKING—Prices per pound:

Table with 2 columns: Item, Price. Items include Rubber and duck for low-pressure steam, Asbestos for high-pressure steam, Duck and rubber for piston packing, Flax regular, Flax waterproofed, Compressed asbestos sheet, Wire insertion asbestos sheet, Rubber sheet, Rubber sheet, wire insertion, Rubber sheet, duck insertion, Rubber sheet, cloth insertion, Asbestos packing, twisted or braided, and graphited, for valve stems and stuffing boxes, Asbestos wick, 1/2- and 1-lb. balls.

FIRE BRICK—Quotations on the different kinds in the cities named are as follows, f.o.b. works:

Table with 3 columns: Item, New York, Chicago. Items include Silica brick, per 1000, Fire clay brick, per 1000, Magnesite brick, per net ton, Chrome brick, per net ton, Deadburned magnesite brick, per net ton, Special furnace chrome brick, per net ton.

Standard size fire brick, 9 x 4 1/2 x 2 1/2 in. The second quality is \$4 to \$5 cheaper per 1000. St. Louis—High grade, \$55 to \$65; St. Louis grade, \$40 to \$50. Birmingham—Fire clay, \$25 to \$30; Denver, \$23, per 1000.

RAILWAY TIES—For fair-size orders, the following prices per tie hold:

Table with 4 columns: City, Material, 7 in. x 9 in. by 8 Ft. 6 in., 6 in. x 8 in. by 8 Ft. Cities include New York, St. Louis, Chicago, San Francisco, San Francisco.

GREASES—Prices are as follows in the following cities in cents per pound for barrel lots:

Table with 5 columns: Item, Cincinnati, Chicago, St. Louis, Birmingham, Denver. Items include Cup, Fiber or sponge, Transmission, Axle, Gear, Car journal.

COTTON WASTE—The following prices are in cents per pound:

Table with 4 columns: Item, New York, Cleveland, Chicago. Items include White, Colored mixed.

WIPING CLOTHS—In Cleveland the jobbers' price per 1000 is as follows:

Table with 2 columns: Item, Price. Items include 13 1/4 x 13 1/4, In Chicago they sell at \$30 to \$33 per 1000.

LINSEED OIL—These prices are per gallon:

Table with 4 columns: Item, New York, Cleveland, Chicago. Items include Raw in barrels, 5-gal. cans.

WHITE AND RED LEAD in 500-lb. lots sell as follows in cents per pound:

Table with 6 columns: Item, Red, White, Dry, In Oil, Dry, In Oil. Items include 25- and 50-lb. kegs, 12 1/2-lb. keg, 100-lb. keg, 1- to 5-lb. cans.

NUTS—From warehouse at the places named, on fair-sized orders, the following amount is deducted from list:

Table with 4 columns: Item, New York, Cleveland, Chicago. Items include Hot pressed square, Hot pressed hexagon, Cold punched square, Cold punched hexagon.

Semifinished nuts sell at the following discounts from list price:

Table with 4 columns: City, Discount, City, Discount. Cities include New York, Cleveland, Chicago, St. Louis.

MACHINE BOLTS—Warehouse discounts in the following cities:

Table with 4 columns: Item, New York, Cleveland, Chicago, St. Louis. Items include % by 4 in. and smaller, Larger and longer up to 1 in. by 30 in.

WASHERS—From warehouses at the places named the following amount is deducted from list price:

Table with 4 columns: City, Price, City, Price. Cities include New York, Cleveland, Chicago, St. Louis.

EXPLOSIVES—Price per pound in small lots at cities named:

Table with 5 columns: City, Low Freezing, Gelatin, Black Powder. Items include New York, Cincinnati, Kansas City, New Orleans, Seattle, Chicago, St. Paul, St. Louis, Denver, Los Angeles, San Francisco.

FUEL OIL—Price variable, depending upon stock. New York quotations not available owing to this fact. In Chicago and St. Louis the following prices are quoted:

Table with 3 columns: Item, Chicago, St. Louis. Items include Mexican heavy, 12-14 Baumé, Domestic light, 22-26 Baumé.

CONSTRUCTION MATERIALS

ROOFING MATERIALS—Prices per ton f.o.b. New York or Chicago:

Table with 3 columns: Item, Carload Lots, Less Than Carload Lots. Items include Tar felt, Tar pitch, Asphalt pitch, Asphalt felt.

PREPARED ROOFINGS—Standard grade rubbered surface complete with nails and cement costs per square as follows in New York and Chicago:

Table with 4 columns: Item, 1-Ply, 2-Ply, 3-Ply. Items include No. 1 grade, No. 2 grade.

Asbestos asphalt saturated felt (14 lb. per square) costs \$5.35 per 100 lb.

Slate-surfaced roofing (red and green) in rolls of 108 sq.ft. costs \$1.85 per roll in carload lots and \$2.10 for smaller quantities. Single red and green slate finish, cost \$4.75 per square in carloads, \$5 in smaller quantities, in Philadelphia.

HOLLOW TILE—

Table with 4 columns: City, 4x12x12, 8x12x12, 12x12x12. Cities include Boston, St. Paul, Cincinnati, Kansas City, Denver, New Orleans, Seattle.

LUMBER—Price per M in carload lots:

Table with 4 columns: City, 8 x 8-in. x 20 Ft. and Under, 12 x 12-In. 20 Ft. and Under. Items include Boston, Cincinnati, Denver, Kansas City, Seattle, New Orleans, St. Paul.

\*Kansas City—These quotations are for No. 1 common.

Table with 4 columns: City, 1-In. Rough, 10 In. x 16 Ft. and Under, 2-In. T. and G. 10 In. x 16 Ft. Items include Boston, Cincinnati, Denver, Kansas City, Seattle, New Orleans, St. Paul.

PORTLAND CEMENT—These prices are for barrels in carload lots, including bags:

Table with 4 columns: City, Feb. 5, 1918, One Month Ago, One Year Ago. Cities include New York, Jersey City, Boston, Chicago, Pittsburgh, Cleveland, Denver, Los Angeles.

LIME—Warehouse prices:

Table with 4 columns: City, Hydrated per Ton, Lump per 300-Lb. Barrel. Items include New York, Chicago, St. Louis, Dallas, San Francisco, Boston, Kansas City, St. Paul, Seattle.

\*Per 180-lb. barrel. †Birmingham, 200-lb. barrels. Denver—There is one classification of hydrated lime, quoted at \$21.25 per ton, paper bags. Lump lime sells for 65c. per bushel of 80 lb. in bulk or barrel weights.

Note—Refund of 10c. per bag, amounting to \$2 per ton.