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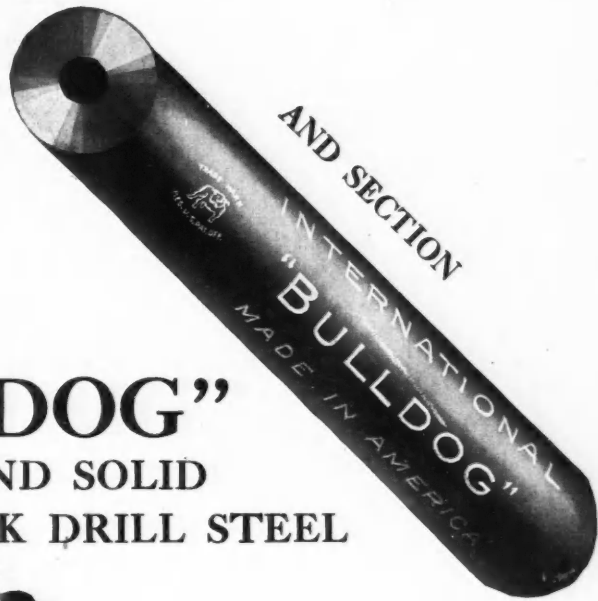
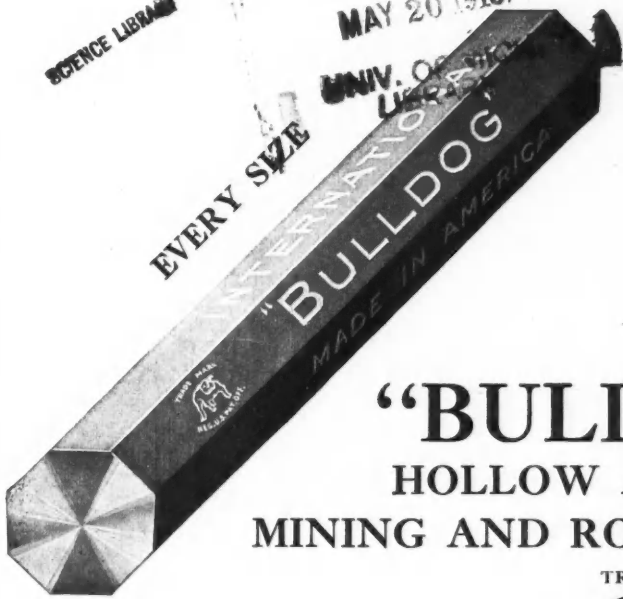
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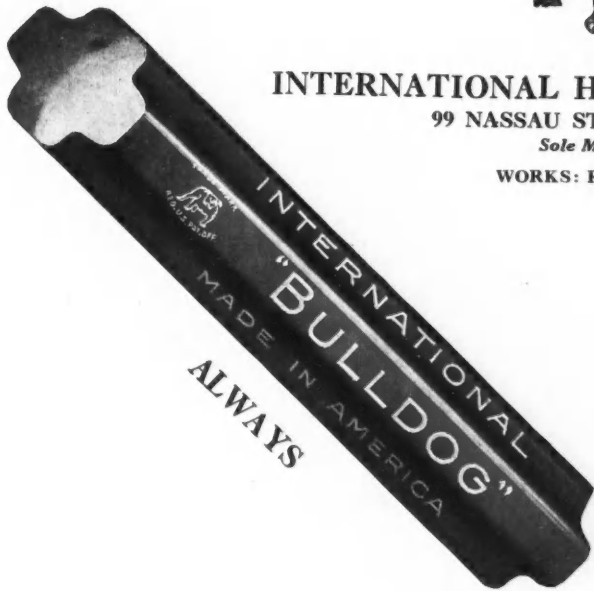
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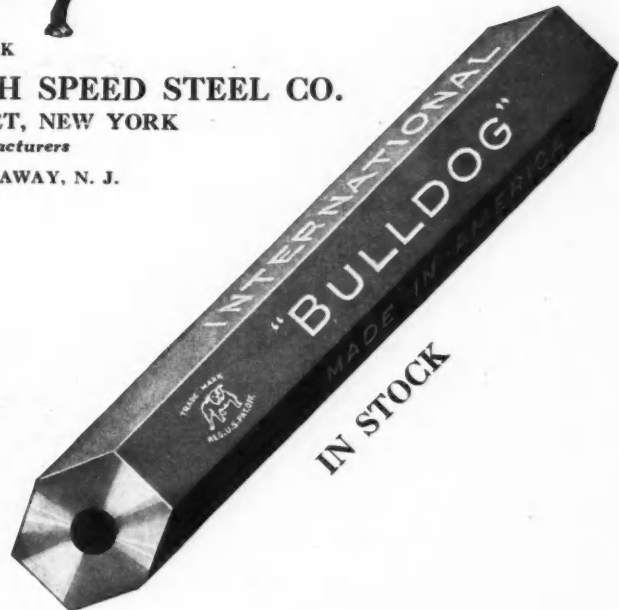
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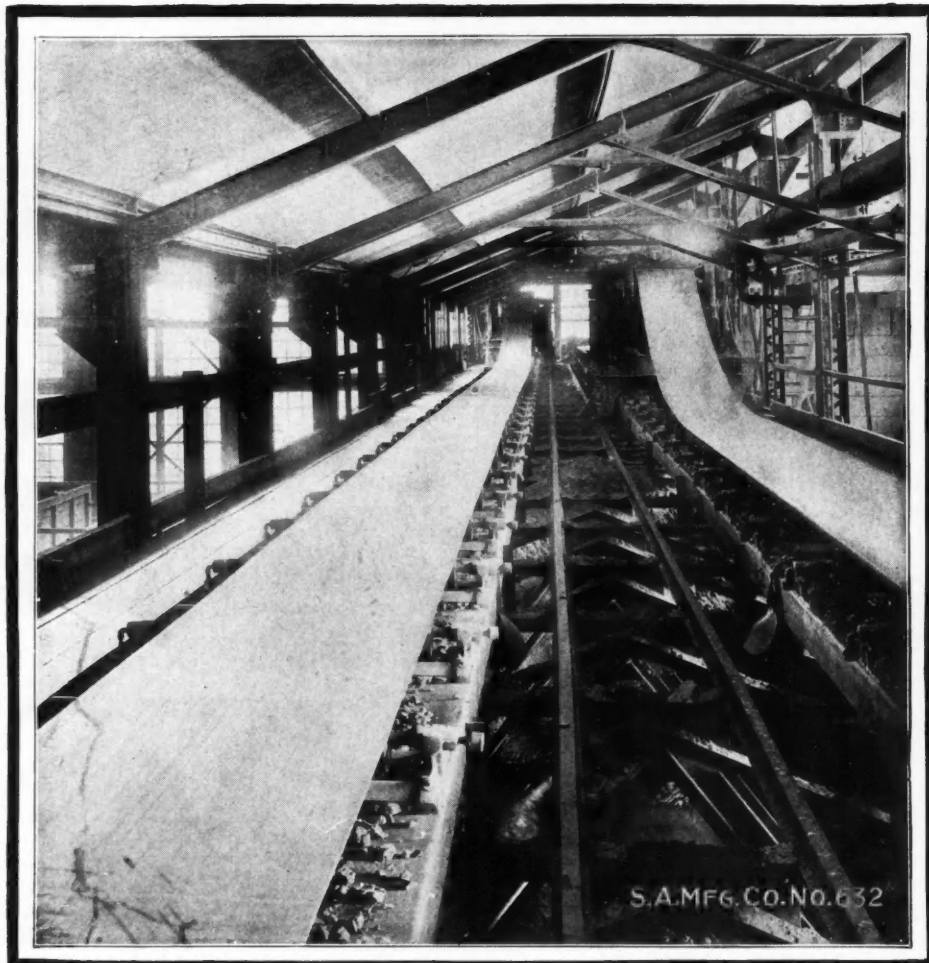


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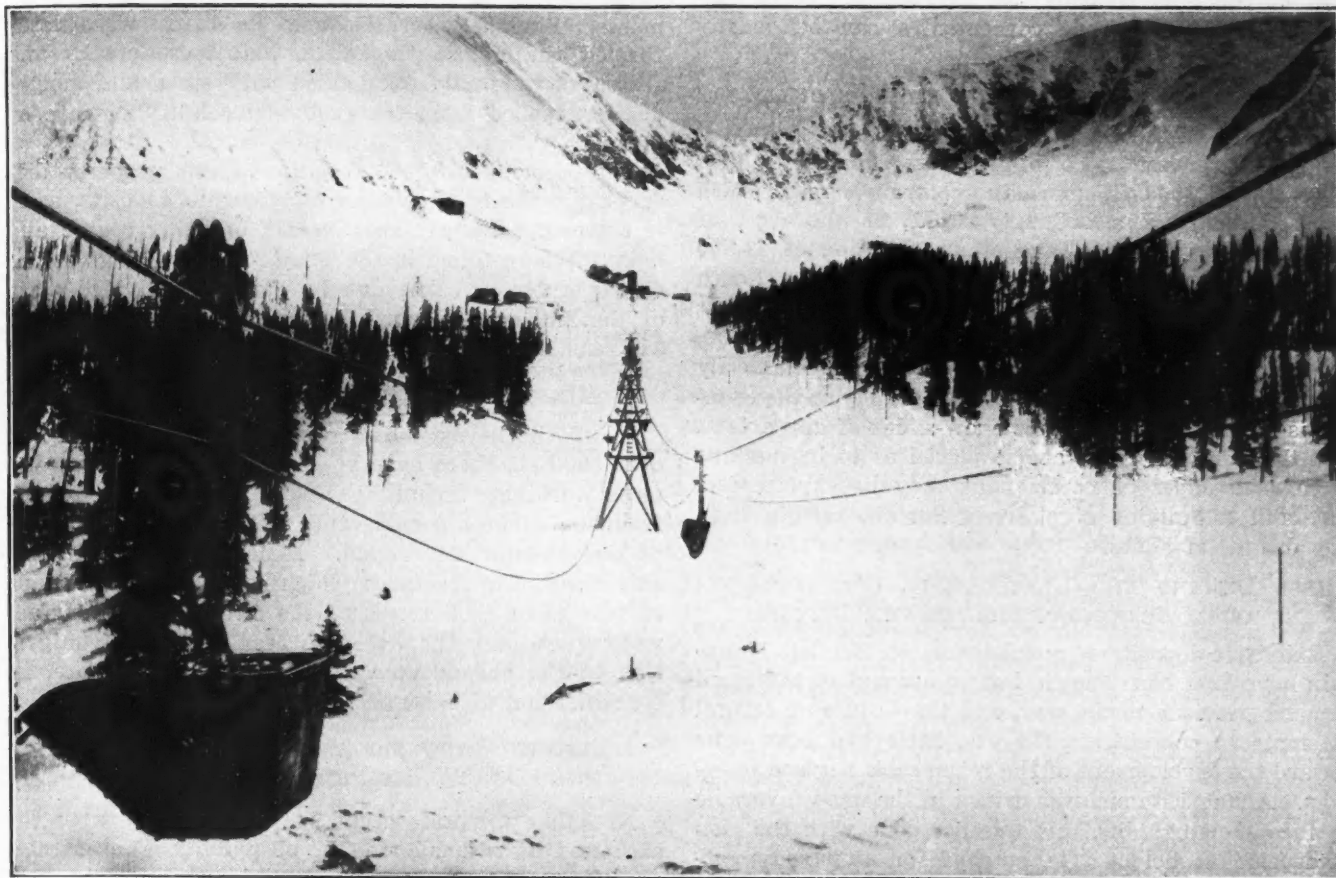
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# Engineering and Mining Journal

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TRAMWAY OF CLIMAX MOLYBDENUM CO., AT CLIMAX, SUMMIT COUNTY, COLORADO

## Molybdenum Mining at Climax, Colorado

By H. L. BROWN\* and M. W. HAYWARD†

*The Climax Molybdenum Co. has developed six million tons of ore, containing 1% molybdenum sulphide, at the company's mine on Bartlett Mountain near Climax, Summit County, Colo., 15 miles from Leadville. Molybdenite occurs in granitic rock and as an intrusive in the granitic gneiss. Mineralization shows no concentration, and values are uniform. It is planned*

*to mine the ore by shrinkage stoping, and the present development includes two tunnels. A 400-ton electrically operated mill is treating 250 tons of ore per day under the present schedule. Considering the altitude and severity of climate, the supply of labor has been satisfactory, as the company has provided exceptional accommodations and conveniences for employees at mine and mill.*

**T**HE increased demand for molybdenum since the beginning of the world war has created an unusual interest in this metal, and while the result has been an increased production, it has been one coming into the market in small intermittent quanti-

ties. The fact has long been known that molybdenum added to steel imparts certain desirable qualities, but its extensive use for this purpose has been retarded for the reason that no large workable deposits were known to exist in the United States on which to base an extensive use of molybdenum and its alloys.

The output from the property of the Climax Molyb-

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†Geologist, American Metal Co., Denver, Colorado.



denum Co. will materially assist in increasing the supply of this metal in much the same manner as the Peruvian deposits of patronite solved the question of an assured supply of vanadium. The Climax company has developed over six million tons of ore, containing about 1% molybdenum sulphide, and it is estimated that double this tonnage of ore is to be found on the property. The ore contains no obnoxious ingredients, and the first unit of the mill, treating 250 tons daily, has demonstrated that high-grade concentrates can be readily produced.

#### PROPERTY SITUATED 15 MILES FROM LEADVILLE

The mine of the Climax Molybdenum Co. is situated on the southwest slope of Bartlett Mountain, 5000 ft. east and 1000 ft. above the company's mill, which is at Climax, Summit County, Colo., on the crest of the Continental Divide, and at an elevation of 11,300 ft. Climax is 15 miles from Leadville, on the South Park branch of the Colorado & Southern Railroad that connects Leadville and Denver. Owing to the altitude, climatic conditions are somewhat severe for practically nine months of the year, but the topography of the country is such that there are no snow-slides of any extent, and the mine buildings are so placed as to be immune from such slides as occasionally may be experienced. The mill is built on a relatively flat sit, remote from any danger of slides.

#### SMALL DEMAND AND UNSUCCESSFUL CONCENTRATION RETARDED WORKING OF MOLYBDENUM DEPOSITS

Extensive deposits of molybdenum on Bartlett Mountain have long been known, but on account of the small demand previous to the war, and the failure of several attempts to concentrate the ore, little had been done toward the development of the remarkable surface showings. A 900-ft. tunnel was driven in the most favorable surface showings, but this was not done with the idea of developing molybdenite, but had for its purpose cutting a supposed extension of a mineral fault known for its gold values, although this drift has been used as the base for subsequent exploration and development work in that vicinity. Several months were spent by the company in thoroughly sampling the ore deposits as far as exposed and conducting mill tests to determine the best flow sheet. Construction and development were started July 20, 1917, and the first shipment of concentrates was made during February, 1918.

#### DEPOSITS OCCUR AS INTRUSIVES IN GRANITE

The mine is situated on the northeast side of a glacial amphitheatre, the open side of which faces the west, while the sides are precipitous and the lower slopes covered with slide rock. Erosion, due to climatic conditions, has been rapid and has kept pace with oxidation over practically all the mineralized area; sulphides of approximately the same grade encountered in the underground workings are exposed on the surface. The eastern end of this amphitheatre consists of a granite gneiss which has been intruded by the granitic rock in which the molybdenite deposits occur. The orebody is made up of a large, irregular-shaped mineralized zone having a siliceous phase of this granite intrusion. The rock in the orebody itself consists largely of quartz, with minor amounts of feldspar. This siliceous mass merges in all directions into typical granite.

Throughout the mineralized zone, the rock is traversed by an intricate network of quartz stringers, which are undoubtedly of magmatic origin. The fact that the molybdenum is found both in these quartz veinlets and in the larger masses of quartz clearly indicates that it is genetically related to the granitic intrusive. When the igneous mass was intruded into the overlying sediments, an outer shell was formed, attributable to quick cooling of the magma in contact with the sediments. Shrinkage cracks and fractures were later formed throughout this shell, and these cracks and fractures were afterward filled with silica and molybdenite expelled from the gradually solidifying core of granite.

The occurrence of molybdenite in this property differs from the usual type of molybdenite deposits, as it is extremely fine grained, instead of being coarse and flaky. Where found in the small stringers, it gives the quartz a bluish color, due to the finely divided state of the molybdenum sulphide. The molybdenite values are remarkably uniform throughout the orebody.

#### MINERALIZATION SHOWS NO CONCENTRATION

In all the development work to date, amounting to over 5000 ft., there have been no blank assays. In the mine workings, including those at a depth of 500 ft. from the surface, considerable amounts of yellow oxide of molybdenum are found. Mineralization is invariably confined to fractures, which have allowed oxidation to take place as a result of the circulation of surface waters. Apparently there has been little or no migration of the molybdenum deposition and, therefore, no concentration of values in a zone of enrichment.

#### DEPOSITS SHOW NO MINERALS OTHER THAN MOLYBDENUM

No other minerals occur in the deposits, with the exception of a small amount of pyrite. Concentrates containing 75% molybdenum sulphide show less than 0.1% copper, the analysis showing, besides the molybdenite, only insolubles and iron. The orebody is apparently terminated on the northeast by a regular fault dipping 60° N E, but while the present opinion is that this fault is the limit of the orebody, this conclusion has not yet been proved.

Development work of the Climax Molybdenum Co. has been confined to an area of 25 acres of patented ground, although the company holdings comprise in all more than 600 acres. From the mouth of the tunnel back to the fault, an area approximately 1000 by 800 ft. has been completely blocked out, and contains over six million tons, averaging 1% molybdenum sulphide. Another tunnel has been started 200 ft. below these workings, and shows ore of the same grade and character. Owing to the dip of the fault, the mineralized area of this tunnel level probably will be nearly double that of the upper level, thus indicating the ultimate development of considerably more ore than now estimated.

The method of mining contemplated calls for a series of parallel stopes, 800 ft. long and 25 ft. wide, with pillars between of the same width. The stopes will be carried as shrinkage stopes to the surface. After the shrinkage stopes are through to the surface, it is planned to break the pillars down into these stopes.



This method is to be adopted wherever a height of 200 ft. will carry the stopes to the surface, and where, owing to the contour, it is less than this distance to the surface; the idea being to drive a series of parallel drifts and raises to the surface and gloryhole from the surface to the drifts on the tunnel level.

Surface mining can be carried on only during four months of the year, for while commercial ore outcrops on the surface, with no overburden, the climatic conditions are such that a scheme of mining had to be outlined which would permit underground work during that part of the year when the surface could not be attacked. The ore is ideal for shrinkage stopes, as it contains no talc and breaks short.

#### ORE REMOVED THROUGH TWO TUNNEL OPENINGS

The ore now mined from the upper adit is delivered to bins at the mouth of the tunnel, and then carried 500 ft. down the mountain by means of a two-bucket tramway to the crusher plant. The elevation of the lower tunnel is the same as that at the crusher plant, and it is planned to eventually bring all of the ore down to this level and do away with the two-bucket tramway.

The two-bucket tram delivers the ore to 500-ton bins, which discharge direct to a 20 x 10 Blake crusher, where it is crushed to 2-in. size. The ore is then delivered to a conveyor belt, which takes it to a 400-ton storage bin at the upper terminal of the main tramway to the mill. The main tramway is a 5000-ft. Leschen continuous type, having a capacity of 1000 tons per day, and delivers the ore direct to the mill bins.

#### MODERN MILL HAS 400-TON CAPACITY

The mill was designed by D. F. Haley, and contains an Allis-Chalmers 6 x 6 and 6 x 10 ball mill, Callow and Janney flotation machines, Goldfield agitating tanks for dewatering concentrates, Portland filter and steam drier, with accessory blower, pumps and elevators. A heating plant and fire pump are housed separately. The present capacity is 350 to 400 tons per 24 hours, and the power is derived from a 13,000-volt line of the Colorado Power Co. The design of the mill is such that it lends itself readily to the installation of additional equipment for increased capacity without interfering with present operations.

#### EXCELLENT ACCOMMODATIONS OFFERED BY COMPANY ATTRACT LABOR

The problem of labor supply at this altitude, and with somewhat severe climatic conditions, has been solved largely by the construction of well-built, electric-lighted, steam-heated accommodations for the men, both at the mine and at the mill, and although this enterprise was started at a time when railroad congestion and labor shortage were a severe handicap, it has been carried to a successful conclusion in a remarkably short time, and no difficulty is looked for in providing a continuous and increasing production of a needed and useful metal.

The Production of Graphite in Madagascar in 1917 amounted to about 35,000 tons, compared with 25,480 tons in 1916, according to Consul James G. Carter in "Commerce Reports." The quantity exported in 1917 was 27,000 tons, against 26,209 tons in 1916. It is estimated that on Jan. 1, 1918, there were about 10,000 tons of graphite in stock in Madagascar, and at the close of February the stock was estimated at about 15,000 tons.

## United States vs. California Trona Co. in Potash Lands Case

The California Trona Co., on Nov. 30, 1914, filed an application for patent on four claims situated on a part of Searles Lake, San Bernardino County, Calif. These claims were located June 27, 1912. Four charges, made at the time of application, as to why patent should not be granted, were: Claims do not contain a mineral deposit of the form and character contemplated by mining laws; all acts performed by applicant company during 1912 and 1913 had been for purposes of securing the title in interest of non-resident aliens; that the applicant was not the *bona fide* owner of the claims, but held same for the benefit of aliens, and that on the date of application the company was not qualified to receive a patent, because the majority of stock was held, owned and controlled by aliens.

The case was heard before the Department of the Interior, the Commissioner of the General Land Office participating, and from the evidence submitted it was shown that: Chemically each and every one of the substances forming the deposit is a mineral; the California Trona Co. was organized under the laws of California, Feb. 19, 1908; the American Trona Co., lessee of the California company and now operating the refining plant and railroad at Searles Lake, was organized under the laws of Delaware, June 12, 1913, and that the charge of foreign control arises from the fact that Foreign Mines Development Co., Ltd., organized under the laws of Great Britain, secured mortgages on the claims of the California Trona Company.

After consideration of the question of alien ownership and control, it was found that there was nothing in the evidence that would constitute a fraud upon the United States or any violation of the provisions of the applicable statutes, and the legal proceedings were therefore dismissed.

## Renaming German Silver

An attempt is being made to rename German silver by calling it "nickel silver." One of the largest producers of the alloy, the American Brass Co., has already made the change. The *Metal Industry*, however, would do away with the name silver as well. It argues:

The matter has taken on added importance in view of the fact that the largest brass-producing company of the United States has lately changed the name of the alloy known as German silver to nickel silver. It seems to us that if a change in name of this material is to be made, we should not stop half way. Why retain the word silver? Why attempt to ennoble a combination of base metals? Surely there can be no other reason than a commercial one. If the nickel is taken from an 18% German silver alloy only a "two and one" brass will remain. Why not then call the compound "nickel brass," or if commercial objections are too strong to be overcome at once, why not call it nickel alloy? The various contents of nickel may be designated by utilizing the different percentages that the alloy contains. Thus, 4, 6, 8, 10, 12, 15, 18%, etc., nickel alloy. It is a fact that some manufacturers are already designating the material now being sold as "Sheffield plate" as "silver plate on a nickel base." We see no reason why the same argument does not apply to the alloy now being called nickel silver. As a matter of fact the new name is no more correct than the one it supplants, for the alloy contains no silver, and while it is admitted to possess some similar physical characteristics, it has really no claim to nobility.

# Dry Sizing as a Means of Preparing Feed For Concentration

BY GEORGE V. BLAND\*

*A process of ore treatment is described involving dry sizing followed by wet concentration, which has been developed at the mill of the Vasco Mining Co. at Boulder, Colo. Applied to the treatment of ores largely hand sorted and of a gross value of over \$400 per ton, it has resulted in a 20-25% increase in recovery at a relatively small increase in treatment cost. The theory of the causes which contribute to the improved results that have been noted is discussed in detail.*

**T**HE method here discussed is essentially a substitution of dry sizing for hydraulic classification and wet screening in preparing feed for concentrating units. It has been found to give markedly improved results on certain ores of the Boulder, Colo., (tungsten) district, and has been adopted in several of the mills of the district. Many possibilities are opened up by its study, the method being susceptible to wide application. Although no new principle is involved, the alignment or combination of old methods constitutes a decidedly radical departure from generally accepted practice.

I developed the process while conducting research work for the Vasco Mining Co. at Boulder, Colo. This work was based on theories which will be discussed and which worked out well in practice as well as in the laboratory. The result has been an increase in recovery of from 20% to 25%, with a relatively small increase in treatment cost. The application has been made initially on ores of higher value and on middling products derived from ores of low value. Direct application of the process to ores of low value is expected to follow.

## DESCRIPTION OF TYPICAL BOULDER ORES

The tungsten mineral of the Boulder district is ferberite, of which 76% is tungstic acid ( $W_2O_7$ ), the constituent upon which the purchase of ore and concentrates is based. The specific gravity of ferberite is high—6.9 to 7.1—while the accompanying gangue contains nothing with a specific gravity over half that figure. Thus conditions are favorable for concentration, but, nevertheless, Boulder ores are difficult to treat. The reasons are the absence of cleavage between the ferberite and the matrix, the fine state of crystallization of the ferberite, and its friability.

These conditions are conducive to excessive sliming. A recovery of 75% of the  $W_2O_7$  as a 55% product has been considered satisfactory, whereas my method yields 85% to 95% of the ferberite as a 60% product. As a large per cent. of the output of Boulder mines comes from hand-sorted ores of an average gross value of over \$400 per ton, it will be seen that the increased saving is considerable on this class of ore alone. The importance of the method is further enhanced through the advant-

age offered in retreating middlings produced from ores of lower grade. Several mills at Boulder are now saving their middlings for separate retreatment, instead of forcing them back into the flow, a prevalent practice. This is particularly valuable in treating Boulder ores, because the middlings consist of grains that are almost entirely included, such as would be expected where crystallization is fine, the crystal clusters of varying sizes, and cleavage lacking.

## COMBINES DRY SIZING AND WET CONCENTRATION

Essentially, the process is the rather unique (outside of the laboratory) combination of dry preparation of feed and wet gravity concentration as shown in the flow sheet in Fig. 1. Certain dry concentration steps might be introduced, but, in the main, wet concentration

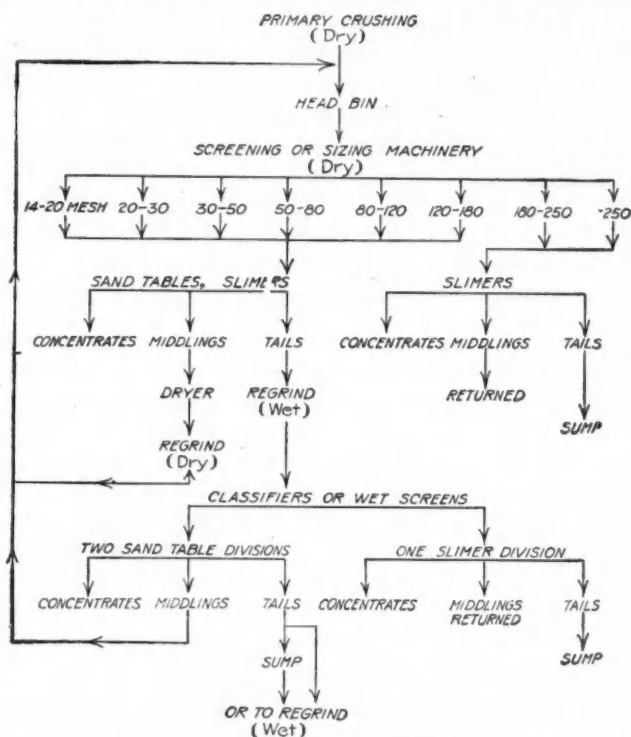


FIG. 1. FLOW SHEET COMBINING DRY PREPARATION OF FEED AND WET GRAVITY CONCENTRATION

is preferable, because more efficient—water being a much heavier medium than air. Sizes are cut out on a screen or other grading machine to correspond with the number of concentrating units. If closer sizing is desired, certain sizes can be stored and several different sizes put over the same concentrator separately.

Development of this method necessitated overcoming some long-recognized screening difficulties, notably expense and the inability to cut out fine sizes on a commercial scale where such sizes are sticky, though not damp—the usual condition when ores are crushed. The term fine sizes is intended to cover from 80 to 250 mesh and finer. It has been advisable to carry the screening to 250 mesh, but not beyond it, except in treating middlings. In the latter case, where all particles are granu-

\*Mining engineer, 2017 10th St., Boulder, Colorado.



lar (prior to regrinding), it is sometimes worth while to screen to much finer sizes. For instance, the Rare Metals Ore Co., at Rollinsville (near Boulder), Colo., screens down to 1-800th of an inch on the screening machine devised by my brother, John Bland, who collaborated with me on some of the work. This machine was developed to meet the difficulties noted above, and without it the process under discussion could not have been commercially applied.

The salient features of the machine are the large number and sharpness of the vibrations imparted by the actuating machinery. From 60 to 100 vibrations per second are easily secured, giving, with other features, a large capacity per foot of screen surface. The construction of the screen permits the use of a large number of superimposed screen beds, which further increases the relative capacity over other machines that have come to my notice. In fact, the work of this screen leads me to believe that the expense of dry sizing will soon be so reduced as to compare favorably with that of hydraulic classification. At the same time, the rapidly expanding use of screening in conjunction with magnetic separation, dry concentration, and especially in the industrials, such as clay, carborundum, cement, sulphur and many others, will force decided improvements over hitherto inadequate screening machinery. With this development, the way opens for the application of the flow sheet, in Fig. 1, to supplant those now in use on low-value ores. This would revolutionize gravity concentration, for dry sizing as a means of preparing the feed for concentrating units is much superior to hydraulic and wet sizing in every essential except that of expense.

#### ADVANTAGES OF DRY SIZING

The main benefits to be derived from dry sizing as a feed preparation are: (1) Control of pulp dilution; (2) independence of all important concentrating units; (3) greater efficiency of sizing machinery as compared to hydraulic; (4) greater efficiency of concentrating units on dry-sized feed as compared to hydraulic and wet sized.

1. Although the pulp dilution in this process in all important concentrating units, coarse as well as fine, is under absolute control, the principal benefit is derived in the slime department, not only in its share of the original feed, but in the greatly lessened flow of water reaching it from the coarser departments. In the Vasco mill, the consumption of water has been reduced 75% since the adoption of the dry-feed process. The study of mill losses invariably leads to the slime department. It was that problem that led to the development of the process under discussion, although incidentally other related issues presented themselves.

The slime problem as it has presented itself to investigators for decades, and does predominately today, is one of taking the reject (water, solids, etc., as a whole) from the preceding departments and making it adaptable to slime concentrators. That is, reducing the pulp to such a consistency that the slimers will do good or fair work, without entailing a heavy loss in the overflow from dewaterers.

It cannot be said that slime treatment is inefficient because of the lack of suitable concentrating machines, for unquestionably the modern slimers are as efficient

as other (coarser) concentrating units, and in my opinion some of the latest are even more advanced, considering the almost impossible results expected. But when one turns to a survey of the progress made in preparing feed for the slime table, comparatively little progress is to be noted. Generally speaking, classification is pretty much the same as it was 20 to 30 years ago, and classification is largely responsible for the flood of water that comes to the slime department. What progress has been made, outside of the effort to prevent sliming in crushing operations, has chiefly been in the effort to get rid of the water accumulated in the coarse and intermediate concentrating departments. Hence the development of thickeners, dewaterers, etc., to a considerable degree of perfection. The best of these, however, are bulky and cumbersome, and unable to undo to a satisfactory degree the damage incurred further up the line.

Dry sizing, where it could be used, and that includes many places, would solve this problem by the simple expedient of cutting out the feed for the slimers in a dry state. Such a step would permit an absolutely controlled feed for slimers. A thick pulp is absolutely essential for good results on a slimer. Where the tails from coarse concentrating units are reground and kept in closed circuit until slimers are eventually reached, a minimum of water would be present with the regrind (in the dry feed process). This happens because the coarser sizes are also fed dry and only water absolutely needed for concentration accompanies the tails to be reground. This reduction in the water used is so great, as noted for the Vasco Co., as almost to equal the work of a thickener, without the attendant overflow loss.

At the same time, it must be kept in mind that 80% to 90% of the mineral to be recovered on the slimers is in the original dry feed, and a relatively small amount only in the reground feed. By proper manipulation, such slimers as Deister concentrator slimer No. 3 (used by myself), will consistently give an extraction of 85% to 95% (Boulder ore) on everything passing 250 mesh—a product that usually undergoes a loss of 50% or more. These figures, perhaps, would apply to nearly all ores that slime easily.

This method of getting at the slime problem is essentially one of dealing directly with the cause rather than the effects. Therefore this process attacks the slime problem, on a large-scale basis, from an entirely new angle. That this theory has proved sound in practice has already been noted as far as ores that will stand a little additional expense are concerned, and, unquestionably, in time all commercial ores, of whatever grade, will become amenable to this treatment. That is, those ores which slime appreciably and are not better adapted to other than gravity processes.

#### CONCENTRATING UNITS ARE INDEPENDENT

2. Ordinarily the whole flow of a wet gravity mill is interlocked, and trouble at any particular point is followed by disarrangement at all other points, more or less serious, according to the size of the mill, and other factors. This causes an interference with pulp dilution, beds on concentrators, etc., followed either by mineral going into tails, or vice versa. In large mills of 500 tons or more capacity this is not a matter of great import-



ance, but it is of considerable importance in mills of 25 tons or less, where there are almost constant fluctuations of varying degree. With dry-sized feed, any one unit can be down without interfering with any other important unit. Another advantage is the ease with which sized feed can be stored where it is desired to prepare more sizes or classes than there are concentrating machines. For instance, where there are two machines and it is advantageous to make five or six divisions of the feed, five or six dry sizes could be stored and concentrated in turn, whereas it would be a more or less complicated matter to classify and store the same number of divisions.

3. The same degree of care and attention that will give an efficiency of 80% to 85% in a hydraulic will be productive of 96% or 98% on a screen (disregarding irregularities in shape of ore particles in each case). That is possible because a screen's product is much easier to standardize—its action is more positive. On the other hand, a hydraulic is more pliable—that is, easier to adjust to small gradations, a property, however, that requires an expert to utilize fully in a practicable way.

**CONCENTRATORS MORE EFFICIENT IN DRY-SIZED FEED**

4. There is some argument as to whether sizing or hydraulic classification gives a better feed where only free mineral is concerned. Both sides have exponents in high standing. There is no question as to which method is best when the problem is to remove all but the lightest middling grain of a specific gravity but little greater than the tailings. This includes two main classes of ore: where much included grain is present in middlings, and where a three-mineral separation is desired. Boulder ores come under the former heading, for in that district coarse sizes yield a high percentage of included grain. Large-scale tests on this ore show a marked superiority in favor of sizing.

Even where everything favored the hydraulic, free or nearly free mineral, very careful work, and a wide margin in specific gravities, Richards found sizing to give cleaner concentrates, cleaner tailings, and a higher extraction. The results of these experiments are reproduced here:

EXPERIMENTS ON GALENA AND QUARTZ ORE

Feed	Grade Per Cent. of Lead	Per Cent. of Concentrates	Per Cent. of Grade of Middlings	Per Cent. of Grade of Tailings	Grade Per Cent.		
Sized.....	7.4	6.5	99.0	1.6	59.0	91.8	0.04
Hydraulic.....	4.8	4.0	98.6	1.3	34.0	94.7	0.36
Natural.....	9.4	4.1	90.0	21.5	23.6	72.9(a)	0.51

(a) Not including slime water.

Reduced to comparative figures, and considering that the middlings from the sized feed had been held down to a grade of 34% to correspond to the middlings obtained from the classified feed, the following figures are obtained:

DISTRIBUTION OF VALUES IN CONCENTRATES, MIDDLINGS AND TAILS

Feed	Per Cent. of Values in Concentrates	Per Cent. of Values in Middlings	Per Cent. of Values in Tails
Sized.....	95	4.5	0.5
Classified.....	83	9.0	7.0
Natural.....	39	54.0	7.0

As stated previously, the real problem with which most mill men are concerned is to separate particles of nearly the same specific gravity. If this is accomplished with a fair degree of accuracy, there need be no worry

as to where the free mineral will go when the feed is the product of a screen. The free mineral will be above the richest included grains, which in turn will grade down uniformly to pure sand. Where ores are encountered that are conducive to both excessive sliming and included grain, it becomes imperative to get a high efficiency on the coarse-concentrating machines; otherwise a large part of the included grain will go to the regrind (presupposing that the ore is valuable enough for retreatment), and much of it will be excessively ground to a size that cannot be recovered in the ordinary mill flow. To keep the tails comparatively free from included grain of a certain tenor or better, close sizing must be used, for classification seems unable to accomplish it in theory or practice. If included grain can be kept from the tails, it can be given the special treatment desired. This is the theory, leading to and involving the prevention of slime losses, upon which

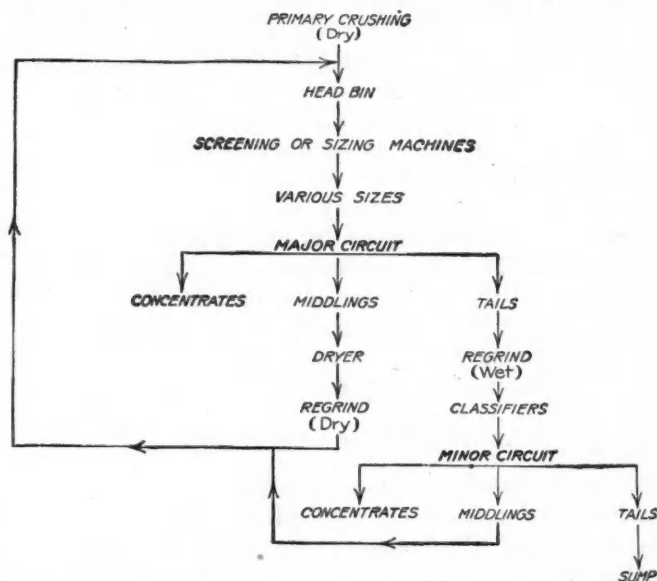


FIG. 2. MAJOR CIRCUIT GETS DRY SIZED FEED, THE TAILS GOING WET TO THE MINOR CIRCUIT AFTER REGRINDING

I initiated my experimental work, and which has proved correct on a practicable working basis.

Middlings treatment as a rule has followed two well-beaten paths: regrind and returned to ore stream, or returned to ore stream without regrinding. In a great many cases, as has been pointed out, regrinding and returning the middlings to the ore stream is followed by a heavy slime loss. Regrinding of materials too fine for rolls is peculiarly conducive to excessive sliming, and unless the resultant discharge is handed carefully the loss will be great. Here again dry grinding and screening avoid the flood of water that would eventually carry so much of these otherwise recoverable slimes in suspension to the tailings pond. There is also involved the unsound practice of mixing two products of widely differing grades, the ore itself being perhaps of low content and the middlings of relatively high content. This is a rule, however, of many exceptions.

In the second case, the middlings are largely or entirely returned to the same concentrating machine from which they were taken, a good practice where the minerals are freed, but a bad one where included grain is present in large quantities. In the latter case, some

of the included grain will be forced into the concentrate, lowering the grade, and the remainder forced into the tails. This brings out the same objection noted in the first case.

On certain ores of low value, the middlings treatment loss is comparatively negligible, but on others, particularly those of high grade, these losses are, or should be, a source of appreciable concern. This applies strikingly to the Boulder district.

PROCESS AS APPLIED AT BOULDER

The present early application of the process, which will no doubt be greatly modified and improved, is to make two distinct and entirely separate ore flows of high and low grades, respectively. To simplify what is to follow, these will be characterized as the "major" and "minor" circuits. The major circuit gets its feed in various sizes cut out from the original ore and the middlings produced therefrom, while the minor cir-

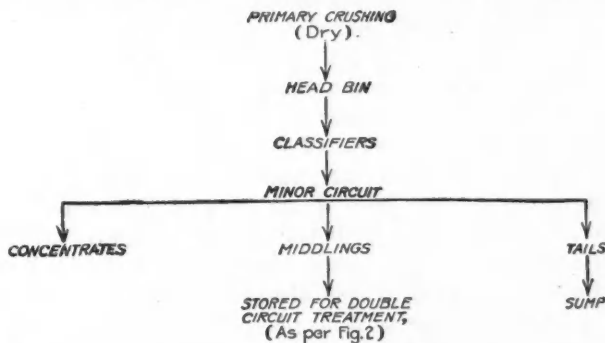


FIG. 3. MAJOR CIRCUIT HAS DISAPPEARED DUE TO LOW GRADE OF ORE

cuit gets its feed from the reground (wet) tails of the major circuit. (See Fig. 2) Incidentally, this permits a relatively high expenditure to go on the major circuit and a low expense to go on the minor circuit, instead of illogically throwing the two together—the standard practice at Boulder and many other places. In short, the double circuit allows: (1) the logical application of expense; (2) separate treatment of materials characteristically different, particularly as to grade; and (3) dry-sized feed of all higher grade material and wet-classified or screened feed of all low-grade material.

The percentage of values allowed to go into the minor circuit is governed by the character of the ore—grade, size of crystal masses, etc. The influence of grade is an economic one, involving the question of cost against increased recovery and of the point at which a balance will be found. The percentage of values to be rejected from the major to the minor circuit is controlled in two ways: by the maximum size to which the ore is primarily crushed, and by the amount of middlings taken in the major circuit—a matter of judgment.

CONDITIONS INVOLVED IN DETERMINING THE BALANCE BETWEEN COST AND RECOVERY

The treatment of an 8% ore might develop the following three conditions in striking what may be termed an economic balance:

1. Retention of a minimum of 80% of the valuable mineral in the major circuit in the form of finished concentrates and middlings. The usual loss in the minor circuit can be approximated within appreciable limits,

and the full initial recovery of both circuits can therefore be predicted closely, for the estimate is made on only 20% of the values.

2. Rejection of 60% of the original feed to the tailings pond through the minor circuit, the remaining 40% being concentrates and middlings from both circuits.

3. Beginning concentration at 14 or 16 mesh. The point at which concentration is begun largely determines the cost of treatment, as concentration becomes more rapid as the feed becomes coarser. Now, if an ore of the same character but of lower grade, say 6%, is to be treated, it may be found (or assumed) that 70% of the feed of the initial or major circuit must be rejected to, and through, the minor circuit to keep within the permissible expense on that particular grade. This reduces the amount of middlings cut out in the major circuit, involving the throwing of a larger percentage of mineral into the minor circuit. Or it may be worked out by starting concentration earlier, at 10 or 12 mesh. The result would be about the same.

As the ore to be treated becomes lower in grade (and value), the reject from the major to the minor circuit would finally reach such proportions that it would not be profitable to maintain the two circuits on the original feed. In this event, the major circuit would disappear and all the original feed would be fed in the old-established way. However, the double circuit operation would still be of value for the retreatment of middlings, the best application, perhaps, being to store them until a considerable amount is accumulated, or until the next high-grade run is made. The flow sheet then would be as in Fig. 3. This might be accomplished profitably by taking the middlings very early, relegating the production of the finished concentrates to the background during this stage of concentration.

PROCESS GIVES LATITUDE IN LAYING OUT MILL

As the concentrating units in both circuits are the same, the mill can be arranged so that the units of the major circuit can be combined with those of the minor circuit when a low-grade run is to be made. In fact, a wide interchangeability, without any excessive disturbance of the usual mill balance, can be maintained.

In changing over the Vasco mill to the dry process, no changes in number or position of the then existing concentrators were made. No other additional machinery was found necessary except a Bryan sizer, a Bland screen, and a ball mill for the dry regrinding. The concentrating equipment consisted of 2 Harz jigs (afterward replaced by one Richards pulsator jig), five Wilfley sand tables, two card slimers (used on fine sand or coarser slimes) and six Deister No. 3 slimers.

Much of the foregoing has been accomplished in the laboratory by others, and I do not wish to give the impression that I am advancing any new theory or idea. I am, however, under the impression that, hitherto, this work has not been carried beyond the experimental stage and that therefore this article may prove of value and interest because of the possibilities suggested.

Sulphur Production in Sicily was smaller in 1917 than in the preceding year. The figures for the first ten months have been published in "Rassegna Mineraria," and show 147,322 metric tons for that period in 1917, compared with 207,504 metric tons for the first ten months of 1916.

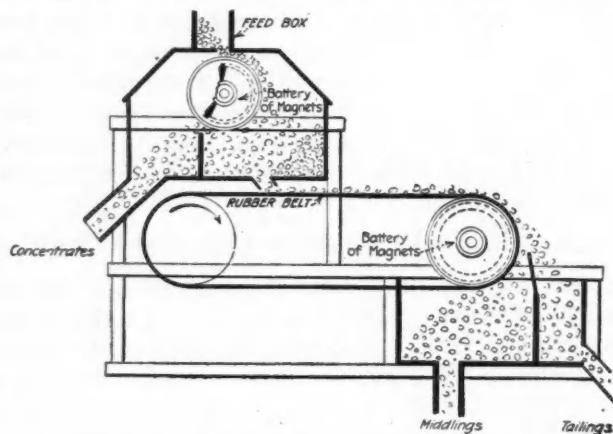


# Magnetic Concentration of Iron Ores at Mineville, N. Y.

By EARL C. HENRY\*

*Magnetite ores containing about 30% Fe are concentrated magnetically at Witherbee, Sherman & Co's mill at Mineville, N. Y. The products are concentrates averaging about 65% Fe and tailings 5% Fe, a 90% recovery being obtained.*

THE magnetite mines at Mineville, Essex County, N. Y., operated by Witherbee, Sherman & Co., Inc., are equipped to produce 2,000,000 tons of crude ore annually. As this ore is not merchantable in its crude state, being too low in iron content, it is treated by electromagnetic separation, with the exception of lump ore, which is hand-picked for furnace use. At present, there are three mills in operation, known respectively as No. 3, No. 4 and No. 5. The first mill treats ore from the Harmony mine; No. 4 mill handles the Barton Hill ores, and mill No. 5 treats Old Bed, Smith and Sherman mine ores. The three mills have the latest and most modern equipment, and, as the prin-



DRUM AND PULLEY TYPE MAGNETIC CONCENTRATION MACHINE

ciples of separation are nearly identical in each, only mill No. 4 will be considered here.

Mill No. 4 is constructed of steel framework, sheathed with No. 22 gage American ingot iron. It has steel floor beams, with floors of 3-in. plank and 1-in. matched boards. The building is divided into two parts, the coarse-crushing department, which contains the crushers, drier, coarse screens and bucket elevators, and the separating department, which contains the fine screens, separators and rolls. The coarse-crushing department is 36 ft. wide by 100 ft. long and 85 ft. high, and the separating department is 66 ft. wide, 90 ft. long and 90 ft. high from basement to roof.

The mill is situated about 300 ft. from the mouth of Barton Hill tunnel, to which it is connected by a trestle, over which the electric mine locomotive hauls the ore from mine to mill. The ore is discharged from side-dump mine cars into a storage bin of 400-

tons' capacity. From this it is drawn by gravity into a 36 x 24-in. Farrel jaw-crusher and crushed to 4-in. size. It then passes to a 20-in. conveyor running over a Merrick weightometer. This conveyor discharges into a storage bin of 700 tons' capacity.

## FINE SIZES MUST BE DRIED

From the bin the ore is fed by gravity over a corrugated feed roll into an elevator of 200 tons' hourly capacity. This is of the continuous-bucket type and has buckets 24 in. wide, 13½ in. along the belt and 13½ in. lip, bolted to an 8-ply 26-in. belt. It discharges into a 48 x 10-in. trommel screen, which separates the ore into three sizes; namely, on 2-in. ring; through 2-in. and on ¾-in. ring, and through ¾-in. ring. As the ore coming from the mine contains more or less moisture, which hinders proper screening, and as most of this is in the fine sizes, all ore that goes through a ¾-in. ring passes to a vertical, brick, gravity drier.

The oversize from the screen passes to a small bin with a division board distributing the feed to two 5K Gates gyratory crushers, which reduce the product to about 1½-in. size. These discharge into a bin, which also receives the minus 2-in. plus ¾-in. material, as well as the discharge from the drier. This latter bin discharges into a bucket elevator having buckets 30 in. wide, 15½ in. along belt and with 15½-in. lip, bolted on a 10-ply 32-in. rubber elevator belt, running at a speed of 300 ft. per min., with a capacity of 500 tons hourly.

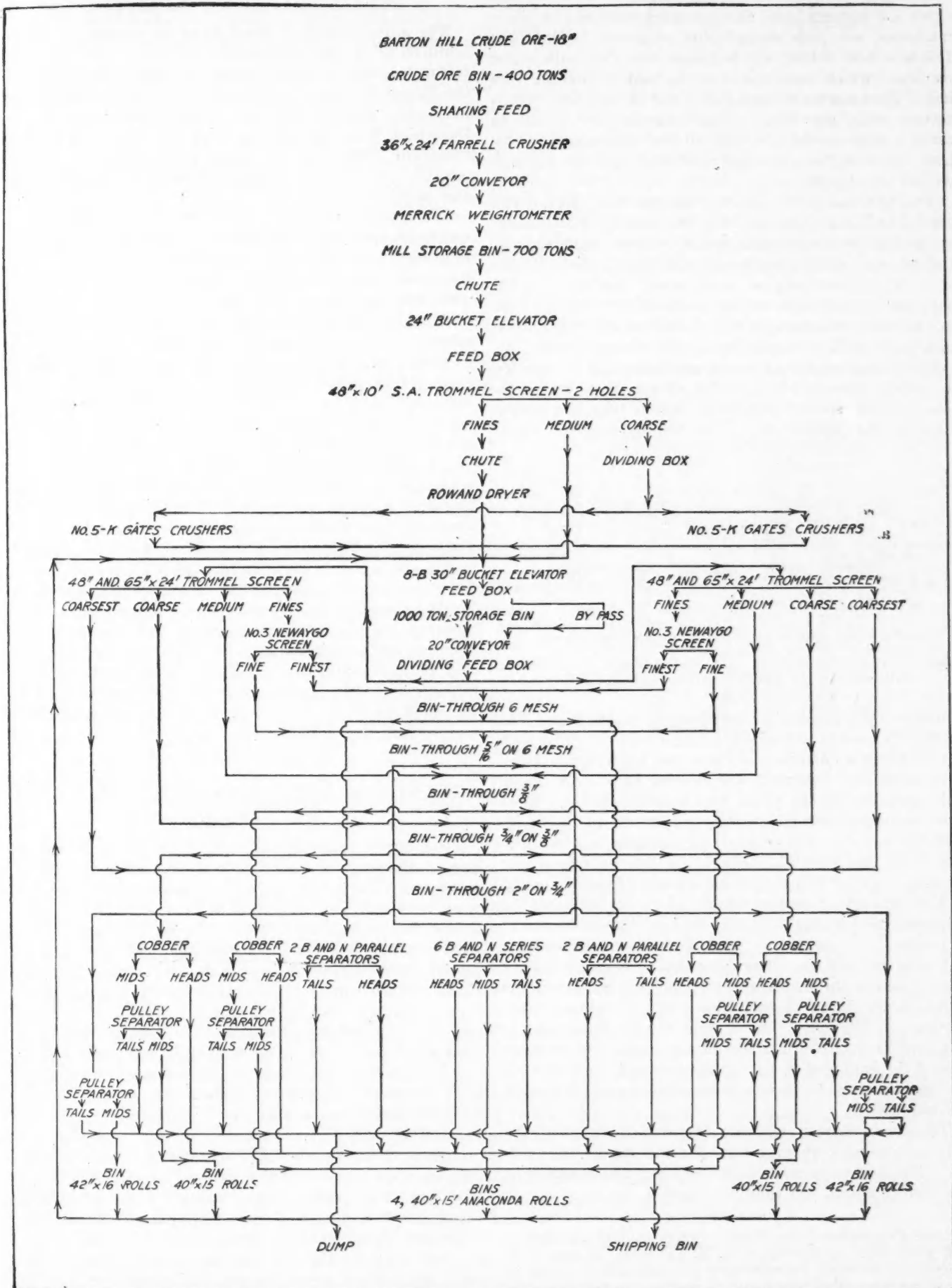
This elevator can discharge into a storage bin of 1000 tons' capacity, which is used for storage in case temporary repairs to the separating end of the mill are necessary, or it can be bypassed to a 20-in. conveyor belt running to the fine screens. This conveyor discharges into a small box with a division board which divides the feed equally into two 48 x 24-in. S. A. trommel screens, making four sizes; namely, on ¾ in.; through ¾ on ¾ in.; through ¾ on ⅝ in., and through ⅝ on ⅝ in. These sizes fall by gravity to separate bins, from which they fall to the separating machines, which are arranged in duplicate on each side of the mill.

The plus ¾-in. material is treated by a pulley-type machine which makes middlings and tails. The plus ¾-in. and plus ⅝-in. sizes are treated by drum-and-pulley type machines making concentrates, middlings, and tails, and the minus ⅝-in. material passes over two Newago hammer screens of six-mesh wire cloth. Ore smaller than six mesh goes to a B. & N. parallel belt-type separator, which makes concentrates and tailings. The oversize from the six-mesh screen (through ⅝ in. on six mesh) passes to a B. & N. series belt-type separator, which makes concentrates, middlings and tails. It is well to explain here the various types of separating machines used.

The drum machines have a section of fixed magnets inside of a revolving brass drum, covered with rubber belting. Feed leaves the feed box with practically no velocity, so that particles will not bounce away,

\*Chief engineer, Witherbee, Sherman & Co., Mineville, N. Y.



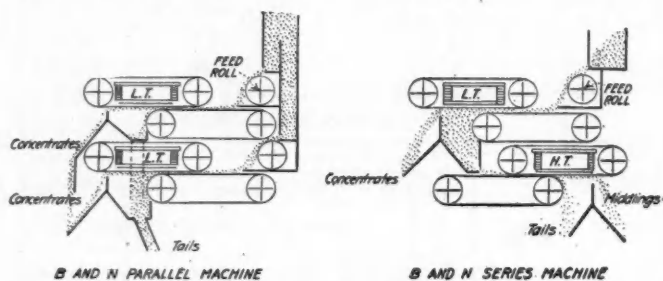


FLOW SHEET OF MAGNETIC CONCENTRATION PROCESS AT WITHERBEE, SHERMAN & CO.'S NO. 4 MILL AT MINEVILLE, N. Y.

overcoming the attraction of the magnets. The magnets carry low current, and the concentrates made on these machines are rich enough for shipment. The tails fall to a belt below, which passes over the pulley-type machine, which also serves as a head pulley for this belt. This machine has a full circle of magnets, which revolve with the drum. The magnets are wound to carry a high current, so that all particles carrying any lean ore will be attracted and only rock or tailings will be thrown off.

The belt machines are used on the fine sizes. The ore being lifted from the belt, the gangue is less likely to be held in suspension, which insures clean concentrates. On all the machines mentioned, the polarity of each adjacent magnet is reversed, thus causing all particles to turn end for end in moving from one pole to the next, which does not permit any non-magnetic rock to be held in suspension by the ore particles.

From these machines the concentrates fall by gravity to a 20-in. conveyor belt, which carries them to a 600-ton shipping storage bin, from which they are loaded directly into railroad cars. The tailings fall to a 20-in.



BELT TYPE MAGNETIC CONCENTRATION MACHINES ARRANGED IN SERIES AND IN PARALLEL

conveyor belt, passing to the dump or waste pile. The middlings pass to extra-heavy Allis-Chalmers rolls, each set treating a certain size from the separator. After they leave the rolls they are carried back by a 20-in. belt conveyor to the small bin beneath the 5K Gates crushers previously mentioned, and thence up the 32-in. elevator and over the screen and machines again. The ore from the 1000-ton storage bin can be drawn out on the conveyor bringing the middlings from the rolls.

The separating end of this mill is so arranged in duplicate that either side may be run independently of the other. All machinery in the mill is driven by 440-volt electric motors. The 25-cycle, three-phase power circuit enters the motor and switchboard room at 3300 volts, where it is stepped down by oil-cooled transformers to 440 volts. The current for the separators is obtained from a motor generator set, and each machine circuit is equipped with a rheostat and ammeter on the switchboard, so that each machine may be adjusted independently.

The crude Barton Hill ore contains about 30% Fe. The concentrates average 65% Fe and the tailings 5% Fe. The iron recovery is about 90.3%. The capacity of the mill is about 100 tons per hour.

**Lime Production in the United States in 1917 was 3,663,818 short tons, according to G. F. Loughlin, of the U. S. Geological Survey. Pennsylvania produced nearly twice as much as any other state, Ohio ranking second, Virginia third, and West Virginia fourth. The output of these four states was 2,000,000 tons.**

## Wind Protection for Sand Dumps

The enforcement of regulations to prevent the dissemination in the atmosphere of dust from cyanide tailings dumps in South Africa is strict, according to the *Financial Times* of Feb. 27, and the method taken to comply with the law and avoid the nuisance at the Champion Reef Gold Mining Co.'s mill is told by Superintendent Gifford in a letter read before a recent meeting of the South African Chemical, Metallurgical and Mining Society.

The growth of even the hardiest vegetation as a means to counteract the effect of high winds on tailings sands has not been successful, but by spraying the sand immediately after deposition on the dump with diluted slimes from the Butter's filter plant, a coating of consolidated slimes forms and has proved effective, even in the heaviest monsoons. The spraying is done daily in connection with the current mill-tail sands, but on the unfinished parts of the dump, where daily spraying is not convenient, shallow slime dams at suitable points are made at the top and foot of the dump. The slimes are then plastered over the surface of the dump by hand to form a covering four or five inches thick. The Champion Reef slimes contain a little lime and magnesia and become fairly hard and durable. The top of the dump is covered by flooding with slimes for a depth of several inches. The impermeability of such a cover over a large surface has required provision for rain-water drainage, as the formation of large pools would cause troublesome washouts. Large timber and masonry drains were built from top to bottom, and the slimes-cover so distributed as to have a slight inclination toward the drains. Mr. Gifford suggests that in tailings less viscous than those of the Champion Reef, the addition of a little lime is useful for hardening and setting the slimes.

## Low-Grade Ores Successfully Utilized in Germany

Stopping of imports and rise in prices in Germany, due to the war, have forced German metallurgists to make use of raw materials which were considered too poor in peace times, according to *Stahl u. Eisen*, (abstr. *Journ. Ind. and Eng. Chem.*). In several cases, sufficient success has been obtained by new methods to justify the working of low-grade ores even in normal times. Thus, copper schists were hardly utilized when they contained only 2.5% copper. Now ores of 1% and even 0.7% find utilization. As regards iron and steel there has not been much change, but poor pyrites and phosphatic ores are no longer rejected. The vanadium for steel is found in sufficient bulk in slags which do not contain more than 0.7% vanadium; the wolframite of old waste heaps is a raw material for tungsten; chrome ore of 24% is welcome—half the percentage formerly deemed worth mining—and sources of nickel are worked if they contain 1.5% of nickel; bauxite of 40% aluminum is considered sufficiently rich. It is also stated that the aluminum can, after all, be got out of clay. There is no change as to arsenic and antimony. Sulphur, no longer obtainable as such, is gained from gypsum and anhydrite, and phosphates of 20% are converted into fertilizer.

# Effect of Addition Agents in Flotation

*Tests were made at the School of Mines at Rolla, Mo., on Missouri lead and zinc ores to determine the effect upon flotation results obtained by adding various sulphates and alums to the pulp. Three different oils were used in each test, and an especially designed flotation machine, having an air lift, was employed. Detailed conclusions.*

TESTS to determine the effect of addition agents in flotation were recently made by M. H. Thornberry and H. T. Mann at the School of Mines, Rolla, Mo. The work outlined covered experiments on three ores: a lead ore from Southeast Missouri, a zinc ore from Southwest Missouri, and a mixed lead and zinc ore from Southwest Missouri. Part of the work on the lead ore is reported in *Met. and Chem. Eng.*, Dec. 15, 1917. The lead ore used was a slime typical of its district and gave the following analysis: Pb, 4.30-4.64%; Zn, 0.30; Fe, 3.51; S, 3.57; Cu, none; CaO, 22.68; MgO, 13.11; and insoluble, 16.68%. A screen analysis showed the following results: On 28 mesh, none; on 35, 1%; lead, 1.21%; on 48, 0.60%, lead 2.82%; on 65, 1.60%, lead 3.20%; on 100, 4.6%, lead 3.07%; on 150, 15.20%, lead 3.41%; on 200, 36.80%, lead 4.87%; through 200, 40.20%, lead 6.14 per cent.

The slime when received contained 10-15% moisture and was not dried; tap water was used in the tests. All solutions and emulsions contained 5% of the salt by weight in water. The quantities used were 5 c.c., 15 c.c., 25 c.c., and 50 c.c. per charge of approximately 800 grams of dry ore. These quantities are equivalent to 0.625, 1.875, 3.125 and 6.25 lb. respectively of the salt per ton of dry ore. A flotation machine with an air lift was used throughout the tests. The air lift was adopted to overcome the difficulty of keeping in circulation either a charge of coarse ore or a charge of ore with a high sulphide content. The apparatus used is shown in the accompanying drawing.

### THREE OILS SELECTED FOR TESTS

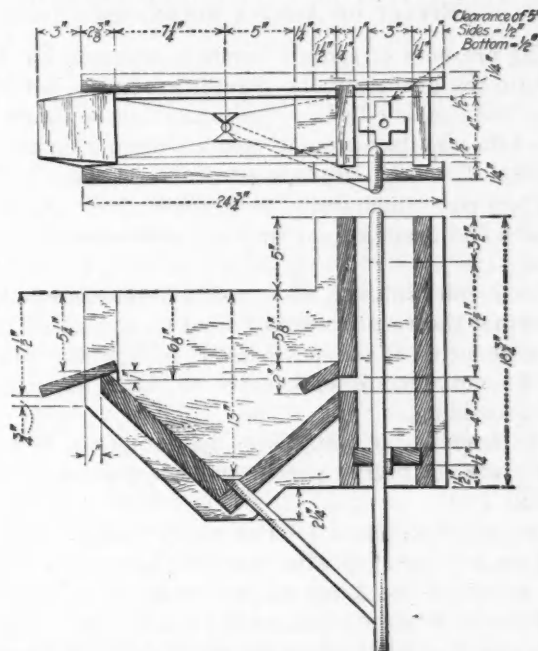
Tests were first run on this ore with a large variety of oils, from which three were selected, namely: Cleveland-Cliffs Iron Co.'s flotation oil No. 1 (hardwood creosote); General Naval Stores flotation oil No. 17; and cresylic acid.

The method of conducting the experiments was as follows: The moisture was determined and a charge of wet pulp containing approximately 800 grams of dry ore was weighed and poured into the machine with sufficient tap water to give the charge a dilution of five of water to one of dry ore by weight. The machine was started and the desired quantity of the reagent added. After a thorough mixing, oil was added at the rate of 0.5 lb. per ton and the froth skimmed off as fast as it raised above the overflow of the machine. A bubble column of about 2 in. was carried until the very last of the experiment, when all froth was skimmed off. This practice undoubtedly, to some extent, raises the extraction and lowers the grade of concentrate, but, as this procedure was uniform throughout, the results are com-

parable. The duration of the test was 40 to 45 minutes, and the speed of the machine 17 revolutions per minute.

All operating conditions, such as the speed of the impellor, duration of the test, volume of pulp in machine, etc., were kept as uniform as possible. In so large a number of experiments, slight variations were unavoidable. These would necessarily cause slight variations in the results obtained; but nearly every result in the charts has been checked once, and where there was a pronounced variation in either extraction or grade of concentrate, the results have been checked several times.

With each of the three oils used, three experiments were made without any addition agent and four each with the different addition agents. The per cent. extraction and the per cent. lead in the concentrates for each



DESIGN OF FLOTATION APPARATUS USED IN TESTS

experiment are shown by Messrs. Thornberry and Mann on charts which it is not practicable to reproduce here. In general it may be said that with the Cleveland-Cliffs Iron Co.'s No. 1 oil the extraction varied from 70 to 95% (as estimated from chart) and the per cent. lead in concentrates from about 49 to 68%. With General Naval Stores flotation oil No. 17, the extraction varied from (approximately) 75 to 97%, and the per cent. lead in concentrates from 49 to 74%. When cresylic acid was used, the extraction was 70-97% and the per cent. lead in concentrates about 49 to 66%. The only exception to the foregoing was in the experiments where cadmium sulphate was added, which apparently is very detrimental, practically ruining the extraction and grade of concentrate obtained. The results obtained with the various addition agents are given by the authors as follows:

"When sulphuric acid is added, the extraction is lowered without any apparent change in the grade of concentrates produced. This indicates that Southeast Missouri lead ores will give better results without acid than with it.



"The addition of magnesium sulphate lowers the extraction without any great change in the grade of the concentrates produced.

"Calcium sulphate gives rather erratic results. With oils which produce clean concentrates with a good extraction, the presence of this reagent lowers the extraction without any great change in the grade of concentrates produced; but with an oil which tends to lift the gangue, its presence seems to improve the extraction.

"Barium sulphate has practically the same effect as calcium sulphate.

"In general the action of sulphuric acid, which with this ore forms calcium and magnesium sulphates, and the action of the individual sulphates of the alkali earths are very similar. With the exception of barium and calcium sulphates when used with cresylic acid, the extraction is lowered about 10% and there is very little difference in the grade of concentrates produced.

#### EFFECT OF ALKALI SULPHATES

"The presence of sodium sulphate seems to have little effect on the grade of concentrates produced, but it does have a noticeable effect on the extraction obtained. The extraction may be better or poorer, depending upon the quantity of sodium sulphate used and on the oil used.

"When potassium sulphate is added, both the extraction and the grade of concentrates are lowered to some extent.

"The result obtained when using ammonium sulphate shows that the results depend more on the oil used than on the quantity of the salt present in solution. The results do not deviate sufficiently to make experimental work promising.

"The tendency of potassium acid sulphate is to give concentrates of higher grade, while it decreases the extraction.

"The results obtained when using sodium acid sulphate are somewhat erratic. As there are no great variations either in the grade of concentrates or in the extraction, no attempt was made to determine if there were critical quantities which would produce a marked result.

"The acid and normal sulphates of the alkalies do not show sufficient deviation from each other, either from the results obtained when using oil alone, or from the results of one when compared with the results of another, to make further experimental work desirable at this time.

#### EFFECT OF THE ADDITION OF ALUMS

"The concentrates obtained when ferrous ammonium sulphate was added were of a little better grade than those produced with oil alone. The extraction varied with the oil used.

"When potassium alum was used it showed a tendency to improve slightly the grade of concentrates. It lowers the extraction to such an extent, however, that the improvement in the grade of concentrates is of no interest.

"The effect of ammonium alum, when the results are considered as a whole, is to lower both the grade of the concentrates and the extraction.

"When ammonio-ferric alum was added, the extractions were lowered considerably with the oils which give a high extraction when used alone. With cresylic acid

there is practically no change in the extraction. The grade of concentrates is improved, slightly varying with the oil used.

"When the percentage of lead in the concentrate is considered, chrome alum does not have much effect. The results are rather erratic, but the extraction is uniformly lowered by the use of this salt.

"In general, when considering the alums and ferrous ammonium sulphate as a whole, the action of all these salts is very similar to those that have been discussed.

#### EFFECT OF METALLIC SULPHATES

"Manganese sulphate when present in solution has little effect on the grade of concentrates produced. It does lower the extraction slightly.

"The presence of ferrous sulphate causes variable results. With the oils which give clean concentrates and high extraction, it lowers the extraction but has little effect on the grade of concentrates produced. With cresylic acid, the lead tenor of the concentrates produced is noticeably lower.

"The effect of mercuric sulphate is to lower the extraction without any very great change in the lead content of the concentrates.

"Copper sulphate lowered the extraction noticeably and also lowered the lead content of the concentrates. This is just the opposite of the results found in many cases when floating zinc ores.

"Zinc sulphate gives variable results. When considering the extractions, it will be noted that some of them are a little higher and some slightly lower than when oil alone is used. Taken as a whole, the effect on the extraction is negligible, though it does cause a noticeable lowering of the lead content of the concentrates. When zinc sulphate is present, one might be justified in giving the pulp a preliminary water-wash in order to raise the grade of the concentrates and thereby save freight and smelting charges.

#### GENERAL CONCLUSIONS

"Generally speaking, when the sulphates are present the tendency is to lower both the grade of concentrates produced and the extraction. There are, however, a few exceptions to this rule. For instance, when using sodium sulphate with cresylic acid, about the same grade of concentrates is produced, but the extraction is noticeably higher. While a few instances may occur in which a certain salt has a slight beneficial effect, this effect is not nearly so pronounced as the detrimental effect of cadmium sulphate. In fact, the position of cadmium is unique among the other salts, and for this reason it is our intention to publish later a study of the behavior of cadmium salts generally.

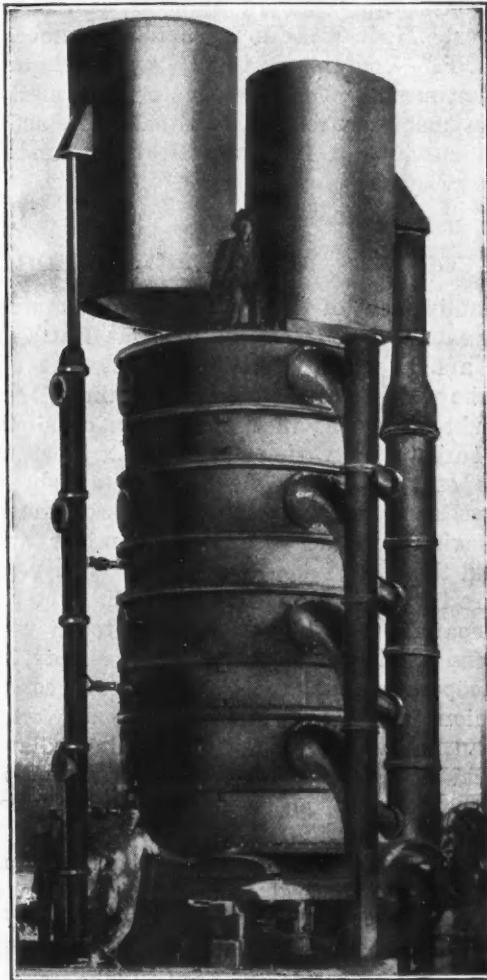
"The poor extraction obtained when sulphates are present can be overcome in some cases by giving the pulp a long treatment. This, however, lowers the capacity of a given machine and increases the cost of treatment."

Output of French Collieries in 1917, according to the *Echo des Mines*, was 28,960,000 tons, as against 21,477,000 tons in 1916, and 19,908,000 tons in 1915. The imports in 1917 declined to 18,470,000 tons from 20,952,000 tons in 1916, and 19,983,000 tons in 1915.

## Treatment of Oil Shale in Colorado

By F. A. WADLEIGH\*

The treatment of oil shale for the extraction of petroleum and its byproducts promises to become one of the principal industries of the western states, and various companies have recently been organized to engage in the production and refining of shale oil. The first corporation, however, to have passed the experimental stage is probably the American Shale Refining Co., of Denver, Colo., composed of experienced oil men, who long ago satisfied themselves that the production of oil from shale was not only feasible but profitable; and on the



RETORT FOR THE DESTRUCTIVE DISTILLATION OF OIL-BEARING SHALE

strength of results from laboratory tests upon Colorado shale, covering a period of two years, decided to enter the field upon a commercial scale.

After considerable study by the best available engineering and chemical talent, a retort furnace, capable of treating 150 tons of shale per day, was designed and constructed, and is now being transported to the company's land near De Beque, Colo., where it will be installed for operation. The furnace consists of four circular combustion chambers and four retort chambers, arranged alternately, forming a cylinder approximately 30 ft. high and 12 ft. in diameter, with two air-tight steel tanks on top containing the crushed shale, which is

fed automatically onto a revolving table in the top retort chamber and is continually agitated while exposed to the heat. Each retort chamber contains a similar table, which revolves on a main shaft extending from the base to the top retort chamber. This process is repeated throughout the three other retort chambers, and provision is made to regulate the heat in the corresponding combustion chambers, so that when the shale is finally drawn off by screw conveyors at the bottom, it is estimated that 95% of the valuable constituents are extracted. The furnace is operated in vacuum and the gases are drawn off by means of a vacuum pump into water-cooled condensers, from which the oils are collected into storage tanks.

Numerous samples of shale from western Colorado, eastern Utah and Wyoming have indicated that a profitable yield of oil per ton of shale can be expected. Meantime, the extraction of the various byproducts is being vigorously prosecuted.

## Tin in the Siamese Malaya

Tin exports from the Siamese Malay States for the year ended Mar. 31, 1917, amounted to 147,259 piculs (1 picul = 133½ lb.), against 151,175 piculs for the preceding year, according to Carl C. Hansen, Vice Consul at Bangkok. Dredging for tin has proved to be so satisfactory and profitable that while one dredge was used in 1908, with an output of 467 piculs of tin, 16 dredges were in operation in the various concessions in 1917, and 47,298 piculs of tin were recovered by that method. There were 10,000,000 cu.yd. excavated by these dredges in 1917, against 9,000,000 yd. in 1916. The amount of tin ore yielded varied in the different workings from 0.44 to 0.87 catty (1 catty = about 1½ lb.) per cu.yd. During December, 1917, another dredge was imported from the United States by the East Asiatic Co. to begin operations at its mine at Pong, in the Takuapa district, where the ground is said to average 1 lb. of tin oxide to the cubic yard.

The following outputs of tin were reported for the month of January, 1918: Tongkah Harbor Tin Dredging Co., N. L., 125 tons; Tin Bentong, N. L., 742 piculs; Bangnon Valley, N. L., 631 piculs; Ronpibun Extended, N. L., 340 piculs; Deebook Dredging, N. L., 200 piculs; Katoo Deebook, N. L., 215 piculs; Rahman Hydraulic Tin, 300 piculs; Siamese Tin Syndicate at Gnow, 1454 piculs; and at Bandon, 956 piculs.

None of the tin produced in the Siamese Malay States appears to reach Bangkok direct, but, on the contrary, Siam, according to the trade statistics issued by the Bangkok customs, imported from foreign countries 806,976 kilos of tin in the rough in 1915-'16 and 1,002,451 kilos in 1916-'17, and of the imports for the latter period 63,212 kilos were supplied by the United States, 52,013 kilos by Hongkong, 22,680 kilos by China, 103,632 kilos by Singapore, and 760,913 kilos by the United Kingdom. The reason for Siam's buying tin abroad while being itself a great tin-producing country is found in the fact that the tin ore mined in Siam is shipped to the great smelting works in the British Federated Malay States, and further export of the metallic tin passes under British trade restrictions and henceforth is known as "Straits tin."

\*Denver, Colorado



### Sodium vs. Potassium Cyanide\*

For titrating potassium cyanide it has been the universal custom to make up a solution containing 1.303% silver nitrate, so that 1 c.c. was equivalent to 10 mg. KCN. This was roughly 0.0767 N. For titrating commercial sodium cyanide it is possible, by a convenient coincidence, to use N/10 or N/20 silver solution without necessitating any calculation. One c.c. of N/10 silver solution is equivalent (by Liebig's titration, or using the preferable modification with potassium iodide indicator) to 5.202 mg. of CN, or to exactly 9.802 mg. of NaCN. Now, 98 is almost the exact percentage of actual NaCN in the high-grade commercial material now in use. Therefore one can titrate solutions with N/10 silver nitrate and call 1 c.c. equivalent to 10 mg. of the actual 98% salt which has to be weighed out in making up the solutions. For technical purposes it is perhaps preferable to use N/20 solution (1 c.c. = 5 mg. commercial NaCN), as the end-point with iodide indicator is delicate and the burette readings then also indicate "pounds per ton of solution" directly. For instance, taking a 10 c.c. sample: suppose 2 c.c. of N/20 silver nitrate are consumed; this indicates 10 mg. or 0.10% of commercial sodium cyanide in solution, or 2 lb. per ton of solution—the "ton" or "fluid ton" used in hydrometallurgy being about 32 cu.ft., or the volume of 2000 lb. of water.

When determining sodium and potassium in a mixed cyanide, chlorides and carbonates being the usual impurities, it is often possible to work by directly evaporating with hydrochloric acid, gently igniting and weighing the mixed chlorides remaining, and titrating chlorine in part of the residue. The following formula, based on 1914 atomic weights, gives the results in the most direct manner possible:

If A is grams mixed chlorides, and B is total grams chlorine in mixed chlorides; then K in grams is  $2.4286 A - 4.004 B$ , and Na in grams is  $3.004 B - 1.4286 A$  or  $A - B - K$ .

Not infrequently the class of cyanide can be determined simply by titrating cyanogen and alkalinity in a fresh solution, using methyl orange as indicator.

It may not be out of place to call attention to the importance, when testing cyanides for the presence of alkaline sulphide, of preparing the solution at the moment of making the test, or, what is better, of dissolving the solid cyanide in the reagent to be applied. If the cyanide is dissolved in water and allowed to stand even a few minutes, the sulphide content may be seriously diminished, and traces of sulphide may be easily overlooked. Three simple methods are available: Shaking with fine lead carbonate suspended in water; dissolving the solid cyanide in a solution of silver nitrate containing slightly less than 1 molecule  $AgNO_3$  for 2 equivalents CN, or dissolving the solid cyanide in a little mercuric chloride solution, each of these reagents yielding a black precipitate or dark coloration. The sulphide may be quantitatively determined by the silver or mercury method. Incidentally, while sodium cyanide is not deliquescent, it is decidedly more soluble in water than potassium cyanide.

In dilute solutions there is no apparent difference in

the stability of sodium as compared with potassium cyanide; in each case decomposition is greatly increased by access of air and retarded by presence of free alkali. Prolonged tests made over a period of three years indicated that in strong solutions there is comparatively little difference in stability, the advantage, if any, lying on the side of the sodium compound, which in the test lost about 40% of its cyanogen in 38 months, against nearly 50% lost by commercial potassium cyanide.

It has long been stated that 5 grains of cyanide have repeatedly proved fatal, at which rate a pound would suffice to kill about 1400 persons. This statement no doubt refers to cyanide of the old type, containing probably 30 to 35% of potassium cyanide or, say, 12 to 14% of cyanogen. Modern sodium cyanide—commercial as well as "C. P."—contains 50 to 52% cyanogen, or practically four times as much as the material formerly sold, and is presumably four times as lethal in its action, so that, as a measure of its toxic effect, a pound would contain more than 5000 fatal doses.

### Anaconda's Labor Commissioner

The establishment of the office of labor commissioner by the Anaconda Copper Mining Co. at Butte, Mont., opens up a field which, while it may not be entirely new, will be watched with interest by mining men and will undoubtedly result in the adoption of similar or modified bureaus by various operators. Most mining companies of the present day have established some form of welfare work which tends to lessen the breach that has existed in the past between miner and employer, and the steps taken by the Anaconda represent a departure that has the approval of both. The purpose of this department will be to keep in touch with the men and the conditions surrounding the miners, so that greater coöperation may be obtained. All complaints of the unions and men will be heard, and, whenever possible, an amicable agreement made immediately, so that constant bickerings, petty differences, and misunderstandings, which often develop serious trouble, may be prevented.

The appointment of Thomas J. Chope to this important post has met with general commendation. Mr. Chope has been employed at Butte continuously since 1903, although he came there first in 1899, but left to take up further mining work in Utah, Idaho, and other points in Montana. His continuous employment in various positions, the popular regard in which he is held by the men, and a broad knowledge of conditions ably fit him for the post which he now holds. Commenting on the appointment, the *Anode* says: "The appointment of Thomas J. Chope to fill this position is a natural one, and will meet with general approval. Not only has he worked at every position in the mines from miner to foreman of one of the largest mines in Butte, but he has also filled many offices in the miner's union in such a manner as to gain the confidence and respect of all associates. During the time that he acted as shift boss, assistant foreman, and foreman, he never had a man killed at any of the places of which he had charge, and won one of the cash prizes awarded by the Bureau of Safety by making one of the best records in accident prevention ever made at any of the Anaconda Copper Mining Co.'s mines."

\*Excerpted from an article by W. J. Sharwood in "Journ. Ind. and Eng. Chem.," April, 1918.



## Recovery of Potash from Greensand\*

The method of recovering potash from greensand, or glauconite, consists in digesting under pressure finely ground greensand with lime and water, thereby obtaining caustic potash of remarkable purity and at the same time converting the residue into a material of value. The reaction is carried out in large digesters or autoclaves, heated by introducing into the charge high-pressure steam in sufficient quantity to maintain the desired pressure of about 225 lb. for a period of two to four hours. To conserve the heat, at the completion of each digestion the steam is allowed to escape and be condensed in the greensand-lime-water mixture next to be treated, and the content of the autoclave, which should have a cream-like appearance, is filtered to separate the dissolved caustic potash from the insoluble residue. The efficiency is largely dependent upon the thoroughness of the heat insulation.

On filtering, the potash appears in the filtrate as potassium hydrate associated with so few impurities that on concentration it may be sold as a high-grade product without further treatment. Following is an analysis:  $K_2O$ , 77.2%;  $SO_3$ , 0.90%;  $Cl$ , 0.35%;  $SiO_2$ , 0.70%;  $Al_2O_3$ , free.

From the origin of glauconite it would naturally be supposed that the percentage of impurities would be higher and the variety greater than is found to be the case. According to standard works on mineralogy, it is a hydrous potassium iron silicate, but this conclusion was probably based on the simple analytical figures, and there are strong recent data to show that this is not its true composition. As greensand is at present being carefully investigated, it will probably be shown to be a potassium iron compound enveloping free silica, but not a silicate. That it is of marine origin is undoubted, and its rich green color is probably due largely, if not entirely, to organic matter with which it is chemically combined.

The solid remaining on the filter, which is the insoluble portion resulting from the digestion, is employed in the manufacture of steam-hardened brick, tile, artificial stone, etc. It acts as a binding or cementing material and is incorporated with high silica sand, as is customary in the manufacture of steam-hardened products, but differs fundamentally in that, whereas lime has always previously been employed as a binding agent, in this case a pre-formed self-cementing hydrous silicate performs this function.

In investigating the various factors governing the yield of potash, it was found that a high pressure and a large excess of water were absolutely essential. In treating feldspar it is necessary to use eight times its weight of water, and ten is a fair amount. This necessitated a great deal of evaporation, materially reducing the capacity of the plant and requiring a large outlay for initial heating.

After a series of experiments, it was determined by a process of elimination that the alumina was the cause of the trouble. The only remedy consisted in the adoption of an alumina-free material, or one in which this element was partly or wholly replaced by a non-injurious one. Greensand was tried. It was found that the

concentration could be doubled, or, in fact, the water could be reduced to a point where it was just possible to agitate the mixture. Some other difficulties met in recovering potash from feldspar, that were due to the presence of soda and aluminum, are obviated by the use of greensand, which is practically free of soda as well as of aluminum.

Greensand contains usually from 6 to 7%  $K_2O$ , and it may be almost completely recovered, but it is found that 70 to 80% of the total potash is a satisfactory yield after considering such factors as dilution, time of digestion, etc. This means the production of about 100 lb. of  $K_2O$ , and binder material for from 20,000 to 30,000 brick from each ton of greensand.

## Centralized Control To Govern Lake Superior Iron-Ore Shipments

A general plan providing for coördination of iron-ore operators and consumers, vessel operators, railroad and coal interests in the movement of the iron ores of the Lake Superior district for 1918 was presented and approved at a meeting held in Cleveland, Ohio, on April 2.

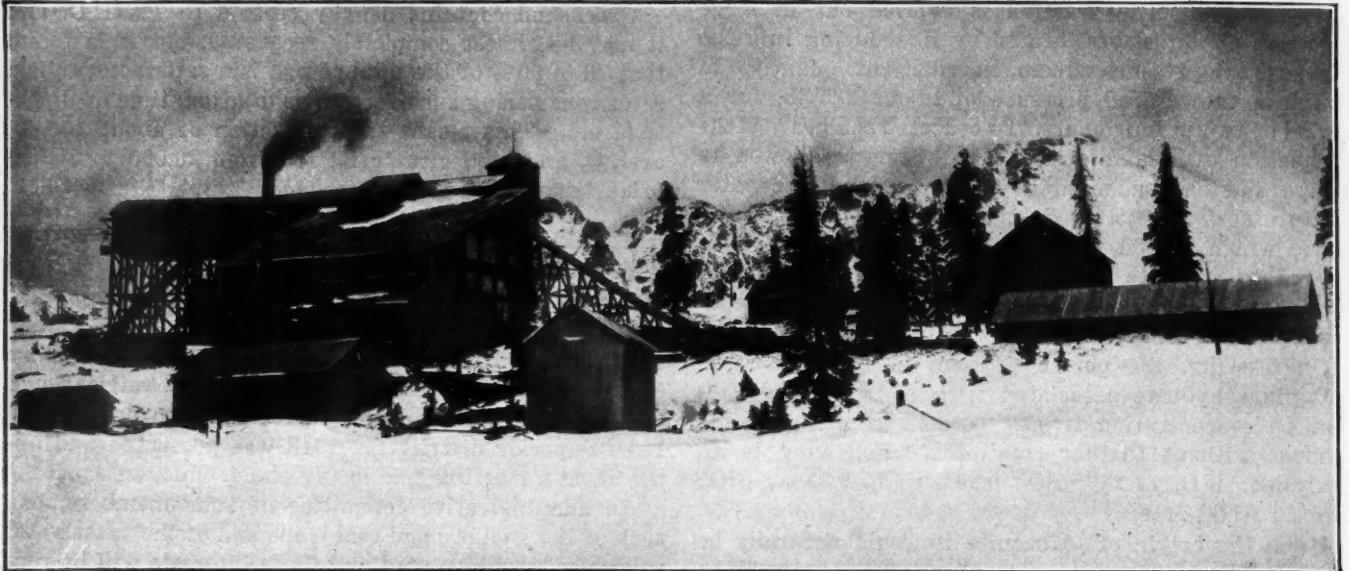
An administrative committee of four members, one each of the iron ore and coal trade and of the vessels and railroads, was appointed and these interests will be represented by individual committees. Details of cargo loading, unloading and distribution of ore will be handled by the ore-operating committee; cargo allotment of coal and loading and unloading problems will be in charge of the coal-operating committee; the vessel-operating committee will look after vessel distribution and supply, and the operating committee of the railroads will supervise car supply and car movement. The keynote of the meeting was conservation of rail movement.

The administrative committee consists of Harry Coulby, president of the Pittsburgh Steamship Co., representing the vessels; Matthew Andrews, of M. A. Hanna & Co., representing the ore interests; A. A. Augustus, of the Cambridge Collieries Co., representing the coal interests, and George L. Peck, representing the railroads. The iron-ore committee will consist of members of the sub-committee of the American Iron and Steel Institute on pig iron, iron ore, and Lake transportation.

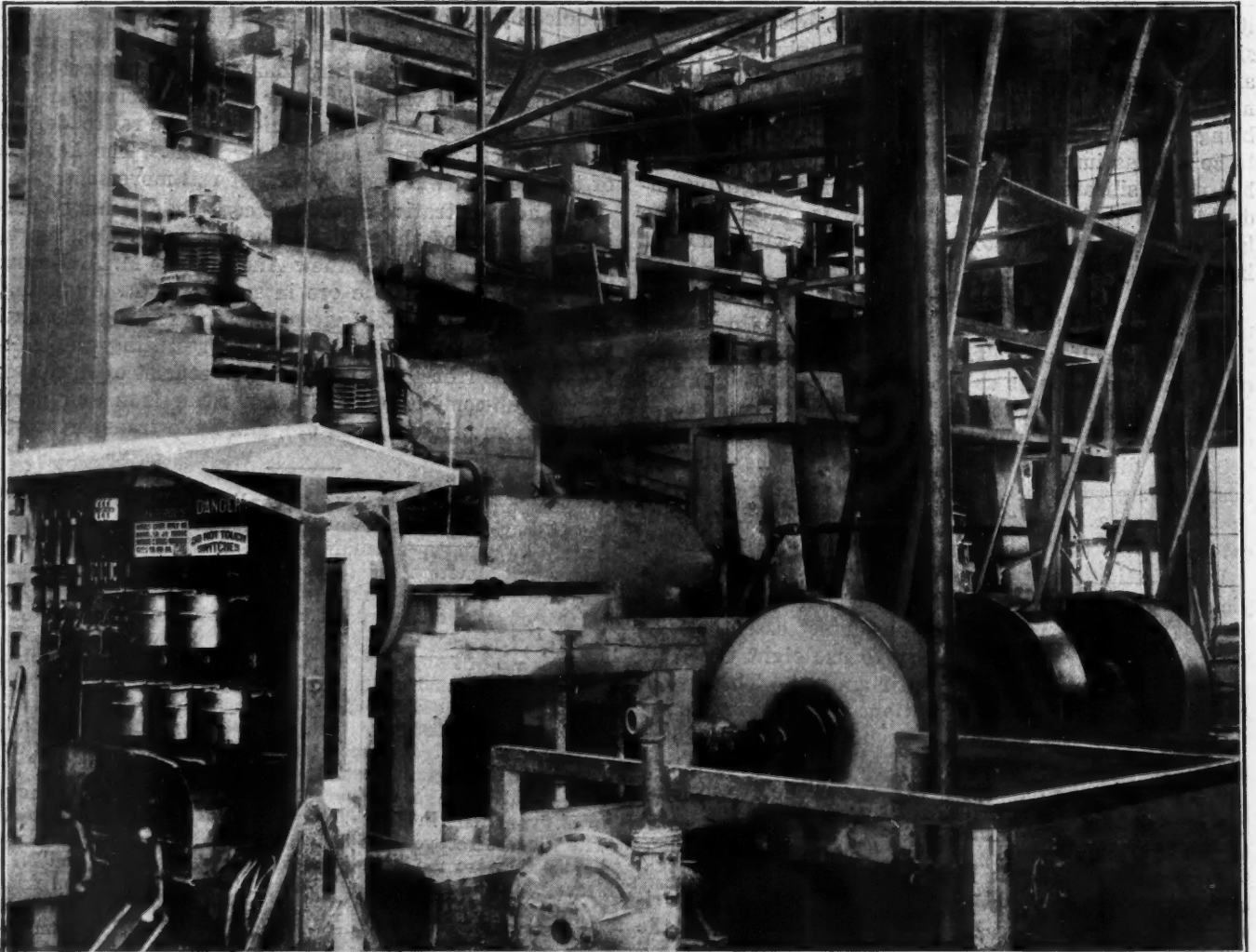
Secondary Metals in 1916, according to J. P. Dunlop, of the U. S. Geological Survey, are those recovered from scrap metal, sweepings, skimmings and drosses. Dealers, refiners and smelters did a large and profitable business in this material. The value of the secondary metals (exclusive of gold, silver, platinum, iron, steel and ferroalloys) recovered in the United States in 1916, was \$265,377,856, an increase of 233% over 1915. The value of secondary platinum, iridium and palladium in 1916 was \$4,000,000 and of old jewelry, dental waste, etc., containing gold and silver, about \$20,000,000. Old car wheels, rails, pipe and other iron and steel shapes were often sold at prices in excess of the original cost. Smelters and refineries in St. Louis and Chicago recovered about 37% of the antimony in alloys; those in New York and Philadelphia about 45%. The largest recoveries from tin dross, tin scruff and clean tin scrap were made in Pennsylvania, New York and New Jersey. Nearly all the secondary nickel was reported from Connecticut. Approximately 350,000 tons of copper was recovered; lead, 96,300 tons; zinc, 115,000 tons; antimony, 4480 tons; tin, 17,400 tons; aluminum, 19,300 tons, and nickel, 816 tons.

\*Excerpted from a paper presented by H. W. Charlton at the Boston meeting of the American Chemical Society, September, 1917.

## Operations of Climax Molybdenum Co.



MILL OF CLIMAX MOLYBDENUM CO., WHICH HAS A CAPACITY OF 400 TONS PER 24 HOURS

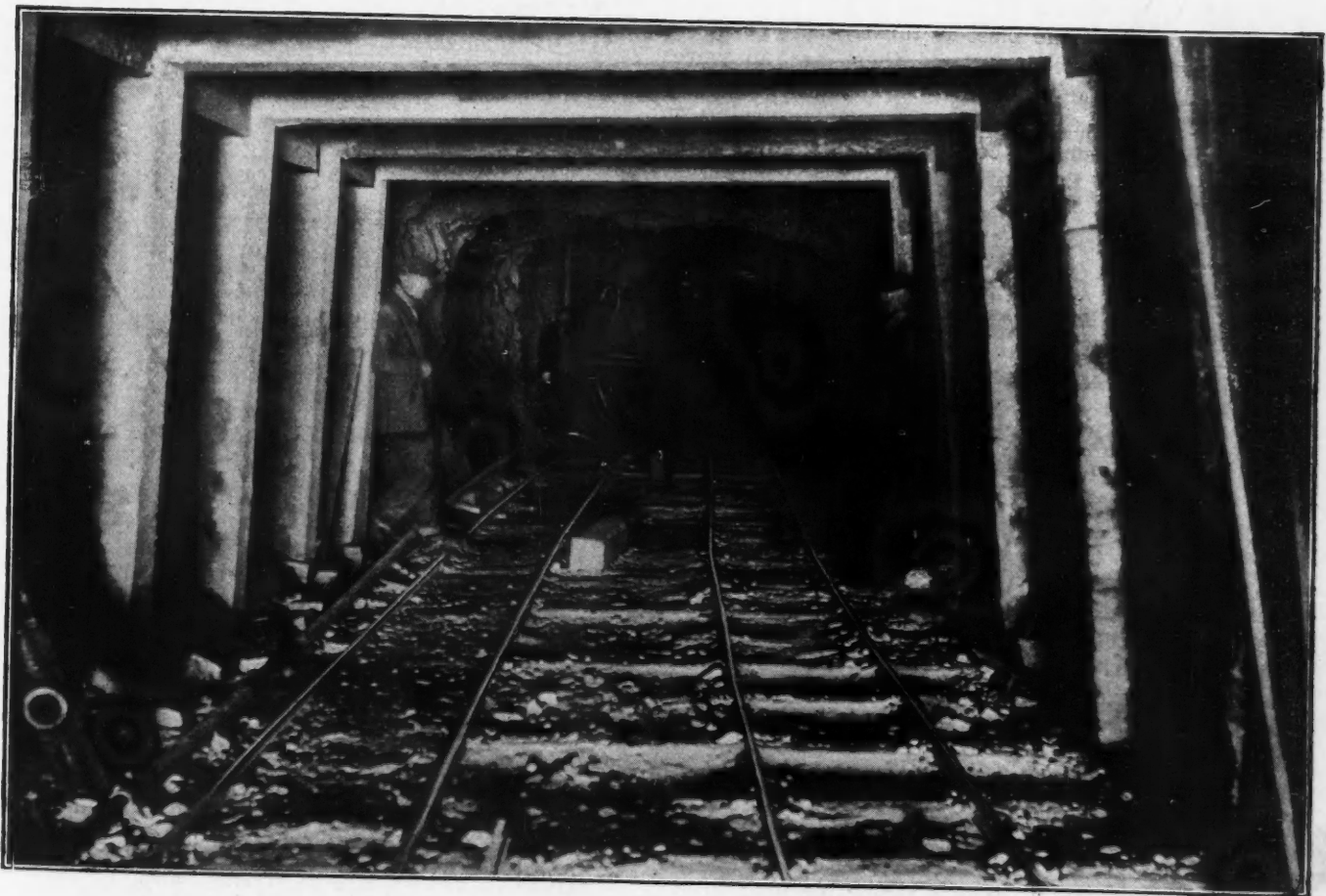


INTERIOR OF MILL OF CLIMAX MOLYBDENUM CO. AT CLIMAX, SUMMIT COUNTY, COLORADO





STOPE IN MINE OF CLIMAX MOLYBDENUM CO. WHERE SHRINKAGE STOPING WILL BE ADOPTED



WHITE TUNNEL OF CLIMAX MOLYBDENUM CO. NEAR CLIMAX, SUMMIT COUNTY, COLORADO

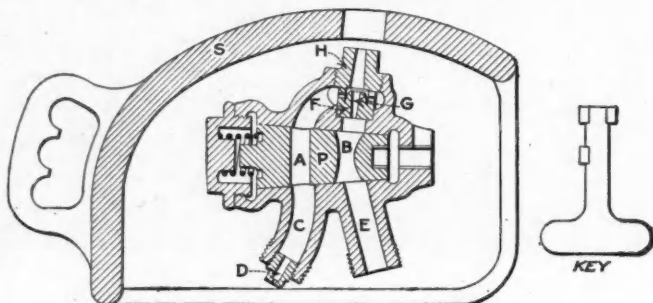


# Details of Practical Mining

## The Apex Water-Blast Apparatus

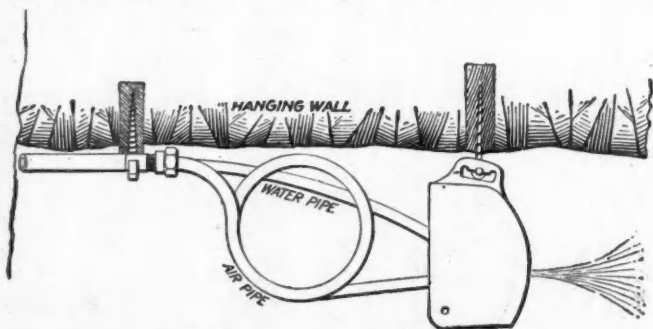
BY E. M. WESTON

Whitehouse and Veasey have presented to the South African Institution of Engineers a paper describing a new water blast, detailing its design, as indicated in the accompanying illustrations. The apparatus is constructed so that the relative quantities of air and water may be regulated to produce the most effective spray for laying fine dust, and the device, with its shield, may be brought up close to the working face and the water blast delivered in the best position for covering the whole area of the drift with spray. Each water blast is numbered and has a numbered key, which is re-



DETAILS OF WATER-BLAST APPARATUS

movable only when the blast is turned on. The pipe-fitter looks after the spray and there are no valves between it and the water main. The shift boss inspects the apparatus every day by simply turning on each spray. The miners coming off shift have to deposit the keys in the shift bosses' office, where they



ARRANGEMENT OF WATER-BLAST CONNECTIONS

are kept on a numbered board, thus giving evidence that each spray is turned on. The trammer collects the keys from the shift boss when coming in on the next shift and turns the sprays off, leaving the keys in. If any keys are missing there is at once evidence of possible danger from fumes, and precautions can be taken.

The mining law of the Transvaal makes the use of water blasts in development headings compulsory. In the sectional view *S* is a cast-iron shield. The remainder is of gun metal. *A* and *B* are passages for air and water in a cone plug. *D* is a renewable plug to vary

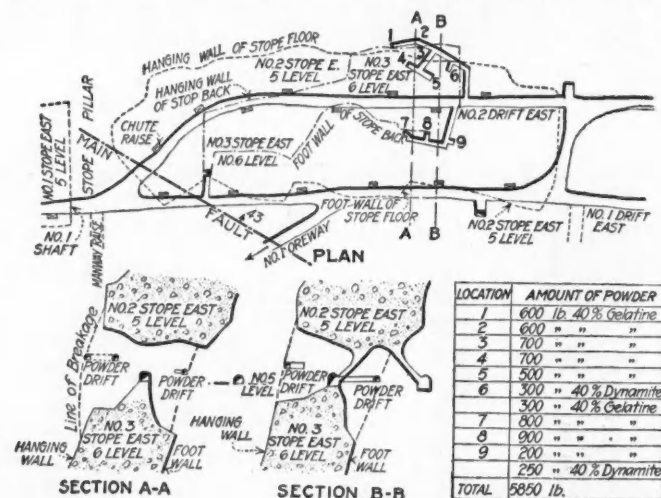
propulsion of water traveling along *C*. *F* is the air-regulating cone and *H* is the cone from which the spray issues with velocity varying with the size. *D*, *G*, and *H* are supplied in various sizes, and any water blast can be produced.

## Powder Blast at the Perseverance Mine, Juneau, Alaska

BY R. L. HEALY\*

An effective powder blast was recently set off at the Perseverance Mine of the Alaska Gastineau Mining Co., Juneau, Alaska. The manner in which the work preparatory to the firing was done and the charges required, together with the costs and results accomplished are of interest.

Referring to the sketch, it will be seen that the No. 3 stope East, sixth level, had been mined to the fifth level. The upper stope, No. 2 East, fifth level, had been worked out and entirely emptied except for the compact ore which had built up on the floor of the stope between



POWDER DRIFTS AT PERSEVERANCE MINE, JUNEAU, ALASKA

the staggered chute raises. The purpose of the blast was to knock out and shatter the floor pillar (or level bottom), allowing the ore to drop into the stope below. The level bottom could have been made to cave by drawing the ore on the sixth level, but this would have resulted in a product made up of large blocks, which would have required bulldozing and blockholing when they reached the chutes.

Tunnels 5 x 4 ft. were driven by contract labor in the foot wall and hanging wall sides of the stope, and short crosscuts or pockets were cut out to take the powder. As little of the muck was removed as possible. The ground is a tough albite schist, with quartz stringers, and somewhat faulted. One-fourth of a pound of explosive per ton of ore was taken as the proper load,

\*Alaska Gastineau Mining Co., Thane, Alaska.

the charge being of 40% Du Pont gelatine, which is quick acting and low freezing. The temperature in the drifts was well below freezing.

The covers, only, were removed from the boxes and two primers placed in each charge with Du Pont No. 6 electric blasting caps, each being tested before and after making the primers. The different charges were connected up in parallel, two sets of No. 14 wires being used in each tunnel as a precaution against breaking or short-circuiting. The wires were strung on porcelain knobs fastened to plugs driven into the back in the corner nearest the charges. All loading was done by the foreman. The pockets in the extreme faces were loaded first and the drift was tamped by shoveling the muck flush with the back, working back until the next pocket was reached. This was then loaded, the pocket and drift tamped solid, and so on. The circuits were tested repeatedly with a galvanometer. No trouble was found in protecting the wires. Loading and tamping took 4½ days, with six men working on two shifts, not counting the foreman in charge.

All men were removed from the mine when the switch was thrown in from a point at No. 1 shaft, on the surface at the fifth level 700 ft. away. No explosion was heard; only a bare tremor of the ground was felt and no damage was done to drift sets or chutes even within 50 ft. of the blast.

COSTS OF POWDER BLAST AT PERSEVERANCE MINE	
5,850 lb. gelatine (117 cases), with caps	\$1,110.00
225 ft. of tunnel	1,575.00
Labor of tamping and loading	230.00
Electrical supplies and labor	25.00
<b>Total</b>	<b>\$2,940.00</b>

Estimates show 30,000 tons of ore broken at cost of 10c. per ton. This tonnage, or 13,300 cu.yd., broken with 5850 lb. of gelatine, shows a duty of 5 tons or 2½ cu.yd. per lb. of explosive. R. E. Murphy, of the Juneau office of the Du Pont Powder Co., assisted in the successful operation of the blast.

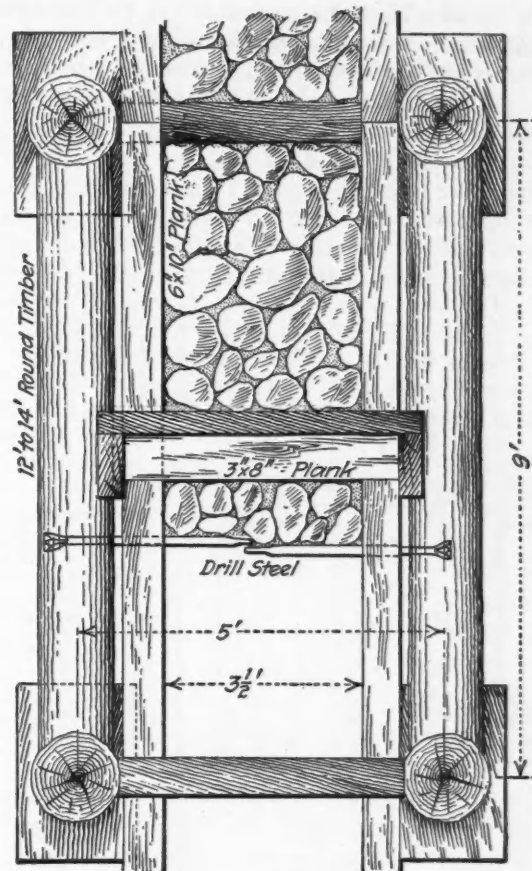
### Fixing a Chute Mouth Without Emptying Chute

BY C. T. RICE

The wear and tear upon a chute are much less if it is kept well filled with ore all the time. When the chute mouth in a square set stope requires repairing, it is not necessary to empty the chute, even when an entirely new mouth set has to be put in. It is possible, when both sides of the chute are accessible, as is the case when the floor immediately above the chute level is kept open, to "work in" from each side pieces of old drill steel so as to form a grid over the mouth that will hold back the ore.

At the Hecla mine, where a box chute the sides of which have 6 x 10-in. timbers and which has an opening about 3½ ft. square is taken up in the center of a three-compartment stull-timbered raise, chute mouths frequently require repairs. This is accomplished by boring holes about 10 ft. above the chute mouth, through two opposite sides of the chute timbers and about 10 in. apart, as illustrated. Short pieces of drill steel (3-ft. lengths are about right) are then driven through the holes into the broken material contained in the chute. In case a drill strikes a boulder, the next one is driven, until all the drills have been stopped by larger rocks or

have been driven in their full length. The same thing is done on the other side. The chute is then drawn until the drills can be driven in their full length, forming a a grid across the chute that will hold the larger pieces of material. The chute is again drawn until enough large rock has been caught on the grid to stop the flow and allow the chute below the grid to be fully drawn empty. Timbermen then lag across the chute just above the bottom for protection from sifted fines and small falling rocks. The chute mouth is then torn out and replaced by a new set. The next problem is to re-



VERTICAL SECTION OF CHUTE WITH ROCK FLOW CUT OFF BY DRILL STEEL OBSTRUCTION

move the grid. This is not so difficult as it would seem at first. The object is to take the weight off the drills. This is accomplished by hammering the ends of the drills sideways so that the finer particles run through the grid. As soon as the chute is filled to the grid, the weight will be relieved from the drills and each can be pulled out without much difficulty.

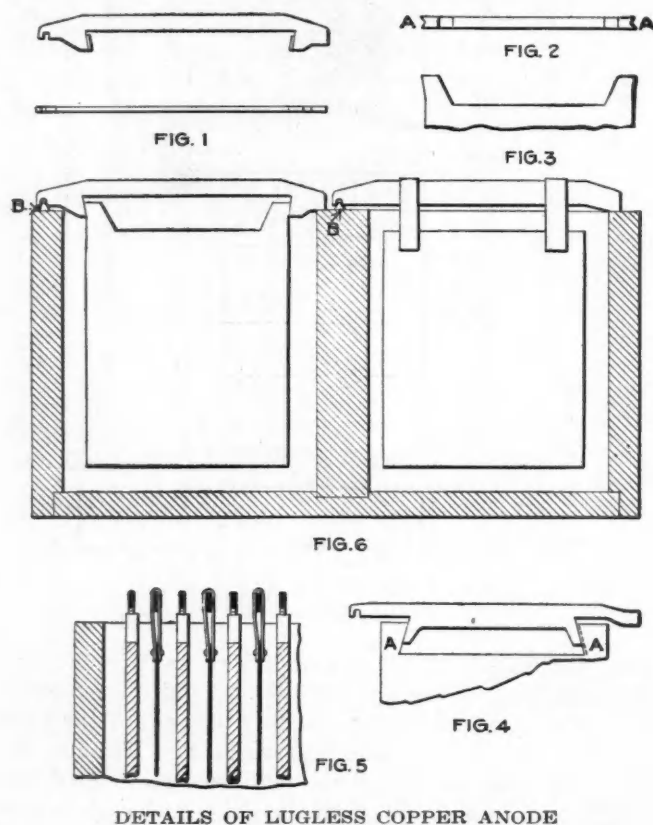
At the Hecla, chute timbers are 6 in. thick, and are therefore strong enough to hold the drills in position when the weight comes upon them. The same method, however, has been used in a chute lined with 2-in. plank by nailing heavy cleats to the chute timbers and boring through both. Drills would be held in place more easily if they went from side to side clear through the chute, but the difficulty then would be to relieve the weight for their removal. This method of holding back the flow in a chute is not generally applicable, on account of only one side usually being accessible, but the method could be modified by reinforcing and working from one side, using longer drills across the full width of the chute.



## Details of Milling and Smelting

### Antisell's Lugless Copper Anode

Frank L. Antisell, of the Raritan Copper Works, Perth Amboy, N. J., has patented (U. S. Pat. 1,250,757) a lugless electrode suitable for use in a multiple system of electrolytic refining. Heretofore, in electrolytic copper refining, the anodes have been cast with a horn or lug at each upper corner for the double purpose of suspending the anode and electrifying same; occasionally anodes have been suspended from a rod or link for the same purpose. Mr. Antisell states in his patent specification that in practice it has been found difficult to cast satisfactorily a thin anode with lugs, owing to the



DETAILS OF LUGLESS COPPER ANODE

freezing of the metal, and it has therefore been customary to cast anodes thicker than is scientifically proper.

It is desirable to place the anodes and cathodes in the electrolytic tank as closely together as possible, to reduce the current density, to save power, and to improve the quality of the copper, but this cannot be accomplished with anodes cast with heavy lugs. Furthermore, it is difficult to hang the anode provided with such lugs plumb in the electrolyte. Also, they are difficult to pack satisfactorily for shipping and are liable to break in handling, and are further objectionable because it is impracticable to roll them, as the lugs are liable to break.

Owing to the roughness of the cast lugs of the anode, the electrical contact is poor. If the contact be made

satisfactory by filling or otherwise smoothing off the castings, the cost of such operation adds considerable expense to the process of refining. Owing to the fact that the anode is energized generally from one side only, there is a tendency of the lugs to cut off, on account of the electrochemical action, thereby making it necessary to recast the anode before the end of its natural life, and even after such an anode has been dissolved, the lugs are left over as scrap, which must be melted and recast, adding additional expense to the operation of refining. Most of the objections urged to the old-style anode also apply to anodes suspended by hooks or links from cathode rods, with the additional objection of one or two additional contacts, which consume from 10 to 20% of the total power in refining, which in a large establishment is an important factor.

These objections, it is urged, have been overcome by the improved methods of suspension suggested in Mr. Antisell's patent, some of which are shown in the accompanying illustration. Fig. 1 is a side elevation of one form of an improved bar for supporting the proposed electrode. Fig. 2 is a top edge view of one form of an improved anode designed for suspension by the bar shown in Fig. 1. Fig. 3 is a side elevation of the same. Fig. 4 shows side view of another possible construction of the bar and anode. Fig. 5 presents a sectional view of anodes and cathodes suspended in accordance with the suggestions of the patent, and Fig. 6 a transverse section of a tank with the improved anode and supporting bar in place and a corresponding cathode suspended from an improved suspending bar designed for the cathode. Discussing this method of suspension, Mr. Antisell says:

"Owing to the inclination of the upper portion of the sides of the anode and of the projections formed on the suspension bar, the contact pressure is greatly increased by the law of resolution of forces over that which is the case where the reaction is directly downward, as in the case of a hook, but, owing to the angle, the contact resistance resolves itself into many times less than what it would ordinarily be (in direct proportion to the angles formed). It is preferable to make this angle of contact so that the line of pressure perpendicular to the inclination will be about three times as great as the vertical line of pressure. By doing this the pressure between the contact surfaces is increased about three times, with a corresponding decrease in the conducting resistance.

"The construction shown enables the same rod or bar to be used over and over again, and it is therefore advantageous from an economical standpoint to put the said suspension rod or bar in the best possible condition for making a good electrical contact between it and the anode. With this construction the rod may be made thin, and therefore does not interfere with the cathode rod that supports the cathode, as was the case with anodes heretofore cast with lugs, and in consequence the

anodes and cathodes may be placed closer together in the tank. Again, as the recesses *A* are formed in a central vertical plane of the anode, the anode tends to hang perfectly plumb in the tank. The lugless anode may be passed through a rolling mill, thereby squeezing out the fins and inequalities due to roughness of the anode mold, without affecting the method of suspension. It is obvious that by the use of this lugless anode much less scrap is produced and the anode is much easier to handle and ship.

"By taking advantage of the laws of the resolution of forces, I am enabled to double, triple, quadruple, etc., the contact pressure between the anode or cathode suspending rods and the conductor *B* by means of various angles, with an evident saving. For instance, if the under straight edge of the suspension rod were resting directly upon the contact bar *B*, and assuming the loss in this form of contact to be 25 millivolts, or 10% of the current flowing—a usual figure—by notching the suspension rod or bar as shown, when the triangular conducting rod *B* is an equilateral triangle, the downward thrust has the value, say, of 1, resolving itself into thrusts perpendicular to the surface of the conducting bar of the value of 2. By actual experience it has been found that, within the range of current densities and pressures generally prevalent in copper refineries, the reduction in resistance of the contact is about proportional to the pressure of contact. Therefore, taking into consideration the law of divided electrical circuits further reducing the resistance, it is found that, by the improved form of contact, the contact loss is reduced from 10% to 2½% or less.

"It is true that, with this improved construction of anode and supporting bar, one more contact is added in the electrical circuit and the anode than is the case where the anode has been cast with integral lugs as heretofore. From the above reasoning it might appear that more resistance is placed in the circuit between the point where the anode rods make electrical contact and the center of the anode proper, but as the angle of contact of the anode suspending rod and anode are so proportioned that they give a contact pressure about three times the vertical pressure, the contact pressure due to the weight of the anode is increased to the same extent. This will reduce the 10% loss to a loss approximately 3%, and, dividing this between the two points of suspension, it is again reduced to about 1½% loss. This is more than compensated for by using an anode suspension rod or bar of refined copper, which has much greater conductivity than impure anode copper, and thus the total resistance is less with the lugless anode than with the usual form of anode."

### Device To Clear Slimes-Filtering Screens

The accumulation of trash in a Dorr slime thickener is a source of more or less trouble. Considerable wood pulp and other foreign substances can be readily taken out of the slime feed by the use of a simple contrivance devised by one of the men at the Hercules mill, Wallace, Idaho. A 3-mm. screen was put in near the discharge end of the slime launder feeding a Dorr thickener. Over the thickener there was also another

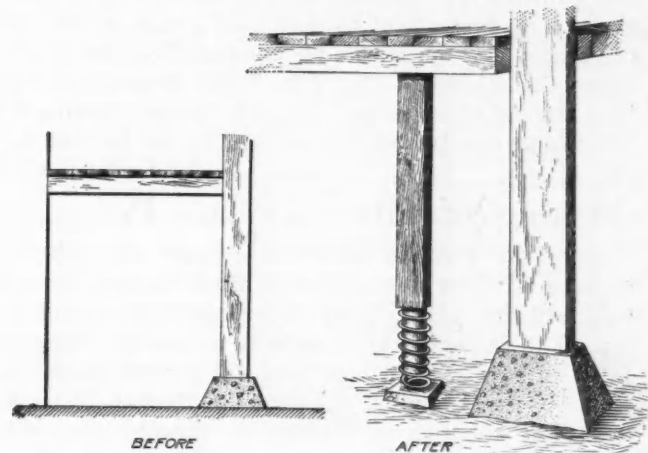
launder, conducting the overflow from the concentrates bin to settling tanks. The screen often became clogged with wood pulp, requiring frequent attention. A water wheel was rigged up in the concentrates-overflow launder and a crank arm extended outside. At each revolution the end of a lever was depressed. At the opposite end of the lever there was attached, through a string and pulley system, a heavy nut suspended over the slimes launder screen. This intermittently falling weight gave an impact to the screen sufficient to prevent clogging of the mesh, as the accumulated substance was caused to gravitate to one side, where it could be removed at intervals without the previous watching that had been necessary.

### Platform for Feeding Stamps

BY FREDERICK W. FOOTE\*

The feeding platform used for small stamp mills is usually fastened in some manner to the framework or foundations of the stamps and is subject to great vibration. This weakens the platform and also makes it unpleasant and unhealthful for the feeder man.

I recently visited a small stamp mill and noticed a simple method of obviating this difficulty that should



IMPROVED PLATFORM FOR FEEDING STAMPS

prove interesting to other stamp mill men. The platform was detached from the foundation of the stamp and 2 x 4-in. upright posts were substituted. The lower ends of the posts were rounded for about eight inches from the bottom. Two springs from the head motions of a Wilfley table were fitted on the foundation of the stamps under the posts, the bottoms of which were inserted into the springs. The collar on each 2 x 4 post kept it up off the floor. This expedient entirely removed the vibration and jar from the feeding platform and in no way weakened its construction or impaired its use. The change could be made in any stamp mill, as old table head-motion springs can usually be found.

Eight Iron Blast Furnaces were completed in 1917, against four new stacks in 1916. The new furnaces completed in 1917 were: In March, Bethlehem B; April, Gary No. 4; June, Jones & Laughlin's Eliza No. 6; July, Cambria No. 11 and Gary No. 3; August, Worth No. 3, Whitaker-Glessner and Republic's Haselton No. 5. With these additions the blast-furnace capacity of the country was brought up to 42,000,000 or 43,000,000 tons.

\*Mining Engineer, 80 Broadway, New York.



## Events and Economics of the War

Actions of minor importance marked the week of the German offensive just passed; slight gains were made in the south by the Allies. With the sinking of the cruiser "Vindictive" on May 9 across the entrance to Ostend harbor, thereby hampering the use of the port, the British struck another blow at the U-boats, following the recent raid on Zeebrugge. Charges by General Maurice that Lloyd George had misinformed the country on the military situation were disproved in Parliament by the Premier, who was upheld by the House of Commons; General Maurice was retired; Field Marshal Sir John French was appointed viceroy of Ireland. Dissension is reported among the Slav elements in Austria-Hungary over the course of the government. A treaty of peace was signed by Rumania with Germany. Nicaragua declared war on Germany and her allies.

In the United States, the week of May 20 was set as "Red Cross week" by the President. The Government's plans for a huge ordnance base in the interior were disclosed. An increase of \$300,000,000 a year in the wages of railway employees was recommended by the Railroad Wage Commission. The War Trade Board announced that the Allied missions will pass upon all exports to their countries before licenses are issued hereafter.

### Melting of Silver Dollars Progresses

Since the Pittman Silver Act went into effect the melting of silver dollars into bullion has greatly overbalanced the calling in of silver certificates outstanding. The cause of this is said to be the Government's delay in printing the new Federal reserve notes that are to be issued, under the terms of the act, to replace the silver certificates withdrawn, thereby preventing any contraction of the currency. The work of melting the coins began promptly with the signing of the bill by the President, and shipment of the silver bullion to India, via San Francisco, was started by the Government as soon as possible thereafter and is still continuing. The silver, which is going to India for the purpose of settling American trade obligations there that cannot otherwise be liquidated, is consigned to the Calcutta Mint, where it will either be melted into rupees or added to the silver reserves back of the Indian currency.

At the same time the Government began to buy silver in the open market at \$1 per oz., in accordance with the new law. Steady shipment to India is expected, as American obligations in that country for materials purchased are said to be heavy. The bullion content of the Indian silver rupee is 165 grains, and with silver fixed at \$1 per oz. the silver in the rupee is worth more than the nominal value of the coin. The value of the rupee as bullion equals its nominal value when silver is worth 94.3c. per oz. Normally, then, a profit could be had by melting rupees and selling the bullion. Any tendency in this direction, however, has been forestalled by the Indian govern-

ment with a law forbidding the destruction of coins. The prohibition, it is said, will probably be effective, as silver bazaars in the country restrict their dealings to foreign bars, stamped by reliable producers and refiners, who certify to quantity and fineness. The bars made by domestic Indian refiners lack this standing, and are therefore difficult to market. Disposal of rupee silver outside of India is prevented by the export embargo in force on the metal.

### Bituminous Output Increases

Production of bituminous coal for the month of April, 1918, is estimated by the U. S. Geological Survey at 46,478,000 net tons, an increase of 10% over April, 1917. Production for the four months ended April, 1918, is estimated at 181,992,000 net tons, an increase of more than 5,000,000 net tons, or about 3%, over the corresponding period in 1917. During the week ended Apr. 27, 1918, the bituminous output broke the record, with 11,668,000 net tons. The average production per working day was 1,946,000 net tons, compared with 1,680,000 net tons during April, 1917. Reports show a gradual improvement in car service. Loss of production on account of car shortage throughout the country during the week ended Apr. 20 was 16.2%, and that due to labor shortage 4.8%. The demand for coal is likewise improving. During the same week, production loss due to "no market" was 1.8% for the country as a whole, against 2.8% during the preceding week.

The loss due to "no market," however, is still large in the states west of the Mississippi River, where summer production must be maintained if the consumers are to avoid a serious coal shortage next winter. In these states the mines have ample capacity to care for the consuming territory allotted them under the zone system of distribution, but they must be kept at work throughout the year to provide the necessary supply.

### "Cost Plus" Contracts Discredited

The cancellation by Charles M. Schwab of the "cost plus" contract under which the Submarine Boat Corporation, of Newark, N. J., was to build 160 5000-ton ships for the Government follows closely upon the announcement of the Government's new method of placing locomotive contracts. The "cost plus 10%" basis is apparently a thing of the past—at any rate, as far as new contracts are concerned.

In commenting upon the locomotive contracts, a correspondent of the *Evening Post* says:

"The understanding is that in the future all orders will be awarded on a fixed basis, subject to deductions. . . . In one instance it was provided that the Government assumes all responsibility for materials, while

the plant holds itself liable for labor and overhead costs. In other words, if material goes above prices prevalent at the time the deal was made, the producer is reimbursed; if there is a saving, the Government gets all of it. The distinction between this plan and the other is that all responsibility has been assumed by the manufacturer. So far as can be ascertained, the hope is to produce the business at between 5 and 10% profit. It was not the opinion in well-posted quarters that this would militate against production, the contention being that in order to get profits on a large amount of business on a small income basis the work would have to be turned out rapidly."

### Assistant Fuel Administrator Appointed

The appointment of Cyrus Garnsey, Jr., as assistant U. S. Fuel Administrator was recently announced by Dr. Harry A. Garfield. Mr. Garnsey will be in general charge of the administrative work of the Fuel Administration. He will supervise the business office of the administration, the legal matters, the fixing of operators', jobbers' and retail prices, as well as conservation and education and the work of the state administrators. Mr. Garnsey was born at Seneca Falls, N. Y., on Apr. 10, 1861. In 1899 he purchased an interest in and became the executive head of the Galloway Coal Co., of Memphis, operating mines in Alabama. At the same time he became general manager and one of the owners of the Patterson Transfer Co., in Memphis, the largest in the South. He sold out his entire interest in the coal business on Jan. 1, 1917, and at the same time retired from the active management of the transfer company, though still retaining his interest in the latter.

### Ship Welding To Be Tested

Electric welding of plates in ship construction is to be tested at the plant of the Federal Shipbuilding Co., at Newark, N. J. The experiments, under the direction of Arthur J. Mason for the Emergency Fleet Corporation, will be conducted on a section of a hull conforming in outline, dimensions and strength to the ships the Federal company is building. The system to be followed is, briefly, to assemble the plates of the hull rapidly by spot-welding them in place and then to finish the seams by arc welding. The spot welds will be made at 10-in. intervals. The appliances necessary for the spot welding are being made by the Universal Electric Welding Co., of New York, and arc welding will be done by the Wilson Welder and Metals Co., Inc., also of New York. Through the spot welding, the ship will quickly take form sufficient to furnish protection against the weather, both by day and night; by arc welding, the seams will be strengthened and rendered water-tight.

A 10,000-ton ship costing \$2,000,000 now costs but \$70,000 to rivet. The chief advantages to be derived from electric welding, therefore, are rather in doing away with or diminishing the work of the template makers and markers, the punching and much of the fitting and bolting done on the ways. The journey from rolling mill to fabricating plant, when at a distance, will also be eliminated. Altogether, it is estimated that

a saving can be effected of a month's time in construction and of about \$40 a ton in the cost of the structure, which means at least \$100,000 on a 10,000-ton vessel.

Only three-quarters of the structure will be welded, it being planned to rivet the remaining quarter so as to afford comparison in the strength tests to which the hull will be subjected. These will include filling the hull with water and shifting the points of supports as well as bumping with rams and other forms of abuse.

### War Industries Board Section on Chemicals and Explosives

The activities and personnel of the chemical and explosives section of the War Industries Board are as follows: Matters pertaining to manganese, chrome, tungsten and ferroalloys are handled by H. W. Sanford; explosives by Leland L. Summers; sulphur, pyrites and alcohol, by William G. Woolfolk; inorganic chemicals, metals and non-metals, electrolysis, electrometallurgy, electric furnace, ceramics and refractories, organic compounds and dyestuffs, by a consulting staff composed of Dr. H. M. Moody, Dr. Samuel A. Tucker and Dr. E. R. Weidlein; glass, chemical carboys and stoneware, by Robert M. Torrence; coal, gas products such as benzol, toluol, etc., nitrogen, oxygen, and rare gases such as argon, helium, etc., by J. M. Morehead; nitrates by Charles H. MacDowell; fine chemicals, including medicinal, analytical and photographic, by A. G. Rosengarten; pigments and paints, by R. S. Hubbard; mica, by J. H. Adams; acids and heavy chemicals, by Albert Brunner, A. E. Wells and R. S. Hubbard; alkalies and chlorine, by H. G. Carrell; wood distillation products, platinum and platinum metals, commandeering and requisitioning, by C. H. Conner; toluol distributions, creosote, by I. C. Darling; tanning materials, greases, tallows, vegetable oils and waxes, by E. J. Haley. Leland L. Summers is chief of the explosives section and Charles H. MacDowell chief of the chemical section.

### Germany Seeks Caucasus Manganese

"In the German metallurgical industry, the cession of the Caucasian districts, Batum, Ardahan, and Kars, to Turkey is considered as a great stroke for Germany's economic future," says the Zurich correspondent of the *Evening Post*, "because of the manganese deposits existing in this region. The German metallurgical industry, having had during the war no possibility of importing this metal from overseas, could get only small quantities from some Hungarian mines. The price of manganese iron became, therefore, especially high. The German politically influential iron manufacturers declare that it is far more urgent to assist Turkey to reconquer the district of Batum than Bagdad and Jerusalem, places which have only a sentimental value.

"It is further remarkable that some Austrian personages in close touch with Turkish circles declare that nobody in Constantinople knew even one day before the settlement of this peace that Turkey had asked for this Batum district. The national war aims of Turkey were discovered in the laboratories of the German steel



trusts at Essen. Since the Batum district became industrialized, about 30 years ago, the Mohammedan population has become a small minority."

### Higher Wages for Railroad Workers

A recommendation has been made by the Railroad Wage Commission to the Director General of Railroads, William G. McAdoo, that approximately \$300,000,000 be added to the annual payroll of the roads under Government control. The increases, affecting more than 2,000,000 persons, will be effective as of Jan. 1, 1918, if approved. They are figured on a sliding scale of from 4.56% to 43% of the wages received by employees on Dec. 31, 1915. The increase will be added to the employee's wage at that time. Increases granted since Dec. 31, 1915, are to be included as part of the increases now granted. The largest increases go to those who receive the lowest wages, and on this theory all of the findings of the commission are based. It is expected that the commission's report will be adopted with alterations. Secretary Franklin K. Lane is chairman of the commission.

### Will Restrict Coal to Canada

Plans for restricting the movement of anthracite from the United States to Canada during the present coal year have been formulated by the U. S. Fuel Administration in coöperation with the fuel controller of Canada. A representative of Fuel Administrator Garfield attended a recent conference of representatives of coal operators, coal miners and railways in Canada, at which this problem was discussed.

An agreement was reached embracing the following points:

Anthracite supplies to points in Western Canada will be materially restricted during the present coal year; no American anthracite will be available for shipment to points west of Winnipeg; the Canadian public, both east and west, must be given to understand distinctly that conservation of coal must be practiced to the utmost extent by all classes of consumers.

### Anglo-American Riveting Contest Open to All

The start of an international riveting contest between American and British shipyards was announced on May 8, when the news was received from London that a gang there had driven 4267 rivets in nine hours. It developed that Lord Northcliffe recently cabled the U. S. Shipping Board asking for the records of American rivet gangs and details of their work to stimulate rivalry.

The American record set by "Finner" Schock, which the British set out to beat, had already been surpassed several times on this side of the water before word of the amazing British achievement was received. Edward Gibson and his gang at the plant of the Federal Shipbuilding Co., in Kearney, N. J., drove 2919  $\frac{3}{4}$ -in. button-head rivets in a ship's floor in eight hours, and John Corrigan, assisted by three men, drove 3415  $\frac{3}{4}$ -in.

rivets in a plate floor on skids in nine hours at the plant of the Detroit Shipbuilding Co., in Wyandotte, Mich. William Hartz, of the Calumet River plant of the Chicago Shipbuilding Co., drove 3055 rivets in nine hours.

The British record was made by Robert Farrant, of Fraser & Fraser's plant, in London. Farrant averaged slightly less than 475 rivets an hour, or one every 7 $\frac{1}{2}$  seconds. From now on the contest is expected to be keen. The title must be regained and kept on this side of the Atlantic.

### Giant Ordnance Plant for Interior

A huge ordnance plant will be built, equipped and operated at the expense of the Government by the United States Steel Corporation without profit, it has been announced by Judge Elbert H. Gary, chairman of the corporation.

"At the solicitation of the Secretary of War," said Judge Gary, "the United States Steel Corporation has undertaken to construct and equip for and at the expense of the Government, upon a site in the interior of the country, a plant for the manufacture of cannon and projectiles of large sizes and in great quantities, and to operate the same when finished.

"At best, the time required will extend over a considerable period, and the cost will be large, but the work will progress with all practicable speed, and economy in the use of money will be practiced. It is hoped and expected the results will be creditable to the country.

"The work will be in the immediate charge of a committee consisting of a vice president and the controller of the corporation, and eight others designated from the officers (presidents or vice presidents) of the various manufacturing subsidiary companies, and all selected because of their education, experience, and peculiar fitness."

### Almost Quarter Million Tons of Ships Launched in April

The records of the Bureau of Navigation show that over 240,000 tons deadweight in shipping was turned out in American shipyards in April, or an increase of approximately 50% over the March launchings. In the week ended Apr. 29 they launched 41,105 tons, making a total of 1,405,000 tons since the building program got under way. Nearly 50,000 tons of completed ships were delivered during the week. Three steel ships aggregating 18,305 tons and one wooden ship of 3500 tons were launched in one day. One of the four wooden ships put into the water during the week, the "Caponka," of 3500 tons, was launched by the Grant, Smith Porter Co., Portland, Ore., in 50 days from the time the keel was laid, the shortest time ever recorded for launching a wooden hull of that size.

Gold Mining Activities are not to be curtailed. The maintenance of the nation's gold output has such an important bearing on finance that no serious consideration has been given proposals from some quarters that gold mining activities be reduced.

## Industrial News from Washington

BY PAUL WOOTON, SPECIAL CORRESPONDENT

### Minerals Control Before Senate Mines Committee

"The undertaking proposed by this bill is one of the most monumental things that has been brought to my attention. Intricacies and important questions bristle in this measure. The amount of money that will be required is stupendous. If we can devise some economic scheme which will take care of the situation, I should like to see it done."

This expression from Senator Jones, of New Mexico, before the Senate Committee on Mines and Mining puts into words a thought which evidently is in the mind of each of the members of the committee considering the Minerals Control bill.

That the sulphuric-acid plants of the United States will be making acid at the rate of 9,000,000 tons annually before the end of the year was revealed when Arthur E. Wells testified before the committee. Mr. Wells was formerly in charge of the Salt Lake City station of the U. S. Bureau of Mines, but is now stationed in Washington, where he is advising the War Industries Board on matters pertaining to sulphuric acid. He told the committee that the country is at present making acid at the rate of 8,000,000 tons per annum.

Despite the remarkable acceleration of manufacture, the output of sulphuric acid is not yet adequate to the country's needs, Mr. Wells said. As an expansion in the explosives program is probable, he said it would be necessary to take some acid away from other industries.

To continue to draw at the present rate on the sulphur deposits of Louisiana and Texas will be dangerous, in the opinion of Mr. Wells. He regards the extent of the sulphur reserve as uncertain, and declared that the fact that acid manufacturers can secure brimstone readily is having a depressing effect on the development of the domestic pyrites industry. It is Mr. Wells' idea that sulphur production should be brought into a pooling system from which supplies could be allocated to the acid manufacturers.

The War Department is working on a plan which will induce the zinc smelters in the Mississippi Valley to operate at maximum capacity—another interesting point brought out by Mr. Wells, who also told of unsuccessful efforts to secure the establishment of explosives works at western smelteries, where abundant acid will be available.

During Mr. Wells' testimony, Mr. Macbeth, who represents to a considerable extent the mining industry in Idaho and adjacent territory, inquired why the Government should secure acid for wealthy manufacturers of explosives and fertilizers. "Why," he inquired, "get manganese for steel makers? They manage to secure the many other substances that they need unassisted by the Government."

During the hearings, there was a tendency to accept as final the orders issued by the Shipping Board deal-

ing with the removal of ships from specified trades. Senator Jones pointed out that it may develop that some of these ships may be replaced in commercial service when it is shown that we can better afford to use them than to add to the difficulties of the railway situation.

The Government should be empowered to control prices, to distribute the materials produced to essential users and to control the retailer, it was stated by Charles W. Merrill, who is in charge of the chemical division of the Food Administration. It is necessary, he said, to control prices and to stimulate production of essential minerals, as well as to prevent exorbitant profits on the part of those who might be inclined to take advantage of abnormal conditions.

Mr. Merrill spoke largely with regard to arsenic, which he admitted will not be affected materially by the Minerals Control bill, inasmuch as ample authority is given in the Lever act to control the arsenic situation. He pointed out that the production of arsenic was 20% greater for the first quarter of the current year than it was during the corresponding period of 1917, despite the fact that the price has been reduced from 16 to 9c. per lb. Even with this increase, production is only keeping pace with consumption, which Mr. Merrill regards as unsatisfactory, as demand may increase suddenly. Such a contingency as an insect plague or the determination to use greater quantities in poison gas would increase the demand considerably above production. He also stated that the Government's investigation had developed that the cost of producing arsenic was from 5 to 6c. a pound.

L. A. Friedman, a mining man from Lovelock, Nev., told the committee that the fixing of a high maximum price for tungsten would probably result disadvantageously to operators who are working on a permanent basis. A very high price, he believes, would be likely to bring a large supply of tungsten into the market quickly, with the result that overproduction would take place, to the detriment of those who are in a position to produce practically all the tungsten needed at current prices. Mr. Friedman is opposed to the licensing system.

Arthur B. Carnahan, a metallurgist and vice president of the American Rolling Mills Co., of Middletown, Ohio, told the committee that steel makers can change their practice so as to get along nearly as well with 65% ferromanganese as with higher grade. Mr. Carnahan believes that Government control is necessary and that it should include the power to invoke both minimum and maximum prices.

Senator Shafroth, of Colorado, expressed himself as being heartily in favor of minimum-price fixing. A. G. White, the economist for the Bureau of Mines, declared that he wants to see the consumer protected from a runaway market by a maximum price. An interesting point developed at the hearing is that manganese stocks in this country are now at the lowest point in the history of the steel-making industry.



## Tin Needed in Silk Manufacture

In view of the investigation which has been made by the War Industries Board to ascertain where it is possible to conserve the use of tin, the opinion of C. L. Auger, president of the National Silk Buying Co., of Paterson, N. J., is of interest. Mr. Auger's testimony, however, is that taken by the Tariff Commission, and is as follows:

If the Government, in order to conserve tin, should cut off our supply of this material, the action would interfere largely with the manufacture of popular-priced silks, and many operatives who now earn their livelihood in the silk business would be thrown out of employment. Then, too, if the manufacture of popular-priced silks is curtailed, it will increase the demand for other textiles, such as wool and wool mixes for dress goods, of which there is a growing scarcity.

Tin in the form of tetrachloride of tin and in conjunction with tannin is used for weighting silks; there is no commercial substitute. There is a mistaken idea that tin-weighting injures the fabric, but this is not the case. If weighting is done carefully, as at the present day, and the limit of the weighting is kept down to the extent that our domestic manufacturers keep it down, weighting has practically no effect on the strength of the fiber.

It is also a mistaken idea that the American silk dyers are large users of tin. As compared to the consumption of tin in the United States, the consumption of tin in the silk-dyeing industry represents a small percentage, and of this small percentage less than one-half actually remains in the fiber. The greater part of the balance is recovered from the wash water and converted into metallic tin.

The American silk-dyeing industry requires from 500 to 600 drums, weighing 900 to 1000 pounds each, of tetrachloride of tin monthly. This is in liquid form and tin constitutes 45.4% of the weight of the solution. The total amount of metallic tin used yearly may be figured as about 1500 tons gross, but much of this is washed off between the repeated immersions in the tetrachloride to which the silk is subjected. Nearly one-half is so washed off, the greater part of which is recovered and resold, so that the total requirements of the silk-dyeing industry, based on liberal figures, would not exceed 900 to 1000 tons net of metallic tin per annum. We understand that the United States requires about 70,000 tons of tin per year, so that it is evident that we require but a small per cent. of this total.

Then, too, it must be borne in mind that the tin that we use is recovered from scrap tin, part of this being waste made in the manufacture of tin plate and part consisting of used tin cans. Tin plate consists of iron sheets covered with tin, so that in detinning there is obtained only a small proportion of tin, by weight. From 2240 pounds of tin-plate scrap the detinning companies recovered formerly from 60 to 70 lb. of metallic tin, but from the tin-plate scrap made to-day the yield is not more than 40 to 45 lb. The tin recovered from used tin cans is 29 to 30 lb. of metallic tin per 2240 lb. of such cans.

## War Board Rations Rubber Imports

Unusual importance is attached to the War Trade Board's announcement on May 9 regarding the restrictions placed upon the importation of crude rubber. The policy outlined in that ruling doubtless will apply to many other imports, including many minerals. That part of the board's statement which embodies the policy laid down is as follows:

The restriction will be given a practical test during the next three months to determine the adequacy of the ration decided upon. After a three months' trial of the ration, the experts of the board expect to be in position to say whether the imports allowed will suffice for the indispensable needs of the rubber industry and to make the necessary adjustments should the amount fixed upon, after consultation with representatives of the trade, prove too large or too small. Unjustified hardship to the industry and to the consumer will thereby be avoided as far as possible, particularly in view of the fact that the stocks in this country at present are fairly large.

It is of course impossible to cut down the amounts of rubber needed for use in military contracts for this and the associated governments, so that the restriction will fall chiefly upon producers of articles not destined for military use.

Estimates of the amounts of rubber required upon such contracts lead the experts of the board to believe that the available supplies of crude rubber from imports during the current quarter will permit an allocation to each manufacturer on the basis of approximately seven-sixteenths of his consumption of rubber during the calendar year 1917.

In justice to manufacturers and to prevent attempts to corner the available supply, measures for an equitable distribution of the smaller quantities of crude rubber imported among the manufacturers in proportion to their regular needs were deemed necessary by the board. In arranging this allocation the board has had recourse to the good offices of the Rubber Association of America.

## Brunton Heads Inventions Board

D. W. Brunton, known nationally in mining and technical circles, has been selected to head the advisory board which has been created as a part of the new inventions section of the general staff corps of the War Department. Mr. Brunton also is the chairman of the War Committee of Technical Societies. The advisory board eventually is to consist of from 12 to 15 members, so as to include men having technical knowledge of the various problems involved in war inventions. In addition, arrangements have been made whereby the board will receive direct assistance from organizations and institutions best qualified to pass upon inventions of a mechanical, electrical or chemical nature.

The advisory committee, in addition to Mr. Brunton, at present includes the following: Dr. Graham Edgar, National Research Council; Col. James W. Furlow, motors division, War Department; Col. J. A. Hornsby, Surgeon General's office; Lieut.-Col. Morgan L. Brett, engineering branch, Bureau of Ordnance; Lieut.-Col. Robert A. Millikan, science and research division, Signal Corps; Lieut.-Col. N. H. Slaughter, radio section, Signal Corps; Maj. Joseph A. Mauborgne, electrical engineering section, Signal Corps. Other members of the board will be named later.

## Relief in Sight for Tin Situation

Advices have reached officials in Washington that a large tonnage of tin destined to the United States is now afloat. Other shipments are expected to follow soon, furnishing a measure of relief in the tin situation. A desirable combination is thought to have been effected in the concern which is to operate the new Long Island tin smeltery. The Williams-Harvey Co. has demonstrated its competence in smeltery operation; Simon Patino controls the necessary production, while the National Lead Co. is in a position to utilize the smeltery's output.

A commission to look into safety matters and to make recommendations for medals and other awards has been named by the Joseph A. Holmes Safety Association. The committee consists of J. W. Paul, representing state mine inspectors; William Green, representing the United Mine Workers, and J. D. Cannon, representing the Western Federation of Miners.

Remember the Comfort Fund of the 27th Engineers.

## Smoke Rises—Also the Comfort Fund

When your effort goes up in smoke, you can smile, for it was just what you wanted, perhaps, when you sent that check to the Comfort Fund. The smoke screen will baffle the foe that attacks the morale of the men. Though tobacco is only one of the comforts that the fund provides for the 27th Engineers, it is one of the most important. Abroad it is treated as a necessity; tobacco cards have even been issued to the French—to the women as well as the men in fact—so that the supply may be equally distributed. It is up to you, Mr. Mining Man, to look out for the men in the mining regiment; to see that each one gets his fair share of all the comfort and fun there is to be had. If you have not already contributed, send in your check today.

The officers of the regiment write that they all take a great interest in following the subscriptions to the Comfort Fund from week to week, and feel a great pride in the support that so many of their mining friends are giving to them and their regiment.

Recently we shipped to Camp Meade, for B and C companies, cases containing 121 sweaters, 249 pairs of socks, 68 wristlets, and 72 helmets. The wool for this was furnished out of the fund, but the ladies of the Woman's Auxiliary of the American Institute of Mining Engineers, under the direction of Mrs. H. N. Spicer, chairman, did the work. Also, they are keeping at it. The officers of the regiment express their high appreciation of what the ladies are doing in behalf of the men. The fund stands as follows:

Engineering and Mining Journal.....	\$1000.00
New York Engineering Co.....	1000.00
A Friend, Nov. 23.....	5.00
H. H.....	5.00
D. E. Charlton.....	5.00
H. W. Hardinge.....	1000.00
Frank N. Spencer.....	5.00
W. L. Coursen.....	5.00
J. H. Polhemus.....	5.00
J. H. Janeway.....	10.00
Albert D. Beers.....	10.00
J. E. Hayes.....	10.00
J. A. Van Mater.....	25.00
L. Vogelstein & Co.....	100.00
"Cuprite".....	10.00
R. H. Bassett (Hanna Ore Mining Co.).....	10.00
A Friend, Dec. 10.....	10.00
P. A. Mosman.....	10.00
American Zinc, Lead and Smelting Co.....	100.00
J. G. H.....	5.00
Daniel Guggenheim.....	100.00
A. H. H.....	5.00
Willard S. Morse.....	25.00
August Heckscher.....	100.00
Anaconda Copper Mining Co.....	1000.00
F. W. Bradley.....	100.00
Charles Le Vasseur.....	5.00
A Friend, Dec. 13.....	50.00
Freeland Jewett.....	10.00
Herman A. Wagner.....	5.00
Francis P. Sinn.....	10.00
R. C. Gosrow.....	5.00
D. C. Jackling.....	100.00
"V".....	10.00
J. H. Brickenstein.....	5.00
E. E. Northrup.....	5.00
Rogers, Mayer & Ball.....	50.00
Denver Technical Staff, American Metal Co., Ltd.....	30.00
A Friend, Jan. 9.....	100.00
E. B. Coolidge.....	10.00
J. V. N. Dorr.....	200.00
Pope Yeatman.....	50.00
W. H. Aldridge.....	50.00
C. E. Hart.....	5.00
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
J. 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
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F. R. Foraker.....	25.00
Charles A. Chase.....	25.00
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Calumet & Hecla Mining Co.....	250.00
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Engineers' Club of Northern Minnesota.....	85.00
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Frank R. Edwards.....	5.00
C. H. Munro.....	100.00
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J. L. Bruce.....	15.00
D. Ford McCormick.....	10.00
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P. G. Spilsbury.....	10.00
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United States Smelting, Refining and Mining Co.....	250.00
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Lane Pearl.....	5.00
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Pick and Shovel Club, Mining Department, Case School of Applied Science.....	11.00
L. S. Cates.....	25.00
J. M. Platt.....	25.00
A. L. Walker.....	5.00
C. G. Rothschild.....	10.00
General Engineering Co.....	25.00
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Iowa Gold Mining and Milling Co.....	50.00
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G. C. Townsend.....	10.00
H. S. Monroe.....	10.00
Jesse Scobey.....	10.00
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William Young Westervelt.....	50.00
B. Britton Gottsberger.....	50.00
Oscar Lachmund (second contribution).....	10.00
L. R. Budrow.....	10.00
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C. F. Kelley.....	50.00
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Staff of the Mogollon Mines Co., Mogollon, N. M.....	
Thomas H. Leitch.....	5.00
C. S. Phillips.....	5.00
Allan H. Moulton.....	5.00
C. A. Botsford.....	5.00
S. J. Kidder.....	10.00
W. E. Lipsey.....	5.00
W. Fitch.....	50.00
Chief Consolidated Mining Co.....	100.90
-Total.....	\$13,664.00

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

## Mineral and Metal Output of Sweden

The official reports of Swedish mineral production show the following, in metric tons:

	1914	1915	1916
Iron ore.....	6,586,630	6,883,308	6,986,298
Coal.....	366,639	412,261	414,825
Gold ore.....	639	221	230
Silver-lead ore.....	3,100	2,671	3,707
Molybdenite.....	7	37	3
Copper ore.....	8,839	10,549	13,895
Manganese ore.....	3,643	7,607	8,894
Zinc ore.....	42,279	55,937	60,700
Nickel ore.....	156	1,642	3,561
Pyrite.....	33,313	76,324	97,848
Feldspar.....	20,818	12,105	12,724
Quartz.....	36,128	33,818	59,599
Graphite.....	56	87	194
Powdered pyrolusite.....	81	126	154

Metals other than iron produced in 1916 were as follows: Gold, 18 kg.; silver, 1180 kg.; lead, 2076 metric tons; copper, 3181 metric tons; zinc, 9997 metric tons.

The year 1916 was a good year, as far as the economic situation in Sweden's mineral industry is concerned. The various products were subject to frequent and considerable increases in price. The demand could not begin to be met by the insufficient supply, caused chiefly by the lack of men, in spite of the much higher wages paid, and a decrease in the importation of raw materials and fuel. The production of iron alloys greatly increased because of the war. The largest establishment making alloys of this type, the foundries at Vargön, have in operation a melting furnace which is considered to be the largest now running. The number of furnaces for the production of electric steel in 1916 was 17, as compared with 10 in 1915. Production of zinc by the electric method at Trollhättan rose according to the report, from 8,588,384 kg. in 1915 to 9,997,090 kg. in 1916.

## Improving Industrial Lighting

"Laco-dalite" is the trade name of a new article for improving industrial lighting that has just been placed upon the market by the Laco-Philips Co., 131 Hudson St., New York. It consists simply of a special blue glass screen that is clamped over the bottom of the electric light reflector, thus inclosing the bulb. The light thus filtered through the special blue glass, it is claimed by the manufacturers, is equal to that obtained from the nitrogen lamp. It is said to be white and pure and the equivalent of daylight. The question of proper lighting is important in concentrators, especially for table work at night. Both here and in the drawing room, as well as in other places, a device of this sort might be worth a trial.

## April Pig-Iron Production

Pig-iron production in April was 3,288,211 gross tons, as compared with 3,213,091 tons in March, according to *Iron Age*. The daily rate was 109,607 tons, as against 103,648 tons respectively, or a gain of 5959 tons daily, and an advance of 5.75% over the rate of output for March. The estimated capacity of 113,460 tons daily from furnaces in blast May 1 indicates a further increase in the rate of production during the current month. Only four furnaces were blown out in April, while 14 were added to the active list. The production of ferromanganese and spiegel-eisen in April was 35,511 gross tons. While this total was surpassed in March and in several months in 1917, the ferromanganese produced, 27,789 tons, was the largest ever recorded for any month. Moreover, the proportion of ferromanganese to spiegeleisen also establishes a record.

## Slime Dam Construction in South Africa

Slime dam walls, according to a paper presented before the Chemical, Metallurgical and Mining Society of South Africa, by J. E. Thomas and E. A. Osterloh, are built of thickened slime carrying from 1.5 to 2% fine sand and a moisture ratio of 1:1. The dams have a circumference of 6000 to 7000 yd., and can be built fast enough to receive the tailings from a 50,000 ton per month plant. Construction is started by digging a peripheral trench 3 ft. wide and 1.5 ft. deep. The pulp discharges at the near end of the trench and fills the entire circumference by sections. This slime, when partly dried and plastic, is dug out and packed so as to form a channel 21 ft. wide with the outer side wall at the edge of the trench.

When the slime dam is 2 ft. high, L shaped launder conduits or spillways are placed at intervals in the wall to drain the overflow water from the interior. These launders are built of 2-in. plank, 2 ft. 6 in. wide by 11.5 in. high inside. The vertical part of the L is in the interior of the pond and is built up with the slime level by means of slats 1.5 x 2 in. in section dropped into guides. The guides are supported at intervals of 12 in. by horizontal stuts nailed inside the launder. The pulp can flow from any part of the surrounding dam channel to the interior of the pond.

The best control is obtained by allowing the flow to travel along one channel to the furthest diametrically opposite side of the pond and there enter to the interior through the inner wall of the channel by means of short lengths of inserted pipe. As the wall channel fills, the interior discharge moves circumferentially, and the plastic pulp is dug out and packed on the outer and inner edges of the wall to form a new channel. The walls are battered or stepped back about six inches in every two feet of rise, and eventually make an angle of 50° with the horizontal.

Existence of Phosphate Deposits in Kentucky is indicated by the examination of samples from more than 100 drill holes sunk in the central areas of that state. The presence of high-grade phosphate rock, as well as a great deal of low and intermediate grade phosphate, is considered by the U. S. Geological Survey to be definitely established.

## Editorials

### The Mines Administration Bill

THE Mines Administration bill passed the House minus its maximum price-fixing provisions and with a reduction from 50 million to 10 million dollars in its appropriation. It is now before the Senate's Committee on Mines and Mining, which is giving very careful consideration to it. In what form it will leave that committee and what will be its fate on the floor of the Senate no one yet can say. There is sure to be earnest and perhaps prolonged discussion of its principles, which are of more deep-rooted economic importance than are those of the ordinary legislative bill.

It is unfortunate that the mines bill was drafted on the basis of the Lever bill, disregarding the inherent differences in conditions of articles that are of only seasonal production, like foodstuffs, and those which are of continuous production, like most minerals. This introduced a good deal of language that is irritating, unnecessary, and capable of constructions not originally intended. Furthermore, the bill, as it stands now, contains provisions that are manifestly impracticable.

However, attention should be directed especially to the principles. To the basic idea, viz. that of stimulating mineral production, we must bow. No matter whether we think that the proponents of the bill are mistaken in their premises, no matter whether we think that natural factors, if let alone, will stimulate the production of necessary minerals more swiftly and more surely than is possible in any other way, the Administration is charged with the duty of carrying on the war, and we are bound to provide it with the means it wants. But it does not follow from this that we should neglect to criticize proposals that are likely to defeat the purpose itself or create evils worse than those that it is sought to correct.

We are of the opinion that the maximum price-fixing provisions ought to remain out of the bill as the House has already taken them out. Maximum price-fixing tends to curtail and strangle production. It always has done so and always it will do so.

The provisions for minimum price-fixing ought also to be eliminated. Guaranteed minima, if sufficiently high, will stimulate production, to be sure, but they will open the door to the most profligate profiteering ever known, and sooner or later they will ruin the industries that are artificially fostered.

The licensing and regulatory features of the bill ought also to be excised. They may easily be made equivalent to maximum price-fixing, and otherwise they will be hampering to our industries rather than helpful.

We have recommended for more than a year the creation of a minerals and metals board, or supervision, or whatever it might be pleased to call it, considering that such a board would be highly useful, but our conception of its functions has been that they should be those of the experienced consulting engineer, not those of the

policeman. The Anaconda company, building a ferromanganese plant in a hurry, was helped by the Government in promptly securing its electrodes. The lead producers have upon occasions thanked the Government for aid in moving their product. The copper producers would like the assistance of somebody in getting prompt payment from the Government.

Many things like these, and others of broad scope, could usefully be done by a central body in Washington. But when we ascertain that it is contemplated that a mines administration shall dictate to manufacturers how they shall do their manufacturing, we experience feelings of alarm. When the most experienced of crucible manufacturers says that it cannot successfully make crucibles out of Alabama graphite, after investing much of its own money in the effort, and Governmental bureaus say that it can, we are disposed to give the more weight to the experienced manufacturer. Dictation to him would mean fewer crucibles, we think, just as when London undertook to make plans for the British shipbuilders the result was fewer ships. Alas! that at this late day officialdom has not learned this lesson, and even while we are mourning over our aircraft fiasco.

The right kind of a minerals and metals board can be created within the War Industries Board. Under the terms of the Overman bill, that will soon become a law, all scattered and conflicting interests in minerals and metals can be centralized and coordinated by Presidential order. No additional legislation is needed for that. All other necessary purposes can best be done by the creation of a War Minerals Corporation on the lines of the War Finance Corporation, with an appropriation, with the right to buy and sell minerals and metals, and with the right to take over and operate idle mines (if there be any such). This would be the simple, businesslike method, which would not only be the more effective in practice, but also would avoid the economic controversies that are likely to delay, if not prevent, action by the Senate. But if a bill on the present lines is to be forced, certainly it should be made clear that it is not to apply to mines and metallurgical works of copper, lead, zinc, etc., in which the substances mentioned in the bill are produced as byproducts or as subsidiary products, and, furthermore, there should be a careful scrutiny for provisions that are unworkable.

### Changes in Economic Policy

FOLLOWING the advent of Mr. Schwab as shipbuilder, there has been a change in the contract system for building ships. The cost-plus-10% system has been thrown overboard and the old-fashioned method of a flat price, with bonuses and penalties, has been substituted. Washington says gravely that the cost-plus-10% method offered no incentive to speed and promoted wastefulness. How simple and self-evident this sounds! It does not matter that experienced men have been



preaching this to deaf ears for a year. That Washington has finally seen the light is the important thing.

The War Industries Board has also been doing some different things in price-fixing, or rather has been avoiding price-fixing. With respect to some metals, it has lately made arrangements with the producers for Governmental supply at rates below the market, but has kept its hands off the market in general. Economically this is similar in its effects to the method of purchasing copper adopted by the Allies in 1916. It is not "price-fixing" and does not introduce the evils of "price-fixing." While it may create the condition of an unbalanced market and lead to an unduly high price for the supply of the commodity that is not ear-marked, that very thing automatically cuts out non-essential consumption and stimulates production, thereby bringing about the natural correctives.

Washington has been rather alarmed about the recent crisis in the zinc industry, which has put much smelting capacity out of use, lest zinc production might fall below the rate of what might be required in an emergency. Its eyes have been closed to the difficulties of the smaller producers of lead and copper. It may be that ere long somebody will awake proudly to the idea that for assistance in winning the war it will be a good thing to have all the copper and lead and coal that it is possible to get, and that the best way to accomplish that will be to abolish restrictive maximum prices.

We do not mean to convey the impression that the ideas about price-fixing have yet vanished. On the contrary, a lot of officials, major and minor, are doing such things on their own hook, or are meditating such actions. This seems to be a sort of mania among them, a manner of brandishing a big stick and exhibiting their ephemeral authority. Last week there was a rumor in the market that somebody was going to fix a maximum price of \$1.25 per unit for metallurgical manganese ore of 48% grade, that being then the market and an advance being expected this month. In view of the situation in manganese, any such action would be sheer lunacy. There are some officials in Washington who are dangerous to the welfare of the country. However, in some quarters there are distinct signs of a return of economic sanity.

### Platinum, Palladium and Iridium

THE War Industries Board has this week announced the commandeering of platinum, palladium and iridium and the fixing of prices at \$105, \$135 and \$175 per oz., respectively. The price for platinum had been fixed, several weeks ago, at \$105, which was then the market price. Palladium was last week quoted at \$150@155, so the price for this is scaled down. It is produced only by the copper refiners as a byproduct, and they are, of course, fair subjects for cheese-paring. However, the business is so small that it does not matter much. Our last quotation for iridium was \$150, but the metal was very scarce, and the price was given but nominally; wherefore it is not surprising to see it raised to \$175 by the Government. It is not an article of big-company production. The price of \$105 for platinum and \$175 for iridium ought to maintain Colombian production. It ought even to bring hither some Russian platinum, unless we let the Germans bid it

away from us. Speaking of this, they may even buy Colombian platinum against us. There have been rumors that in fact they have been busy in that way already. It would be a good idea for the gentleman of the War Industries Board who is encharged with platinum to reflect about this and be ready to act, and not wait until it is too late. Considerations of price ought not to stand in the way. We feel that in spite of warnings the platinum business has been pretty much bungled in Washington.

### Metallography or Mineralography

THE study of polished sections of ores by metallographic methods, that is by reflected light, has recently received much attention from economic geologists, and the technique of this branch of microscopic work is being steadily improved. The polishing methods of the metallographers have been abandoned for others better suited to the mixture of hard and soft minerals found in ores. For the final polish chromic oxide and alumina have been substituted largely for the old "rouge." The modern methods result in perfectly even faces, from which the light reflects details not obtainable in other ways.

However, the students of ores are not quite satisfied with the present nomenclature. They object to the term "metallography" and wish to substitute "mineralography." One audacious spirit proposes "mineragraphy."

An interesting phase is the recognition of the property of many silver minerals to be affected by strong light. This has already become an important diagnostic feature. Much attention is also given to the photographic record of the effects observed. Excellent results have even been obtained with direct linear magnification of 3000. The contrasts are brought out by color screens of various kinds.

"Mineralography" certainly has arrived, and no investigator of complex ores, both for scientific purposes or for studies of concentration or smelting, can afford to neglect its powerful assistance.

### The Flotation Patents

THE decision of the Court of Appeals in San Francisco in the case of Minerals Separation vs. Butte & Superior, reversing Judge Bourquin's decision at Butte, is a serious blow to the pretensions of the plaintiff. We must defer extended comment upon this until the full text is received. This was the case in which Butte & Superior, bowing to the decision of the Supreme Court as to the limitation of the patents to the use of less than 1% of oil, altered its process so as to use more than 1%; whereupon Minerals Separation claimed that to be merely an evasion, alleging that the excess of oil played no useful part, and was upheld in that contention by Judge Bourquin.

According to the telegraphed reports, the San Francisco court has construed the decision of the Supreme Court so as to limit the Minerals Separation patents to not more than 0.5% of oil. If this be reported correctly, it will make the flotation process more free in the matter of oil admixture, besides which the matter of the Callow process remains open, at least so far.

It is probable that the San Francisco decision will be taken on appeal to the Supreme Court, which can hardly refuse to pass upon it, in view of the way its own previous decision has become a matter of controversy. Thus this interminable litigation goes on. It is too bad that it has been impossible to find a basis for amicable settlement, but the thing has now gone so far that nothing but a final decision by the highest court will be satisfactory to all parties.

### Railway Wages

THE report of the Railway Wage Commission, recommending an advance of about \$300,000,000 in the wages of railway operators, is a conservative and well-considered study. The proposed advance is not from the existing scale, but rather is it based on the rates prevailing at the beginning of 1916. Since then there have been numerous raises, with the result that certain classes of operatives are now getting all that it is deemed they should get. To them will not be given any more, but, on the other hand, if they have got already more than they should, there is not to be any reduction. The theory of the commission is to adjust wages according to the increase in the cost of living. That increase is indicated as having been about 40%, which agrees with the figures that we cited and deduced in a previous article on this subject.

### Let Nearing Guess Again

SCOTT NEARING, one of the most blatant and one of the most conspicuously ill-informed of our socialists, entered into a public debate with Prof. William B. Guthrie, upon the question whether the so-called capitalistic system of political economy has outdone its usefulness. Professor Nearing, while admitting that capitalism has benefited the country in the past, asserted that its usefulness is at an end. He asserted, moreover, that if incomes were equalized all over the United States there would be enough for every workingman in the country to have \$60 a week.

Let us see about this. The gross income of the American people in 1917 is variously estimated at 40 to 50 billions of dollars; that is, something like that was the total business turnover. According to the U. S. Department of Labor, the total number of workers was about 40,000,000. Let us convert Professor Nearing's \$60 per week to \$3000 per year. We will disregard the odd hundred. To give every worker \$3000 per year the total income would have to be \$120,000,000,000, whereas in fact it was only about one-third of that amount in 1917 and much less in previous years. A thorough investigation of the earnings of railway employees, which showed that they, about 2,000,000 in number, earned an average of nearly \$1000 each in 1917, looks more in conformity with actual conditions than does the conjecture that everybody ought to get \$3000.

The illustration in our issue of Apr. 20, 1918, carrying the caption "Chalmers and Williams Ball-Mills at the Hercules Mill, Idaho," is in error. The caption should have read "Power and Mining Machinery's Ball-Mills at the Hercules Mill, Idaho."

### BY THE WAY

This is an authentic story of an incident that occurred recently: A party of mining and metallurgical students from one of the Western universities made its periodical visit to a neighboring lead smeltery under the instruction of the smelter superintendent. The class as a whole seemed mildly bored. The students were seniors, had delved deeply into the art of smelting and were thoroughly conversant with all modern methods and the latest practices. Therefore the trip was merely sending coals to Newcastle. A number of the students displayed a desultory interest in the proceedings; others matched nickels and indulged in horseplay; one or two asked an occasional question and jotted down the answer in notebook. But there was one member of the party who, though somewhat backward, paid a great deal of attention to what was being said. He asked intelligent questions, and understood the plant methods and the explanatory talk. Noting this interest, the superintendent spoke to him and asked if he intended to follow mining or smelting. The young man became rather confused and replied that he would probably follow neither, as he was only the chauffeur who drove the boys down from the college in his bus.

### Hunka Tin

You may talk about your voitures  
When you're sitting round the quarters,  
But when it comes to getting blessés in,  
Take a little tip from me,  
Let those heavy motors be,  
Pin your faith to Henry F.'s old Hunka Tin.  
Give her essence and de l'eau.  
Crank her up and let her go,  
You back-firin', spark-plug foul'in' Hunka Tin.

The paint is not so good,  
And no doubt you'll find the hood  
Will rattle like a boiler shop en route;  
The cooler's sure to boil,  
And perhaps she's leaking oil,  
Then oftentimes the horn declines to toot.  
But when the night is black,  
And there's blessés to take back,  
And they hardly give you time to take a smoke,  
It's mighty good to feel,  
When you're sitting at the wheel,  
She'll be running when the bigger cars are broke.

After all the wars are past,  
And we're taken home at last,  
To our reward of which the preacher sings,  
When these ukulele sharps  
Will be strumming golden harps,  
And the aviators all have reg'lar wings,  
And the Kaiser is in Hell  
With the furnace drawing well,  
Paying for his million different kinds of sin,  
If they're running short of coal,  
Show me how to reach the hole,  
And I'll cast a few loads down with Hunka Tin.

Yes, Tin, Tin, Tin,  
You exasperating puzzle, Hunka Tin,  
I've abused you and I've flayed you,  
But by Henry Ford who made you,  
You are better than a Packard, Hunka Tin.

—From the *American Field Service Bulletin*, Paris.



## NEW PUBLICATIONS

- Popular Oil Geology.** By Victor Ziegler. 5 x 7½, pp. 149, illus. \$2.50. C. H. Merrifield, Golden, Colo.
- The Philippine Journal of Science, Contents and Index, Vol. I (1906) to Vol. X (1915).** Pp. 442. Bureau of Science, Manila, P. I.
- Shorter Contributions to General Geology, 1916.** By David White. Pp. 376, illus. U. S. Geological Survey, Washington, D. C.
- Catalog of the Publications of the California State Mining Bureau, 1880-1917.** Pp. 44. Bull. 77, California State Mining Bureau, Sacramento, Calif.
- Heaton's Annual Commercial Handbook of Canada and Board of Trade Register, 1918.** 5 x 7½, pp. 492; \$1.25. Heaton's Agency, Toronto, Canada.
- A Treatise on Roads and Pavements.** By Ira Osborn Baker. 6 x 9, Pp. 666, illus. Third Edition, Rewritten and Enlarged. John Wiley & Sons, New York.
- Espanola District, Ontario.** By Terence T. Quirke. Pp. 92, illus. Memoir 102, Canada Department of Mines, Geological Survey Branch, Ottawa, Canada.
- Commission of Conservation of Canada: Report of the Eighth Annual Meeting.** 6½ x 10, pp. 344, illus. Canada Commission of Conservation, Montreal, Canada.
- Temiskaming and Northern Ontario Railway Commission. Sixteenth Annual Report, for Year Ended Oct. 31, 1917.** Pp. 450, illus. Department of Public Works, Toronto, Canada.
- Concentration Experiments with the Siliceous Red Hematite of the Birmingham District, Alabama.** By Joseph T. Singewald, Jr. Pp. 91, illus. Bull. 110, U. S. Bureau of Mines, Washington, D. C.
- Thirty-Eighth Annual Report of the Director of the United States Geological Survey to the Secretary of the Interior for the Year Ended June 30, 1917.** Pp. 176, illus. U. S. Geological Survey, Washington, D. C.
- The Coal Fields of the United States: The Coal Fields of Ohio.** By J. A. Bownocker. A Computation of the Original Coal Content of the Fields. By F. R. Clark. Pp. 62, illus. U. S. Geological Survey, Washington, D. C.
- Anticlines in the Southern Part of the Big Horn Basin, Wyoming.** A Preliminary Report on the Occurrence of Oil. By D. F. Hewett and C. T. Lupton. Pp. 192, illus. Bull. 656, U. S. Geological Survey, Washington, D. C.
- Mineral Springs of Alaska.** By Gerald A. Waring. Also a Chapter on the Chemical Character of Some Surface Waters of Alaska. By Richard B. Dole and Alfred A. Chambers. Pp. 114, illus. U. S. Geological Survey, Washington, D. C.
- A Text-Book of Coal Mining for the Use of Colliery Managers and Others.** By Herbert W. Hughes. 6½ x 8¾, pp. 563, illus. Sixth Edition. Charles Griffin and Co., Ltd., London.
- A reprint of a well-known text upon coal mining practice. The book deals particularly with English mining.
- The Central Kentucky Phosphate Field.** By W. C. Phalen. 6½ x 10, pp. 90, illus. Kentucky Geological Survey, Frankfort, Ky.
- A review of the geography, topography, geology, methods of prospecting and mining phosphatic deposits in central Kentucky, with discussion of the phosphate industry in that field and a bibliography of publications relating to phosphate rock.
- "Iron and Steel of Canada" is the name of the new periodical which started publication in February, 1918. It is described as a monthly magazine devoted to the science and practice of the iron, steel, foundry, machine and metal-working industries, with an up-to-date review of conditions in these and allied industries and trades. The publication office is in Montreal, the editor-in-chief being Alfred Stansfield. W. G. Dauncey is associate editor. The first issue is well printed and illustrated, and we believe the publication will be a useful addition to the technical literature of the iron and steel industry.
- Philippine Islands: Fifteenth Annual Report of the Director of the Bureau of Science, Philippine Islands, for the Year Ended Dec. 31, 1916.** By Alvin J. Cox, Director. Pp. 79. Bureau of Science, Manila, P. I.
- Technology of Salt Making in the United States.** By W. C. Phalen. Pp. 149, illus. Bull. 146. U. S. Bureau of Mines, Washington, D. C.
- A review of the bulletin was written by Director Van. H. Manning, of the U. S. Bureau of Mines, in the preface, and an excerpt from this follows:
- "The importance of the salt industry needs no comment. The domestic output in the United States in 1915 was 5,352,409 short tons, valued at \$11,747,686. This industry is scattered over 14 states, distributed from coast to coast and from the Great Lakes to the Gulf. Competition has been keen in it, and this, together with the low value of the commodity, prevents its transportation to considerable distances except where local prejudice favors a certain brand. This competition has led to loss.
- "The general view of the industry that Mr. Phalen was enabled to obtain from his visits to all the operating plants in the United States enabled him to draw certain general conclusions with reference to the industry. One of these was the great excess of plant capacity as compared with the domestic requirements. The consensus of opinion seemed to be that much more salt was being produced than could be marketed, estimates of overproduction ranging from 20 to 50 per cent. The facts that large, up-to-date plants were not working at full capacity, that others were working at half time or half capacity, and that others were either temporarily or permanently closed, are significant to those planning to enter the salt business.
- "The rapid deterioration of the equipment also deserves consideration. The wear and tear on all salt-making machinery is heavy. If a plant is allowed to remain idle for any considerable time it is wellnigh ruined. For this reason it may often be cheaper to make salt for a season without profit than to shut down. In figuring costs and basing selling price on them, some producers have not provided for the rapid deterioration of plant, and this, together with overproduction, has caused heavy losses among salt manufacturers during the past decade.
- "Mr. Phalen points out the possibilities of utilizing the residual bittern (mother liquor) from salt making, and especially the recovery of potash and magnesium salts. Along the California coast and on the shores of Great Salt Lake, the mother liquors contain considerable quantities of these salts. As the cost of magnesium salts on the Pacific Coast has been high during the war, and as the potash salts for fertilizer have been difficult to procure recently at any price, the value of these mother liquors should be appreciated, and seemingly this fact is beginning to be realized.
- "The report presents a valuable series of analyses made by W. B. Hicks, of the U. S. Geological Survey, of representative samples of natural brines. Most of these brines are now worked for salt, bromine, and calcium chloride, but some of them, for example, in northern Ohio and parts of Michigan, have never been used. These brines deserve careful investigation as a possible basis of chemical industries. The report also includes:
- "1. An outline of the general distribution and character of the salt deposits of the United States, which is inserted because all the readers of the report will probably not have access to the Survey's complementary report.
- "2. A detailed description of the different methods of salt-making—by solar evaporation, direct heat (including the open-pan process), and steam evaporation (including grainer and vacuum-pan practice).
- "3. An outline of the manufacture of bromine from natural brines, and a description of the preparation of calcium chloride."

## Personals

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

Scott Turner has been commissioned a lieutenant in the U. S. Naval Reserve.

Alfonse H. Heller is superintendent of the Afterthought Copper Co., Ingot, California.

W. L. Honnold was recently elected a director of Springs Mines, Ltd., Transvaal.

James R. Finlay has removed his office from 52 William St. to 45 Cedar St., New York.

Claude Huddleston, assayer of Yellville, Ark., will open a laboratory at Batesville, Arkansas.

R. T. Hancock, of the Nigerian Tin Corporation, left London on Apr. 10 for Northern Nigeria.

Victor Rakowsky, of Joplin, Mo., has returned home after spending several months in Washington.

Robert E. Seip has accepted a position as engineer with Witherbee, Sherman & Co., at Mineville, New York.

Charles M. Shannon has been appointed fuel administrator for Arizona, succeeding Will L. Clark, resigned.

L. A. Womble, lately manager of the Witwatersrand Deep, is now with the Union Minière du Haut Katanga, Belgian Congo.

N. M. Garland, district manager of the Ohio Brass Co., at Mansfield, Ohio, has been elected a director of the company.

W. H. Warrington has succeeded F. Jost as superintendent of the Central Eureka mine, at Sutter Creek, California.

Arvid E. Nissen has taken a position on the metallurgical staff of the Taylor Wharton Iron and Steel Co., at High Bridge, New Jersey.

Dr. H. C. H. Carpenter, professor of metallurgy at the Royal School of Mines, London, has been elected a Fellow of the Royal Society.

P. McCormick, of Rush, Ark., assumed active management of a manganese property near Batesville, Ark., controlled by himself and associates.

E. R. Schoch has been appointed superintending engineer for the Anglo-French Exploration Co., with headquarters at Johannesburg, South Africa.

F. C. Runckel, of Dutch Flat, Calif., recently investigated dredging ground at Minersville, Trinity County, for the Pacific Gold Dredging Company.

W. G. Matteson has opened an office as consulting petroleum geologist and engineer at Forth Worth, Tex., having severed his connection with the Texas Company.

L. W. Trumbull, state geologist of Wyoming, recently spent several days in the Ely, Nev., district on professional work.

Capt. Charles La Vassuer, consulting mining engineer of Yellville, Ark., has opened an office at Batesville, Ark., and will devote much of his time to manganese.

James Horsburgh, recently manager of Chillagoe, Ltd., Queensland, has been appointed assistant general manager of the Mount Morgan Gold Mining Company.

H. M. Wolfin, mining engineer and chief mine inspector of California, has completed an extensive professional visit to the mines in the Grass Valley and Nevada City districts.

H. A. Hauser, formerly of Monterrey, Mexico, is in New York at the Hotel McAlpin, where he will remain for some time. He is interested in the development of Lower California properties.

E. W. Keith has resigned from his position in charge of ore purchases for the Empire Zinc Co., Denver, Colo., a subsidiary of the New Jersey Zinc Co. Mr. Keith is succeeded by G. T. Tunnel.

W. E. Condon, chief of the civil engineering and drafting department of the California State Mining Bureau, is surveying in the oil fields of the state for the oil and gas department of the bureau.

Addison H. McKay, formerly identified with the Harriman interests in the Tampico oil field, is at Caracas, Venezuela, where he is engaged in developing important oil concessions in Venezuela and Colombia.

Carl T. Hewitt has been appointed metallurgist and testing engineer for the Fafnir Bearing Co., New Britain, Conn. He was formerly with the Remington Arms Union Metallic Cartridge Co., of Bridgeport.

W. H. Knowles, mining engineer of San Francisco, made a recent visit to the Yreka district in Siskiyou County, Calif., investi-

gating chrome deposits in the interest of prospective investors of Cleveland, Ohio.

E. E. Vanderhoef, superintendent of steam shovel operations for the Nevada Consolidated Copper Co. during the last 10 years, has resigned, as his contract has expired. He will move his family to Salt Lake City.

Fletcher Hamilton, state mineralogist of California, has returned to San Francisco from a trip to the East, during which he visited Washington and New York on Federal and State business relating to the mining and oil industry.

J. C. Shepherd, of Rush, Ark., who has been engaged in zinc mining in the northern Arkansas field for a number of years, is spending much of his time in the Batesville manganese field, where he recently took over a number of properties.

Vernon F. Marsters, formerly geologist for the New York & Honduras Rosario Mining Co., San Juancito, Honduras, and who has recently established a consulting office at 315 Rialto Bldg., Kansas City, Mo., has gone to Louisiana on an examination work.

E. W. Young succeeds William Seymour, resigned, as assistant superintendent of the Northampton plant of the Bethlehem Steel Co., in charge of byproducts. J. A. Beaty, formerly general foreman, has been made assistant superintendent of the oven section, and Robert L. Martin succeeds him.

Kirby Thomas, of New York, is making an examination of sulphur deposits in Culberson and Reeves counties, Texas, for London and New York interests. Coöperating with Edwin R. Eaton, Mr. Thomas has concluded the examination of a talc property at Johnson, Vt., for New York interests.

Samuel W. Cohen, who recently resigned as general manager of the Crown Reserve Mining Co., Ltd., and Porcupine-Crown Mines, Ltd., which position he held for 10 years, has taken up general consulting mining engineering practice with headquarters at Montreal. He remains with both of the above companies as consulting engineer.

## Obituary

Assheton Leaver, chairman of Jos Tin Area, Ltd., and other Nigerian companies, died on April 3.

Robert Lowry Martin, formerly active in Colorado mining affairs, died at his home in Denver on May 1, aged 76 years.

Capt. Harry H. Talon, well known as a mining man on the Mesabi range, died recently at Hibbing, Mich. He was a native of Ishpeming, Michigan.

T. C. Cloud, metallurgist of the Wallaroo & Moonta Mining and Smelting Co. for many years, and more recently retained by Elliott's Metal Co. at Burry Port, South Wales, died recently. He was a member of the council of the Institution of Mining and Metallurgy.

Lieut. Edward Hale Perry, a geologist, was recently killed in Picardy, in France, while serving with the 6th Engineers. He was born in 1887 in Boston, and was graduated from Harvard in 1909 and from the Harvard mining school in 1912. He was engaged in field and laboratory work until 1915, during which time he was associated with Prof. L. C. Graton, of Harvard, on the latter's secondary-enrichment investigation. For the next two years he was associated in private work with Augustus Locke, of San Francisco. He was a remarkably imaginative and able geologist and had made a special study of rock alteration in relation to ore deposits.

## Societies

**American Institute of Mining Engineers.**—A tentative plan for the Colorado meeting of the American Institute of Mining Engineers, which will be held Sept. 27, has been formulated. A day each will be spent in Denver, Colorado Springs, Cripple Creek, Pueblo and Leadville. An automobile trip to the top of Pike's Peak also will be scheduled. All of the principal mines and mills in the districts mentioned will be visited, including the gold mines in Cripple Creek, the lead, zinc and steel works of Pueblo, and the electric furnace producing ferromolybdenum at Leadville. Many papers have been accepted for the meeting, some of which have already been published.

**American Institute of Mining Engineers.**—The iron and steel section will hold its fall meeting at Milwaukee during the week of

Oct. 7, concurrent with the annual conventions of the American Foundrymen's Association and the American Institute of Metals. Throughout this week also will be conducted an exhibition of foundry equipment and supplies and machine tools and accessories. It is also probable that several trade organizations of castings manufacturers will schedule their monthly meetings at Milwaukee for the same week.

**American Iron and Steel Institute,** at its annual business meeting on May 6, re-elected the following directors for the three-year term ending 1921: James A. Burden, James A. Campbell, Thomas Cantley, Eugene G. Grace, William A. Rogers, J. F. Welborn. Colonel Maben retired from the board on account of ill health, and Thomas K. Glenn, president of the Atlantic Steel Co., Atlanta, Ga., was elected to succeed him.

**American Mining Congress.** The Utah chapter met recently and elected the following officers: Imer Pett, general manager of the Bingham Mines Co., governor, succeeding A. E. Apperson resigned; directors: H. M. Hartmann, Ophir Hill Consolidated Mining Co.; J. B. Whitehill, International Smelting Co.; Moroni Heiner, United States Fuel Co.; and A. C. Ellis.

## Trade Catalogs

**"Gramercy" Reagent Bottles.** Elmer & Amend, New York. Folder, pp. 4; 8 x 9½ in. Illustrated. Descriptive of reagent bottles having enamel labels that are acid proof and do not chip; the labels are so burned in that they become an integral part of the glass; large, distinct black letters on a white background that is slightly roughened to take pencil writing. Made in America.

**Mack Moto Trucks,** International Motor Co., New York. Pp. 23; 4x9½ in. Illustrated. A description of body types suitable for every purpose.

**Mine Trolley Supplies,** Ohio Brass Co., Mansfield, Ohio. Supplement No. 1 containing additions and improvements to the O-B materials listed in General Catalog No. 16. Pp. 51; 5½x8½ in. Illustrated. A description and price list of hangers, insulators, trolley cars, etc.

## 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.

**Amalgamating Device**—Paul Kuehn, Denver, Colo. (U. S. No. 1,262,812; Apr. 16, 1918.)

**Flotation**—Process and Apparatus for the Recovery of Float Metal from Water Containing the Same. James Harris Reed, Philadelphia, Penn. (U. S. No. 1,262,984; Apr. 16, 1918.)

**Flotation**—Separation of Metallic Sulphide Ores. James Hebbard and Rasmus John Harvey, Broken Hill, New South Wales, Australia, assignors, by mesne assignments, to Minerals Separation North American Corporation. (U. S. No. 1,260,668; Mar. 26, 1918.)

**Smelting**—Process of Recovering Metal from Scrap Material. John W. Brown, Lakewood, Ohio. (U. S. No. 1,260,312; Mar. 26, 1918.)

**Steel**—Process for Manufacture of Ingot Molds. John B. Walker, Birmingham, Ala. (U. S. No. 1,262,718; 1,262,719; Apr. 16, 1918.)

**Sulphur Dioxide**—Recovering from Gases Containing the Same. Utley Wedge, Ardmore, Penn., and Frederic A. Eustis, Milton, Mass. (U. S. No. 1,260,492; Mar. 26, 1918.)

**Tunnel Construction**—Duncan D. McBean, New York, N. Y. (U. S. No. 1,260,416; Mar. 26, 1918.)

**Tungsten**—Apparatus for Electric Welding of Tungsten Ingots. Carl A. Pfanstiel, Waukegan, Ill., assignor to Pfanstiel Company, Inc., North Chicago, Ill. (U. S. No. 1,260,940; Mar. 26, 1918.)

**Wire Rope**—Charles G. Roebbing, Trenton, N. J., assignor to John A. Roebbing's Sons Co. (U. S. No. 1,260,583; Mar. 26, 1918.)

**Zinc**—Compound for Boiler Feed Water Treatment. Fred O. Paige, New York, N. Y., assignor to Paige & Jones Chemical Co., Inc., New York, N. Y. (U. S. No. 1,260,987; Mar. 26, 1918.)



## Editorial Correspondence

SAN FRANCISCO—May 13

**The Decision of the U. S. Circuit Court of Appeals** has been rendered in the case of the Minerals Separation Ltd. vs. Butte & Superior Mining Co., the court ruling that in the use of more than 0.5% oil there is no infringement of patent. The case was remanded with instruction to dismiss the bill.

**The One-Fourth Royalty Lease** is offered California oil men in the bill reported to Congress by the House Public Lands Committee. If the bill shall become a law, the operators will have opportunity to prove their contention that well drilling and oil production cannot be made profitable if burdened with the payment of one-fourth of the oil produced. At any rate the law will not be greatly encouraging to drillers and producers. Considering the high prices and the scarcity of oil-well supplies, and the possibility of the Government fixing the price of crude oil at the wells, the outlook for oil men on the naval reserve is not alluring.

**Shortage of Oil-Well Supplies** is likely to become a menace to the drilling of new wells in California fields. The shortage is partly due to the consumption by ship-builders of large amounts of wire rope and pipe so necessary in well drilling. The shortage was for a time partly relieved by an embargo on exportation of materials essential to the oil industry, by Mark L. Requa, as chief of the petroleum department of the U. S. Fuel Administration. Now it is said that George E. Day, chief of the oil-well supply department, contemplates asking priority of shipment of such materials, in the hope of giving further relief to the situation.

**Chrome Shipments from California** Mines are steadily increasing as climatic conditions improve and the roads dry out. California is reputed to have a wonderful climate, and the reputation is not undeserved. But rain and snow in the mining districts are just as disastrous to wagon and truck roads in this state as in any other. Chrome mining is not the only mining that advances with climatic improvement; and it is not the only class of mining that has suffered lack of development through bad roads. Road improvement by state appropriation has been chiefly for the benefit of tourists, and the tourists have been for the benefit of the railroads. County supervisors and the railroads have for years constantly neglected the chrome-mining interests, as they have neglected the tungsten and magnesite, the marble and sandstone, the iron ores and other industrial mineral deposits. When the demand came for the chromic iron ores of California, the owners of the numerous deposits were not ready to instantly meet the market demand. Deposits had to be developed, roads had to be built. Consequently there was a great rush to get into line. Some of the deposits were mined, not developed; many of the roads were badly constructed; every one was in a hurry to supply the market while the prices were high; temporary and makeshift equipment was installed. The war was not going to last long, anyway; the chrome deposits were at the best kidneys or lenses of ore that would be soon exhausted, and little thought was given to the future of the chromic-iron industry. Now shipments are increasing as the condition of the roads and the weather permit, and more deposits are being discovered and developed, practically all over the state. In 1917 the total shipment of chrome ore and concentrate was less than 40,000 tons, at prices ranging from \$20 to \$35 a ton. The most conservative estimate for 1918 is 60,000 tons, and this might have been largely increased if the energy and thoroughness in road building were equal to the desire to get quick action on the money invested in the chrome industry.

**The Tungsten Mines Co.**, operating mines and mill near Bishop, Inyo County, is reported to have recently sold a consignment of tungsten concentrate which netted the company more than \$400,000. F. W. Griffith, vice president of the company, is said to have corroborated the statement of a large sale, but the amount is not verified, nor is the further statement that bonds

outstanding to the amount of \$300,000 might be paid off before maturity, which falls in 1919. The tungsten mines, situated about five miles out of Bishop, developed and brought into commercial production within the last two years, have added large amounts to the tungsten supply and been the incentive to development of scheelite ores in other parts of the county and nearby Nevada points. When the Standard Tungsten Co. began development it was soon followed by the Tungsten Mines Co. The Round Valley Tungsten Co. property, developed within the last half of 1917 and equipped this year, is also producing tungsten concentrate in commercial quantity. Other smaller properties in the county are actively developing and some are making a small production. The development during the period since the entrance of the United States into the war has been greatly handicapped by long delays in receiving necessary concentrating machinery. The high prices for tungsten have played an important part in development and equipment of these new mines. The investors in the tungsten properties had no assurance that high prices would rule for any definite time, but they had the assurance of a probable permanent demand for tungsten produced in the United States, once the fact should be demonstrated that the demand could be met. And they have been doubly assured since war was declared by the American Government. The mines in Inyo County and the long-established tungsten mines at Atolia, San Bernardino County, and smaller deposits near by, in Kern County, easily accessible to Atolia, are capable of a large aggregate production of tungsten. And the mines of Nevada also may be depended upon.

DENVER—May 10

**Oil Land Withdrawals** in the Buck Creek and Cow Gulch oil fields near Manville, Wyo., have caused surprise among oil men. Operators do not understand why the Department of the Interior should make any further withdrawals of oil lands at this time when the product is so badly needed and private capital stands ready to open up the district and increase the output, should it prove to be oil-bearing territory. It is reported that there are no wells being drilled on the tracts withdrawn, and that this order specifies certain lots and acreage bordering on the district where actual development is in progress.

**A Duty on Lead Imports** is expected by Charles F. Caldwell, president of Independent Mine Owners of Kootenay, who has been in Ottawa urging the government to establish same duty as now is in force on lead ore from Canada into United States.

**The Northwest Mining Association** has undertaken to get accurate data of the number of miners needed to supply full crews to all companies running shorthanded in eastern Washington, northern Idaho, northeastern Oregon and the Kootenay district of British Columbia. In these districts it is believed 4000 additional miners are needed. Information will be presented to Bureau of Mines, with an appeal for aid.

**Improved Mining Conditions** are expected following the announcement of the Consolidated Mining and Smelting Company of Canada that after May 1 shipments of ores to its smeltery at Trail will be paid for at once to the extent of 90% of the value. The company says it no longer is necessary to withhold payment for an extended period. This has been done during recent months, because it was necessary to store the lead on account of the market conditions. The surplus of 18,000 tons at the smeltery is now almost all sold.

**Government investigation** and if necessary financial aid are suggested for the tin deposits near Spokane if the bill appropriating \$10,000,000 for assistance in developing deposits of war needed metals becomes a law. The little work done here 10 years ago shows several lenses of tin ore, and engineers are of the opinion that property should be developed to determine its possibilities. An incline shaft is down 160 ft. along a pegmatite contact. At 96 ft. on the incline a drift 180 ft. long runs

along this contact and at 50 ft. in this drift a winze was sunk 20 ft. in a second lense of tin ore. On the dump is 125 tons of tin ore from both lenses. This tin occurs as a black cassiterite. In trenches and opencuts tin has been found in three other places. The Spokane Tin Mines company holds these claims, amounting to 132 acres. F. C. Bailey, of Spokane, has taken an option and plans development.

BUTTE, MONT.—May 10

**The State Council of Defence**, in accordance with authority given it in a law passed at the special session of the Legislature, has made an order that every man in the state must work at least five days per week until the close of the war. There is no scarcity of labor so far as the mines and smelteries are concerned, but there seems to be no doubt that there is going to be a scarcity of men for farm work. In this city and in many towns of the state there are many idle men—men who will not work as long as they can eke out a living of some kind. In this city particularly, there are hundreds of men who will not work, although they always have money in their pockets. These people are principally connected with the I. W. W. Whether they are receiving money from outside organizations or from pro-German sources, the authorities have not been able to ascertain. It is believed that with a number of arrests of the idle characters something may be learned as to their means of livelihood, as they will have to tell how they exist or go to jail. At the same meeting the Council of Defence also took action as to the use of the German language, and an order was passed forbidding the teaching of the language in any school, public or private.

WALLACE, IDAHO—May 8

**An Accident at the Sherman Mine** recently was the result of two missed holes. After an interval of time had elapsed, a miner went in with new primers. He picked out the missed primers and inserted the new. When about half way out the long tunnel one of the old detonating caps exploded, mutilating his hand to an extent that will require amputation. The only explanation is that the fuse was defective; that the powder train burned down until it struck a barren place in the fuse, which it burned through slowly until it reached the powder again and then quickly reached the cap.

**Coeur d'Alene Mines** established a new high record in net earnings in 1917. This fact is disclosed in the annual statements just filed by the several companies with the county assessors. The impression has generally prevailed that the net earnings of 1917 would be somewhat less than 1916, which was the banner year, owing to the continued high cost of mining, the decline in the price of spelter, the complete suspension of the Success, the curtailment of the output of the Morning through litigation and the suspension of production altogether in December, the passing of the Green Hill-Cleveland and the reduced output of the Tamarack & Custer. All these adverse conditions, however, were more than offset by the increased earnings of other companies. For example, the net earnings of the Hercules amounted to \$3,690,400, as against \$2,931,136 in 1916. In 1916 the net profits of the Bunker Hill & Sullivan were \$1,310,971, while last year the company earned \$2,447,285. Among the large companies which have reported the following net profits are given: Caledonia, \$1,227,155; Federal (Wardner), \$54,884; Federal (Morning), \$1,319,962; Federal (Mace), \$228,327; Gold Hunter, \$130,812; Hercules, \$3,690,400; Tamarack & Custer, \$350,857; Green Hill-Cleveland, \$137,322; Bunker Hill & Sullivan, \$2,447,285. Companies which have not yet reported are the Hecla and Interstate-Callahan. It is safe to estimate the net earnings of the former at \$2,000,000 and the latter at \$1,000,000. Both will probably go over these figures. But on this basis, and including a large number of small irregular producers and leasing companies which have filed their reports, the total net earnings of the mines of the district in 1917 were \$12,612,965, as compared with \$12,154,620 in 1916.

## JOPLIN, MO.—May 10

**Closing of the Smelter of the Fort Smith Spelter Co.** has been announced. The smelter, which was completed early last year, was shut down last summer and opened again in December, when it was understood all its production would be taken by the sheet-zinc mill that had been erected at Newcastle, Ind. Now its owners decline to come in on the \$75 agreement price for high-grade ore, and it has closed down its plant.

**Sales Recorded Recently**, include that of the Big Chief mine, at Picher, Okla., to Oklahoma interests for \$150,000. The property was developed by A. E. Bendelari, manager of the Eagle-Picher Lead Co., and associates, and has become a big producer. The Bulah B. mine, also at Picher, has been sold to Texas interests. Playter Bros., of Joplin, have taken over 10,000 acres of land near Seneca, in the western part of Ottawa County, Missouri.

**Picher Properties Are Closing Down** for first time through inability to make profits from operation at the present price of zinc. In the past it has been claimed that all mines in this section could be operated with zinc ore valued as low as \$30 per ton, but this at present, in the face of higher costs, no longer holds. While some of the larger companies are curtailing their output, the production still continues so heavy that ore prices are weak and promise to become still weaker. Producers have about given up any expectation of getting help through any Governmental action, this opinion being arrived at largely through addresses made by Congressman Perl D. Decker, of Joplin, during the week. Mr. Decker addressed meetings of mining men at Picher and at Webb City, and declared it utterly impracticable to think of attempting to obtain a tariff on zinc ore at this time. He was agreeable to trying to bring some betterment by attempting to get an order prohibiting the use of freight cars for importing Mexican ores, but is inclined to believe no great relief can be expected from such a move. An interesting development is a suggestion from the district manager for the American Metal Co., W. H. Eardley, of Joplin, who in a carefully written letter proposes that the mining men of this district should form a producers' organization and sell their own ores. He cites the example of the fruit-growers of California and thinks operators might obtain equally as happy results with zinc ore. He also asserts that the imports of zinc ore at this time are negligible, in that they would produce only about 18,000 tons of spelter a year. The idea of a cooperative selling agency for zinc ore is not new, but it has added interest at this time, when it comes from the local representative of one of the largest metal companies of the world.

## CALUMET, MICH.—May 10

**Man Shortage and Slow Deliveries** of equipment are retarding production in the Lake Superior copper region. In several cases electric equipment ordered more than a year ago and expected months ago has not been delivered. The need for much of this equipment is imperative, but the volume of contracts, the war demands and the freight and general rail situation constitute the cause for delay in delivery. Electric haulage equipment, particularly motors and storage batteries, is slow in arriving. The copper companies, a half dozen or more, contracted long ago for equipment of this sort. Only a few of the battery locomotives have been delivered. These locomotives are designed to take the place of the men, who no longer can be obtained in the numbers required for hand tramming. Men are leaving the district every day, and the locomotives are arriving too slowly to fill the deficiency. Every effort is being made to hurry the manufacturers and railroads. It is understood that 30 or more electric installation equipments have been ordered by mines of this district.

**Exploration and Development Projects** in the Lake Superior district have been forced to close down on account of high costs and labor shortage and none of those companies operating now, with the possible exception of the Michigan, which is considered well beyond the mere exploration stage, are planning to make any mill tests this year or until costs return to normal. The manager of one exploration project is authority for the statement, however, that it is practically as inexpensive to continue work sufficiently to keep a mine open and clear of water as it would be to close down. In the latter case it would be necessary to entirely dismantle the mines and part of the surface equipment. The mines would fill with water and equipment would

be ruined or at least depreciate considerably. There would likely be considerable caving, and this would all mean costly work to reopen. Among the exploration projects that have already closed are the Keweenaw Copper, the Indiana, the Cherokee and the Wyandot. The Federal is continuing its campaign of diamond drilling, but with one drill only. In fact, there are not more than three diamond drills in operation in the district. The Federal is drilling the second hole. The Michigan is working in three lodes and shipping from 50 to 120 tons of ore per day to the mill; but the Michigan is making high copper recovery and thereby defraying its development expense. Work has not been discontinued at the North Lake, the New Baltic and New Arcadian. These properties are still operating and have made no plans for closing down, although they probably will not make any mill tests this year. Seneca and Mayflower-Old Colony are sinking their shafts, but both are in proved ground, and therefore are hardly to be considered in the exploration stage. Federal is doing nothing this year at its Keweenaw County properties.

## TORONTO—May 8

**The Production of Molybdenum** from the properties situated on Indian Peninsula, Lake Keewagama, in the Hurricanaw River district, will be undertaken by a company now being formed under the title of the Indian Peninsula Mining Co., the promoters including Frank Groch, of Cobalt; W. E. Simpson, of Cobalt and London, England, and F. Geddes Grant, of New York. The new company will control and operate the St. Maurice Mine Co., the pioneer of the district, which owns the molybdenum properties. The molybdenum deposits occur in a granite outcrop near the center of the lake, and a contact vein between the granite and the Laurentian schist is traceable for nearly half a mile. It is planned to sink three shafts, one on the north, one on the south end of the contact and one in the center near the mill site, where a pyroxene dike occurs, indicating the central point of mineral deposition, where it is expected a large tonnage will be recovered. The properties are about 20 miles south of Amos, on the Transcontinental Railway.

## VICTORIA, B. C.—May 7

**The Iron Bounties Act** which binds the Province of British Columbia to give a bounty of \$3 per ton on all pig iron manufactured from British Columbia ore in British Columbia and \$1.50 per ton on all pig iron manufactured in British Columbia from foreign ore, is the most important mining legislation passed at the recent session of the Provincial Legislature. The bill went through the House without difficulty, the consensus of opinion being that it was good policy and an opportune move on the part of the government to encourage the development of deposits of iron of the province. Another section of this act anticipates the use of electric furnaces in the treatment of ores and provides for a subsidy.

**The Strathcona Park Amendment Act** is a measure passed by the 1918 Legislature of British Columbia which is of special interest to the prospectors of the Northwest. This opens to mining development a highly mineralized section of Vancouver Island comprising 530,066 acres. It was closed years ago in order that it might be preserved in its natural state as a national park. It is claimed by the present government that the location and the exploitation of its minerals cannot interfere, at any rate to any material extent, with its value as a park, and consequently permission now is given to miners to record claims within its limits and to proceed with the work of their development and mining.

**The Taxation Policy** of the British Columbia government in respect to mining properties was a matter which, during the session just concluded, caused considerable concern among operators and was the subject of not a few discussions between their representatives and the Minister of Finance. The result, however, as contained in the Taxation Amendment Act, is believed to be generally satisfactory, it being conceded by the mining men that, owing to the absolute need of greater revenue to meet the province's obligations, increased taxation is essential. The tax is to be 10% of the gross profits or 2% royalty on the ore mined, the choice of the impost applied depending on which will produce the greater return. There, however, are several important allowances provided for. One of these is for salaries paid "directors, officers, partners, and persons who reside within the province," and thus are liable to assessment under the act for income tax. Another is for depreciation of plant "used in the production of the income" but which must not exceed "for any one year 15%

of the original cost" of the plant. A third is for outlay involved in the development of a mine "having regard to the amount of ore actually mined and shipped from which the income is derived."

**Three Amending Acts** directly in the interests of men working at mines or smelters were passed at the recent session of the British Columbia Legislature. These are entitled "An Act to Amend the Labor Regulation Act," "An Act to Amend the Metalliferous Mines Inspection Act," and "An Act to Amend the Coal Mines Regulation Act." The former provides for an eight-hour working day for all men employed "in, or about any coke-oven, smeltery concentrator, or mineral separation plant." The chief amendment to the Metalliferous Mines Inspection Act is that providing for an eight-hour working day to those employed underground, whose working day will start when they leave the surface and end when they reach it again, as well as those employed on the surface. These two acts will become effective on Mar. 31, 1919. The amendment to the Coal Mines Regulation Act gives the surface workers at coal mines the eight-hour working day from Mar. 31 of next year. New legislation also stipulates that inspectors of metal mines, after making their inspection, shall post the result thereof in some prominent place outside the workings in order that the miners may be kept in touch with the conditions under which they are working. Another provision is that "every drill used in stopping in any mine where the character of the ground is such that dust is caused by the work shall be equipped with a water spray."

**Australian Zinc Mines** produce zinc as a byproduct of lead-silver ores. While the Broken Hill mines are today the largest Australian producers of zinc concentrates there are several other fields not yet in the producing stage. These are the Tasmanian lead-silver-zinc mines, about to be worked on a large scale by the Hercules Primrose Corporation, an offshoot of the Mount Lyell Company; the Mount Stewart Mines, Leadville, N. S. W., the Lawn Hills mines, North Queensland, etc. The last half of 1917 the Broken Hill output was approximately 233,000 tons ore milled, 217,000 tons "zincy" sands milled, for 54,000 tons "leady" concentrates and 100,000 tons zinc concentrates. "Leady" concentrates average over 65% lead, 25 oz. silver, 7½% zinc. Zinc concentrates average about 47% zinc, 12 oz. silver, 7½% lead. Increasing amounts of concentrates are now made from the current and accumulated slimes, and these average up to 80 oz. per ton silver, 60% lead and 10% zinc, while the "zincs" from the slimes average 49% zinc, 3½% lead and 13 oz. silver. The slimes concentrates are chiefly made by the selective-flotation process, of which there are several variants in use. With the present practice, recoveries of over 90% are made and several mines average over 95% recovery of all the valuable metals. It takes about 5½ tons crude ore to each ton of "leady" concentrates, and about 4½ tons of the tailings from these crude ores go to make one ton of zinc concentrates. Apart from the "leadies" and "zincs" made from the slimes separated out from the tailings sands, it will be seen that the "zincs" output is governed by the "leadies" output. While the two existing lead smelting works, the Associated, of Port Pirie, and the Sulphide Corporation, of Cockle Creek, can take care of the whole of the "leadies" output and more, they cannot handle the output of zinc concentrates. The problem of their treatment is not yet solved. Technically, the distillation method and the electrolytic methods are already successfully at work—the first at Port Pirie works, the second at the Risdon works, Tasmania. Neither of these works is as yet of sufficient capacity to cope with nearly 250,000 tons of the "zincs" output per annum. Present conditions of shipping space allow only a small fraction of these "zincs" to be exported to England or the United States. In consequence there is a huge accumulation of "zincs" at Broken Hill and Port Pirie, and the stacks are growing each month. There are two electrolytic zinc works in Tasmania. The first, an offshoot of the Amalgamated Zinc Co., of Broken Hill, together with most of the producing mines of this district, is already producing spelter of excellent quality at its Risdon works, near Hobart, Tasmania. Output, however, is restricted until the plant is completed and the full supply of hydroelectric power available from the Tasmanian government works. The second works are not yet producing, and construction work is only just about to start properly. These are situated near Zeehan, Tasmania, and are to handle the Hercules-Primrose ores. The water-power scheme is in the hands of the Tasmanian government, but actual construction not yet begun.



# The Mining News

## ALASKA

### Copper River District

**KENNECOTT COPPER CORP.** (Kenne-cott)—Reported that Mother Lode group and other neighboring copper properties are to be taken over on basis of exchange of stock.

## ALABAMA

### Chilton County

**GRAPHITE LANDS** (Canton)—Verner heirs recently sold to A. H. Anniston and W. P. Blake, of Birmingham, a tract 13 miles east. To develop property.

### Etowah County

**ALABAMA CO.** (Gadsden)—To blow in a furnace soon.

**BIRMINGHAM-TRUSSVILLE IRON CO.** (Gadsden)—To blow in a furnace soon.

### Talladega County

**TALLADEGA IRON CO.** (Talladega)—Furnace about ready for operation, but may be delayed, as the Government has refused export license. The property has been reconstructed by Japanese capital.

## ARIZONA

### Cochise County

**SHATTUCK ARIZONA** (Bisbee)—Production in April was: Copper, 842,790 lb.; lead, 143,861 lb.; silver 15,469 oz.; gold, 102.13 ounces.

**KIMBLE MINES** (Dos Cabezas)—Recently installed 16-hp. engine.

**J. H. CROSS PROPERTY** (Douglas)—New wagon road being built and sawmill being erected.

### Gila County

**GILA COPPER SULPHIDE** (Christmas)—In a suit brought by the London-Arizona Consolidated Copper Co., it was alleged that on account of war conditions it will be impossible to borrow the amounts necessary for refinancing. Allan Forbes, of Boston, was appointed receiver by U. S. Judge Hand. The property is being operated at present by the American Smelting and Refining Company.

### Graham County

**GOLDFIELD CONS. MIN. CO.** (Duncan)—First ore shipped last week.

### Maricopa County

**ARMOUR MINING CO.** (Phoenix)—J. A. Armour and E. A. Williams, of Phoenix, to explore by churn drill claims on Big Wash, 16 miles east of Florence and five miles south of Price. Area to be prospected covers 900 acres. Twelve men now employed at the property.

**MONTE CRISTO MINE** (Wickenburg)—Attracting attention as a promising silver property.

### Mohave County

**ALEXANDER PROPERTY** (Cerat)—Recently purchased by Herbert E. Smith and associates, of Los Angeles.

**SCHUYLKILL MINING CO.** (Kingman)—Tennessee mine reported to have developed enough ore to warrant building mill.

**RED GAP MINES** (Kingman)—Keen St. Charles placed mine with eastern interests and developments soon to start.

**BIG JIM CONS. MIN. CO.** (Oatman)—Stripping engine preparatory to moving it to Bluebird mine.

**GOLD ROAD MINES CO.** (Oatman)—Foundation work begun for new Marcy-mill plant. More men employed than at any time in last three years.

**OATMAN UNITED GOLD** (Oatman)—J. K. Turner, consulting engineer, reports 2000 ft. of development, consisting of a shaft 400 ft. and 1300 ft. of crosscut on 375 level. Continued exploration to depth of 200 ft. highly recommended.

## Pima County

**PIMA MINING & SMELTING CO.** (Tucson)—To enlarge plant from 250 to 500 tons. G. M. Garrison is in charge.

**SAN XAVIER EXTENSION** (Tucson)—Ninety feet of high-grade lead-silver-zinc ore, and copper vein said to have been exposed in first working shaft, have been blocked out between first and second shafts. Construction of mill to be completed by autumn.

**REINIGER FREEMAN** (Twin Buttes)—Operating the Wakefield-Lambing property and reached 250-ft. mark in new two-compartment shaft. Two new engine units of 120 hp. each are to be installed at once. Charles W. Freeman, of Bramwell, W. Va., W. R. Sprague, of Portsmouth, Ohio, and John E. Fox, of Ft. Wayne, Ind., are the principal owners with Mr. Reiniger. A. B. Richmond is consulting engineer.

## Pinal County

**BROKEN HILLS** (Ray)—Shaft passed 300-ft. depth. Pumps to be installed, capable of handling considerable water.

**COPPER BUTTES** (Ray)—Hercules interests suspended work at Copper Buttes property.

**McCALLUM** (Ray)—Shipments of silver-lead ore are being made by Jim Pollard.

**U. S. VANADIUM CO.** (Ray)—Completed installation of 50-ton dry-process mill.

**TROY-ARIZONA** (Kelvin)—Work in the Climax shaft suspended pending installation of larger pumping equipment.

## Santa Cruz County

**CASTLE BUTTE MINE CO.** (Patagonia)—Under lease and bond Miller and Scheerer, together with C. F. Byron, of Tucson. Several carloads shipped lately and lessees to begin developing immediately.

**JEROME CENTRAL MNG. CO.** (Jerome)—Recently organized. Incorporators are W. M. Malody, Eatts, Calif.; Peter Gordon, Jerome, Ariz., and H. A. Harding, Arizona.

**JEROME SUPERIOR** (Jerome)—Second shift to go to work. New compressor in operation. Hoist delayed because of war orders. Machinery for private electric light plant on ground. To put up 50-ft. gallow's frame. Camp being supplied with water from Hopewell tunnel of United Verde. George Mitchell is general manager.

**ARIZONA-VIRGINIA COPPER CO.** (Prescott)—Purchased 15 claims in Castle Creek district from P. A. Johns. E. C. King is in charge.

**PECK** (Prescott)—After many years of idleness, to be reopened. Property purchased by C. E. Batton, representing an El Paso syndicate. There is about 20,000 tons of ore on the dumps, 80,000 tons in the stopes. Syndicate also acquired properties of Frank W. Giroux and R. H. Burmister, adjoining the Peck.

**YAGER CANYON** (Prescott)—Shannon Copper Co. sinking shaft from the 600 to 900-ft. level. Developments to date justify continuation and company has made an appropriation of \$70,000 for this work.

**WENDEN COPPER CO.** (Wenden)—W. K. Pearson, Richard Clews and James Goad, of Globe, have taken a year's lease on this property. Will continue drift on 200 level to prospect big vein showing on surface.

## ARKANSAS

### Boone County

**TAR KILN** (Zinc)—Taken over by Magnolia Lead and Zinc Co. of Oklahoma. Property equipped with a 100-ton mill. Operations have started.

### Marion County

**COWAN BARREN** (Yellville)—Completed one hole between this and Rush properties and have moved drill rig to a new position. First hole showed deep zinc sulphide. Two more drill rigs ordered.

## CALIFORNIA

### Calaveras County

**ANGELS DEEP** (Angels Camp)—Operation resumed. Contemplate installation of electrical equipment to take the place of the old steam plant. Main shaft to be deepened.

### Del Norte County

**MANGANESE DEPOSITS** on north fork of Smith River reported at Crescent City by John Taggart, of Smith River. An important chrome deposit in the same neighborhood is also reported. Chrome properties are owned by the Tyson Mining Co., of Baltimore.

### Eldorado County

**ELDORADO SLATE CORPORATION** (San Francisco)—Large deposit of good marketable slate in quarries situated near Placerville.

### Nevada County

**NORTH STAR** (Grass Valley)—Large tonnage of milling ore being hoisted from 3000, 3400 and 4400 levels. Ore reserves being well maintained. Improved central mill treating 9000 tons per month, crushing with 60 stamps. New work in progress at Champion, most of ore coming from 2700 level. Development at other points. Cost of mining and treatment \$1.15 per ton greater than before the war. Underground men were granted an increase of 50c. per day after a strike of several hours. The demand followed a voluntary raise of 25c. a day in all the mines in the district.

### San Luis Obispo County

**CHROME DEPOSITS**—Ten locations have been recorded by J. F. Beckett and associates of Arroyo Grande. Deposits are situated west of Santa Margarita.

### Shasta County

**U. S. S. R. & M.** (Kennett)—Railroad roundhouse at the smeltery destroyed by fire Apr. 23, damaging two of the company's locomotives. Loss estimated at \$7000. Locomotives can be quickly repaired. Company has a third one, which was not in the fire. Production from smeltery in April was 1,530,000 lb. copper.

### Sierra County

**MONTE CARLO** (Downville)—Heavy gold recovery being made from gravel claim, amounting to \$1 to \$10, and one nugget recently containing \$61 worth of gold. Negotiating pending for bonding property to Southern California men.

**PRIMROSE** (Sierra City)—Mill started on good ore carrying some free gold. Large tonnage ready for milling. M. D. Cogley, manager.

### Tehama County

**KLEINSORGE** (Lowrey)—New installation of mill composed of ten 850-lb. stamps and two concentrating tables. Large tonnage of low-grade and small deposits of shipping ore reported. Property in rough country 45 miles southwest of Red Bluff. Ore handled over three aerial trams.

**ELDER CREEK CHROME** (Red Bluff)—Installation for crushing and concentrating plant. Property 31 miles west. S. H. Tolbear, of San Francisco, is manager.

### Trinity County

**CORONA** (Hawkins Bar)—Mine closed down for season on account water shortage. Last clean-up of five days' run yielded \$1200 gold and \$200 in platinum. Property in extreme eastern edge of county.

### Tuolumne County

**CHROME MINING** is progressive in southwestern part of county. Frearia brothers have approximately \$50,000 worth of ore mined. Richards brothers are shipping three carloads per week. Powell, Booker and Porter to begin shipping soon. C. E. Shafer and Frank Atherton working leased ground. McCormick mine shipping high-grade ore daily. Quigg brothers taking out \$40 ore.

## COLORADO

## Boulder County

**SLIDE GOLD MINING CO. (Boulder)**—Flotation on dump ore proved success. Mine being unwatered and reopened; shaft 1000 ft. deep. Mine to be equipped with steam hoist, air compressor and drills.

**VASCO (Nederland)**—Vasco No. 3 has opened payable ore. Work under direction of Albert Scogland. In Vasco No. 7, the 150 ft. level has been advanced 140 ft. and the 250 ft. level has been advanced 75 ft. A 3-ft. vein has been opened containing a 6-in. streak assaying 7 per cent tungstic oxide.

**WHITE RAVEN (Ward)**—Shaft sinking in progress under the direction of Charles Davis.

## Clear Creek County

**RANDOLPH GOLD MINING (Empire)**—Company cleaning out and repairing caved stores in the old Empress tunnel, preparatory to resumption of development on this level. Howard Peck is superintendent.

**ARGO REDUCTION AND ORE PURCHASING (Idaho Springs)**—Company operating Argo mill at portal of Newhouse tunnel, and Jackson mill, on Chicago Creek, on custom basis. Additional equipment installed in Jackson mill and the capacity increased.

**NEWTON MILL (Idaho Springs)**—Capacity of plant being doubled to take care of the ore from the Gem mine operated by the Idaho Mining, Reduction, Transportation and Tunnel Co., under the management of W. E. Renshaw. Foundations laid and construction of building under way. New unit to be equipped with two Ruth flotation machines, and the entire plant to have capacity of 100 tons per day.

## Dolores County

**RICO ARGENTINE (Rico)**—Bismuth, in addition to gold, silver and copper, opened in No. 4 stope in new lower adit.

**RICO MINING CO. (Rico)**—Sold to reorganization committee, and transferred to new company called Syndicate Mining and Milling Co. Authorized capital, \$500,000.

**RICO-WELLINGTON (Rico)**—Oil-driven compressor to be installed.

## Hinsdale County

**FRANK HOUGH (Lake City)**—Property on American Flats, north slope of Engineer Mountain, to be reopened by lessees. Owned by A. E. Reynolds, of Denver.

## Lake County

**BARTLETT TUNNEL (Leadville)**—Streak of smelting-grade ore opened recently.

## Ouray County

**CAMP BIRD (Ouray)**—Reported rich vein to be developed as soon as title is cleared.

**MOUNTAIN TOP (Ouray)**—Regular shipments good-grade copper-silver ore being made. Deeper development now under way.

## Park County

**DOLLY (Alma)**—New aerial tramway nearly completed.

**LONDON (Alma)**—Lower tunnel progressing satisfactorily. New side-dump cars and mule haulage to be installed.

**MAGNOLIA (Alma)**—To be reopened in spring. New towers first to be added to tramway and other improvements made.

## San Miguel County

**TELLURIDE DISTRICT SHIPMENTS** in April were: Smuggler, Humboldt and Black Bear, 43 cars to Durango and 32 cars to Pueblo; Tomboy 43 cars; total 113 cars, all concentrate. Liberty Bell has discontinued shipping ore. All recoveries now made in form of bullion.

**NEW DOMINION (Ophir)**—Property being developed under management of James Belisle. Air compressor, machine drills and other mining equipment recently installed.

**BUTTERFLY (Ophir Loop)**—Property developed during winter by Paul Nardin and associates. East drift advanced 200 ft., part of the distance in payable ore, to be milled when water supply is sufficient. The mill being placed in working order.

**MOUNTAIN FLOWER MINING (Telluride)**—Company developing 23 claims on Deep Creek. M. J. Clemings is manager.

## San Juan County

**CALEDONIA (Silverton)**—Mine reopened and mill overhauled; flotation to be installed. Some machinery on way. D. W. Fleming is manager.

**SUNNYSIDE (Silverton)**—Mill and tramway ready. No shortage of labor is expected.

## Summit County

**AMERICAN METAL CO. (Bufferhs)**—Second shipment of molybdenum concentrates made. Main haulage tunnel being driven; when finished will be 2200 ft. in length and equipped for electric haulage.

**DENVER M. & M. CO. (Wortman)**—Mill being overhauled. Small force on mine development work.

## Teller County

**CRESSON (Cripple Creek)**—Lateral from Roosevelt tunnel now in Cresson ground at point 600 ft. from main tunnel. In drift on Funeral Dike, low grades obtained and expected better ore will be cut.

**EL PASO EXTENSION (Cripple Creek)**—Rich strike made in Index mine. Ore-shoot is 6 ft. wide and shows considerable sylvanite. Regular production being made.

## KANSAS

## Joplin District

**VALLIERE (Baxter)**—New company, with C. M. Mitchell president, to develop lease south of city. Five good drill holes. New shaft down about 50 ft. To develop further.

**L. G. HAMILTON (Kansas City, Mo.)**—Promising deep lead ore find southeast of Galena. Ore at 285 ft. extends to 360 ft. First instance of deep lead in Galena camp.

**CHANUTE SPELTER (Joplin)**—To put down second 19-in. drill hole to install Pomona pump and make dry shaft sinking possible. First hole unable to accomplish this. Second hole to be placed on opposite side of shaft.

## IDAHO

## Donner County

**ARMSTEAD MINES CORP. (TALACHE)**—Mill to be erected. Plant to cost \$100,000. The initial unit to have a capacity of 100 tons daily. The plans have been prepared in the Hofstrand laboratory. Henry H. Armstead is manager.

## Shoshone County

**PINE CREEK DISTRICT.** Branch of the O.-W. R. & N. will be completed to forks of creek. Work to begin about May 15. Two miles of track washed out must be repaired after which there will be about two miles new construction. Eventually the track will be extended to the Constitution mine. The Douglas, under lease to the Anaconda company, is now hauling ore to the railroad.

**BIG CREEK LEASING (Kellogg)**—Crosscut 2000 ft. from lower tunnel cut one foot vein of ore, two-thirds gray copper carrying 500 oz. silver and one-third galena with high silver content.

**AMAZON-MANHATTAN (Wallace)**—Aerial tram connection with Ray-Jefferson mill, now treating Amazon-Manhattan ore. Mine owned by the Days.

## MICHIGAN

## Copper District

**SENECA (Calumet)**—Sunk vertical shaft 154 ft. in April. Previous record here 130, at Allouez; shaft down about 300 feet.

**HANCOCK (Hancock)**—Daily output of 800 tons, as compared with 1100 tons per month last winter.

**NEW ARCADIAN (Houghton)**—Amygdaloid lode was on 1700 ft. level 11 ft. wide, with copper enough to warrant drifting later.

**LAKE (Lake Mine)**—Output of last two months 6000 and 4500 tons, but yield has increased. Knowlton lode 4 to 5 ft. wide, but rich and to be mined from Butler lode. Almost all rock coming from Lake lode.

**NORTH LAKE (Lake Mine)**—New lode along hanging wall has 6 in. of "copper brick" sandstone.

**COPPER RANGE (Painesdale)**—Optioned land south of Globe has completed cross-section by diamond drilling from Jacobsville or Eastern sandstone to Freda or Western, nothing being found; drilling continued at promising places.

## MINNESOTA

## Mesabi Range

**MESABI RANGE** mining companies have adopted a new wage scale of \$4 for 10-hour day for common labor and \$5.50 for 8-hour day for miners. State Auditor J. A. Preus, of St. Paul, has called for bids for contracts to mine, remove, and dispose of the ore beneath Syracuse Lake near Biwabik. No bid will be accepted for a royalty of less than 50c. per ton. The successful bidder is given the right to drain the lake. It is claimed that there is a large tonnage of high-grade ore beneath the lake.

**BANGOR MINE (Biwabik)**—Pickands Mather Mining Co. erecting an addition to their group of 10 modern houses.

**OLIVER IRON MINING CO. (Eveleth)**—Has authorized erection of a concentrator and crushing plant at the Leonidas mine to serve its openpit operations of the Adams district.

**SHENANGO FURNACE CO. (Hibbing)**—Fire destroyed the headframe of the Webb mine main timber shaft and also considerable mining timber stored in the yard near by.

## MISSOURI

## Joplin District

**OSAGE MINING CO. (Damsel)**—Shaft down 40 ft. Machinery purchased and delivered. Plant expected to start up soon. L. W. Jeffords is president and manager.

**BUCKEYE (Joplin)**—W. A. Kober and T. J. Marlow, of Toledo, Ohio, to do some deep drilling on Buckeye lease north of Cave Springs, Missouri.

## MONTANA

## Jefferson County

**MONTANA STATES CO. (Alhambra)**—Unwatering 250-ft. shaft.

**ALTA MINE (Corbin)**—Shipping dump screenings.

**AMALGAMATED SILVER MINES (Lump Gulch)**—Stopping on 250 and 180 levels. Carload shipped.

## Lewis and Clark County

**CRUSE CON. (Helena)**—Deepening 185-ft. shaft.

**HELENA MINING BUREAU (Helena)**—Work progressing with one shift, owing to a strike of stationary engineers. Miners scarce.

**SCRATCH GRAVEL GOLD CO. (Helena)**—Upper workings leased and ore mined.

**BARNES KING DEV. CO. (Marysville)**—Shannon and Pigan-Gloster mines, under operation by the Barnes-King Co., producing ore of milling grade. Ore from Shannon comes from above the 500 level.

**BELL BOY MINE (Marysville)**—The discovery at depth of 150 ft. is claimed to be from 5 to 7 ft. wide and high in grade. The ore contains gold, silver and lead.

**JERUSHA MINE (Marysville)**—Auto truck to be used for transporting ore from the Jerusha mine in Towsley gulch to the East Helena smelter, a distance of 45 miles.

**TOWSLEY GULCH CO. (Marysville)**—A crosscut has intersected a streak of lead-silver ore on the hanging wall.

**LEE MOUNTAIN (Rimini)**—Ore uncovered in tunnel and in shaft.

**PORPHYRY DIKE (Ten Mile)**—James Breen mill rapidly approaching completion.

## NEVADA

## Clark County

**MANGANESE ASSOCIATION (Las Vegas)**—Three-year lease at 15% royalty sold to Los Angeles interests, which have taken over \$16,000 indebtedness and contract obligations of the association.

## Lincoln County

**AMALGAMATED (Pioche)**—Operating under lease, and mill treating 10 to 12% lead-zinc sulphide ore containing silver from new orebody found in limestone.

**BLACK METALS CO. (Pioche)**—Recently shipped carload of manganese in cleaning out old workings. Grade of 40% Mn expected.

**BRISTOL-MAY (Pioche)**—Shipping silver-lead-copper ore from Jack Rabbit station.

**PIOCHE MINES CO. (Pioche)**—Old mill being remodeled and developing mine.

**PRINCE CONSOLIDATED (Pioche)**—Making shipments of 300 to 400 tons daily of low-grade fluxing iron-manganese ore, with about 8 oz. silver per ton.

**SILGOLED MINING CO. (Pioche)**—Retimbering shaft prior to shipping ore opened at 490 level.

## Nye County

**MANHATTAN CON. (Manhattan)**—Mud fault 3 ft. wide crossed on 500 level marking western limit of orebody.

**UNION AMALGAMATED (Manhattan)**—Shortage of crew due to epidemic of grippe. Ore from 600 level raise at top high in grade. Option on one-half interest to Charles S. Sprague Co. is rumored.

**WHITE CAPS (Manhattan)**—Mine crew nearly all laid up with grippe. Daily output about 140 tons.



**TONOPAH DISTRICT** production of silver ore for the week ended Apr. 27, amounted to 10,165 tons of an estimated gross milling value of \$172,805. Producers were: Tonopah Belmont, 1927 tons; Tonopah Mining, 3400; Tonopah Extension, 2380; Jim Butler, 568; West End, 1107; MacNamara, 543; Montana, 225; Cash Boy, 6; and miscellaneous, 9 tons.

#### Storey County

**JACKET (Gold Hill)**—Sent 200 tons from shaft bins to mill gloryhole. Jacket shaft 300 level north drift advanced 14 ft. Surface tunnel timbering and sinking advanced four feet. Started west crosscut to connect with gloryhole from No. 2 raise 25 ft. above tunnel, advanced six feet; saved nine cars low-grade ore. Seven mills, tables and old cyanide plant in operation; 448 tons mine ore put in mill bins.

**MILLIONAIRE GOLD MINE (Gold Hill)**—Three miles east. Recently purchased and taken over by Charles Knight, who will resume operations. This mine has been owned and closed by the McKean National Bank, of Terre Haute, Ind., for a number of years. It is fully equipped with mill and shaft machinery and operated to the 400 level.

**SYLVANITE GROUP (Gold Hill)**—Gold mines three miles north leased by J. W. Davies and associates, of Sacramento, Calif., have recovered \$40,000 worth of ore from an 80-ft. raise, 400 ft. below the old workings on a stringer of the main vein. Two new drifts are being made on the property, one 1200 ft., and one 900 ft., both attaining a depth of 550 feet.

**CON. VIRGINIA (Virginia)**—Sent eight tons from 2000 level sampling \$11.51 per ton. Cleaned out caved material in southwest drift from C. & C. shaft; laid floor for tracks distance of 130 ft. Northwest drift on 2700 level advanced 6 ft. and connected with southwest drift from Con. Virginia and Ophir shaft.

**MEXICAN (Virginia)**—On 2300 level drove north in low-grade quartz to 50-ft. point and followed the vein northeast, advancing the face 12 ft., giving occasional fair assays. Mill handled 424 tons, including ore from Union, Con. Virginia, Ophir, Sierra Nevada, of total value of \$8,403.

**OPHIR (Virginia)**—Extended northwest crosscut 2000 level to 74-ft. point and connected with main south lateral drift from Union shaft. Milled at Mexican mill 76 tons of ore sampling \$15.40. Sent 15 tons to Ophir dump at Mexican mill, sampling \$23.09 per ton.

**SIERRA NEVADA (Virginia)**—Saved from north drift on 2500 level 51 tons sampling \$19.19 and milled at Mexican mill 56 tons sampling \$12.21 per ton.

**UNION CON. (Virginia)**—Milled 311 tons in the week, of total value, \$6,788. On the 2500 level 86 tons sampled \$37.09 per ton. Average of 294 tons of the total milled was \$22.27. On 2400 level the roof of the raise in east crosscut showed 15 in. of ore sampling \$13.46. Extended east crosscut on 2600 level 10 ft., face in quartz and porphyry.

#### OKLAHOMA

##### Joplin District

**ZUMA (Miami)**—New company to drill out lease at Lincolnville. B. J. Liggett, Oklahoma City, is president.

**NORWOOD (Norwood)**—Rich run of iron pyrites found at depth of only 10 ft. and extending to 30 ft. May be developed by steam shovel. J. M. Little, Norwood, manager.

**MISSOURI MULE (Picher)**—Has sunk shaft to second level and resumed production.

**WILSON (Picher)**—Started drifting from new shaft in ore at 120 ft. New mill under construction. Mine owned by Hare interests, of Oklahoma City.

**WHITE SWAN (Quapaw)**—Broke into ore in new shaft just south of old Mission mine. Plan mill building soon. Will H. Zorn, West Plains, Mo., is president.

#### OREGON

##### Grant County

**TRI-STATE (Canyon City)**—Has acquired and remodeled 80-ton mill of Jupiter Mining Co., between Canyon City and Prairie City, and has contracts for large deliveries of chrome ore from owners and leasers. No product below 20% to be accepted. Company also owns and purposes to work one or two properties of its own. Walter J. Nicholls, A. L. White and R. E. M. Strickland of Spokane, chief stockholders. Expect concentrator in operation May 25, and ore shipments to start May 15.

#### Jackson County

**RAINIER MERCURY Co (Gold Hill)**—This Seattle, Wash., concern has taken over the Utah Mercury Co.'s group of 35 lode claims, and the Samuel Bertleson holdings, 12 miles north. These claims are contiguous to the Chisholm mine, which has been a producer of mercury ore since 1878. The company has erected a 12-pipe mercury furnace to reduce the cinnabar ore and developing sufficient ore to erect a 150-ton capacity modern reduction works.

#### Josephine County

**WALDO DISTRICT** chrome properties controlled by R. J. Rowen and associates, of Grants Pass, who began operation early in April, are making shipments of chrome-ore concentrates direct to Canton, Pittsburgh, and Jersey City on Government orders. The output is hauled by auto trucks from 10 to 20 miles to Waterville, the nearest shipping point.

**ALAMEDA COPPER MINES (Grants Pass)**—Considerable progress being made in erecting new reduction works 27 miles below Grants Pass, on Rogue River. Contract calls for 200-ton ore-concentrating mill and a blast furnace of 150-ton capacity at an expense of \$200,000, requiring 500 electric horsepower.

#### UTAH

##### Juab County

**CENTENNIAL-EUREKA (Eureka)**—Strike reported on 1900 level in new part of mine.

**GODIVA (Eureka)**—Drifting on 1200 level to further open low-grade ore.

**GOLD CHAIN (Mammoth)**—Work resumed after short shut-down by labor troubles.

**RIDGE & VALLEY (Eureka)**—New find on 1800 level shows 8 ft. width of lead-silver-copper ore.

**SCOTIA (Jericho Station)**—Several stringers opened and hope to continue shipments. Small hoisting engine to be installed on 150 level. Property recently changed hands, present controlling interests being Dudd and Fabian, of Salt Lake.

##### Millard County

**BLACK ROCK DISTRICT** has a large sulphur deposit near Black Rock, on the San Pedro, Los Angeles & Salt Lake R.R., which is to be developed by a Chicago syndicate represented by Michael Morrissey. About 600 acres have been acquired, and it is thought that \$100,000 will be put in a modern plant. Mine worked by early Mormons.

##### Salt Lake County

**CARDIFF (Salt Lake)**—To start two or three trucks hauling to railroad. Over 1500 tons of ore at bins.

#### VIRGINIA

##### Roanoke County

**ROANOKE ORE & IRON (Roanoke)**—To equip and operate the Catawba iron property, 25 miles north. To build 12 miles of railroad and a washing plant. E. E. Franey is president, 315 Stephen Girard Bldg., Philadelphia, Penn.

#### WASHINGTON

##### Ferry County

**LAURIER (Laurier)**—Shipments to be resumed and continue at rate 100 tons month. Grade of 4 to 5-ft. orebody is 5% copper. Chrome discoveries are reported near by.

##### Stevens County

**ELECTRIC POINT (Northport)**—One ore chimney developed to a depth of 700 ft. Large orebody, the extent of which has not been determined. Winze from 600 level for 100 ft. showed the ore to that depth and that its extent was increasing. Four chimneys of ore from 25 to 35 ft. wide to be expected at 700 level. Material for a \$50,000 tram is being hauled to the property.

#### WISCONSIN

##### Zinc-Lead District

**VINEGAR HILL ZINC CO. (Platteville)**—Sinking new shaft on Franklin Rundell land at Livingston, to supply the Yewdall mill. Another new shaft in progress on Dale Rundell land, and a mill to be equipped. New Jefferson mine, at Hazel Green, has again been unwatered, but operations held in abeyance awaiting improved market conditions.

**WISCONSIN ZINC CO. (Platteville)**—Drilling the Rosa Bennet lease, just beyond city limits; the property formerly known as Trego and Big Four and was at one time a big producer of low-grade blende ore.

#### CANADA

##### British Columbia

**CORK-PROVINCE (Kaslo)**—Ball mill and flotation plant installed at expense \$15,000, giving 120-ton plant. Flotation to be used to treat silver-zinc tailings.

**CANADA COPPER (Princess Camp)**—Kettle Valley railroad has let contract to W. P. Tierney, Vancouver, B. C., for 15-mile branch to mining properties on Copper Mountain. Cost estimated at \$1,000,000. Mr. Tierney will let sub-contracts within two weeks. Construction difficult and will require a year, during which time company will build 3000-ton concentrator. West Kootenay Power and Light Co. to build 150-mile power line from Greenwood to Copper Mountain for the mining company.

##### Ontario

**ELK LAKE SHIPMENTS** of silver ore over the T. & N. O. Ry. from Miller-Lake-O'Brien in March were 30 tons.

**WALSH (Gowganda)**—Crown Reserve is continuing development, and some narrow veins have been discovered at the 100 level.

**McINTYRE (Porcupine)**—April production a record. Deal for control of New Ray has been ratified.

**McINTYRE (Porcupine)**—Decided to defer indefinitely contemplated additional mill equipment, owing to present high cost.

**MAHON CLAIMS (Porcupine)**—Diamond drilling contract let and the work under way.

**NEWRAY (Porcupine)**—A special shareholders' meeting was held April 30th, at which the agreement under which 1,530,000 shares of stock were placed under option to the McIntyre Co. at 45c. per share was ratified.

**COBALT DISTRICT SHIPMENTS** of silver ore over the T. & N. O. Ry. in March in tons of 2000 lb. were: Aladdin, 68.75; Beaver, 32.87; Buffalo, 395.73; Coniagas, 164.50; Dominion Reduction Co., 196; Hudson Bay, 32.12; Kerr Lake, 49.89; La Rose, 98.81; McKinley-Darragh, 290.24; O'Brien, 64.68; Silver Queen, 37.31; total, 1430.90 tons.

**MINING CORPORATION OF CANADA (Cobalt)**—Changes being made in mill to treat 300 tons per day of tailing accumulations. Capacity to be gradually increased to about 700 tons. Pump of 1000 tons' daily capacity to be installed to accumulate a reserve supply for treatment in the winter.

**MINING CORPORATION (Cobalt)**—Considering treatment of large amount of old mill tailings in Cobalt Lake. Sands by flotation process and slimes by cyanide treatment.

**NATIONAL (Cobalt)**—Started treating tailings in the lake by flotation.

**OPHIR (Cobalt)**—Shaft down 440 ft.; station being cut. Winze to be sunk to the contact, 150 ft. further.

**BURNSIDE (Kirkland Lake)**—New vein 6 ft. wide carrying free gold has been cross-cut at 125 level.

**ASSOCIATED GOLDFIELDS (Larder Lake)**—Large amount of new machinery is being installed. Crosscutting of one of main orebodies and extensive development at 500 level under way.

**PORQUIS JUNCTION** shipped from the Alexo mine in March 4400 tons of nickel ore.

**ALEXO (Porquois Junction)**—During eleven months ended Mar. 31 total shipments amounted to 11,580,200 lb. of ore. The highest record was for January, when 1,625,700 lb. was shipped.

**OTISSE (Fort Matachewan)**—Diamond drill outfit now on ground and operations to begin in a few days. Machinery on way.

**LIGHTNING RIVER DISTRICT**—Permission to work granted to claim owners in this new gold section. An inspector has reported and states that prospecting is not likely to conflict with interests of Abitibi Power and Paper Company.

#### MEXICO

##### Sonora

**GREENE CANANEA COPPER CO. (Cananea)**—Production in April was. Copper, 4,100,000 lb.; silver, 121,670 oz.; gold, 1270 ounces.

##### CHOSEN

**ORIENTAL CONSOLIDATED (Unsan)**—April cleanings \$180,405.

# The Market Report

## SILVER AND STERLING EXCHANGE

May	Sterling Exchange	Silver		May	Sterling Exchange	Silver	
		New York, Cents	London, Pence			New York, Cents	London, Pence
9	4.7550	99½	49½	13	4.7550	99½	48½
10	4.7550	99½	49½	14	4.7550	99½	48½
11	4.7550	99½	49½	15	4.7550	99½	48½

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

## DAILY PRICES OF METALS IN NEW YORK

May	Copper		Tin		Lead		Zinc
	Electrolytic	Spot	N. Y.	St. L.	N. Y.	St. L.	St. L.
9	*23½	†	@ 6.60	@ 6.57½	@ 6.60	@ 6.57½	7
10	*23½	†	@ 6.60	@ 6.57½	@ 6.60	@ 6.57½	7 12½
11	*23½	†	@ 6.80	@ 6.62½	@ 6.70	@ 6.60	7 17½
13	*23½	†	@ 6.80	@ 6.62½	@ 6.70	@ 6.62½	7 20
14	*23½	†	@ 6.80	@ 6.62½	@ 6.70	@ 6.62½	7 20
15	*23½	†	@ 6.80	@ 6.62½	@ 6.70	@ 6.62½	7 20

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

†No market.

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

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

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

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

## LONDON

May	Copper		Tin		Lead		Zinc
	Spot	3 Mos.	Spot	3 Mos.	Spot	Spot	Spot
9	110	110	125	380	380	29½	54
10	110	110	125	380	380	29½	54
11	110	110	125	380	380	29½	54
13	110	110	125	375	375	29½	54
14	110	110	125	370	370	29½	54
15	110	110	125	367	367	29½	54

The above table gives the closing quotations on London Metal Exchange. All prices are in pounds sterling per ton of 2,240 lb. For convenience in comparison of London prices, in pounds sterling per 2,240 lb., with American prices in cents per pound the following approximate ratios are given, reckoning exchange at \$4.7515. £29½ = 6.2576c.; £54 = 11.4545c.; £110 = 23.3333c.; £125 = 26.5151c.; £260 = 55.1515c.; £280 = 59.3937c.; £300 = 63.6362c. Variations, £1 = 0.2121205c.

## Metal Markets

### NEW YORK—May 15, 1918

The interesting features of this week were the further advance in zinc and the beginning of an advance in lead, signs of which were discernible last week. In copper there is a general air of expectancy.

**Copper**—Although the conversations that occurred during the meeting in Washington on May 1 were not of a nature to inspire hope, it is nevertheless now in the air that the War Industries Board will

advance the price for copper after May 31. The expectation of this is so firm that none of the refiners will book orders for delivery after May upon any other conditions than the price that will then prevail. In the meanwhile, there is a great demand for copper for June and later delivery.

However, the refiners are going to be far behind in filling their orders for this month, especially for cakes, ingots and wirebars. They are in a better position to supply copper in the form of cathodes, and the situation will be helped if manufacturers can be persuaded to use cathodes more extensively, instead of the other standard forms. The chief direction for such a substitution is, of course, among the brass makers, who would need merely to provide simple devices for cutting up the cathodes. However, those of the wire drawers and sheet rollers who possess furnaces for remelting their scrap might buy cathodes and convert into wirebars and cakes through the medium of their own furnaces, thus adding to the melting capacity of the country, in which there is a deficiency at present. Copper in the form of cathodes is obtainable at 0.05c. to 0.1c. below the price for wirebars, cakes and ingots.

**Copper Sheets** are quoted at 31½c. per lb. for hot rolled, and 1c. higher for cold rolled. It is said that some manufacturers have increased their prices. Copper wire is quoted at 26½c. f.o.b. mill, carload lots. Higher prices are expected.

**Tin**—The situation remains about as was reported last week. Chinese No. 1, May shipment, is quoted at 99c. @ \$1 per lb., while such small lots of that grade as are available here fetch \$1.10 @ 1.12. Without any doubt, \$1.25 would be paid for Straits if it were available.

An interesting feature of the week was the decline in the official quotation in London, while in the East the market rose. However, it has been recognized that the London quotation has been only normal, and that while it was at £360, tin could actually be sold at £30 @ 40 higher.

**Lead**—Consumers bought from day to day in lots of 100 tons up to 500 tons, besides numerous transactions in lots of one or two carloads, the aggregate of the business amounting to a fair figure. This resulted in an advance in price, and at the close the market was firm on the basis of about 6½c. Lead for July shipment realized better prices than for June. The A. S. and R. Co. has maintained its price steadily at 7c. during the recent period of dullness and lower quotations outside.

**Zinc**—The speculative movement which began in the previous week continued this week, and was accompanied by more buying by consumers, besides which the Government placed an order for grade C. Today the Government is asking tenders on 2000 tons of grade C, to be opened on Friday. Toward the close of the week the advance in the market halted. The rise to the present level has been rather rapid, and there is some opinion that perhaps the advance has gone far enough for the present.

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

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

**Antimony**—The recent purchase of 1000 tons by the Government, which was procured from several sellers, some of whom quoted very low prices, inspired outside buying and a trifling advance in the market, but this was short lived, and during the last week the market became very dull and weak. At the close we quote spot at 12½ @ 12¾c., and perhaps even the lower figure might have been shaded. We quote futures at 11½ @ 11¾c., c.i.f., in bond, which is relatively higher than the spot price.

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

**Cadmium**—This metal is quoted at \$1.40 per pound, unchanged.

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

**Quicksilver**—We quote California virgin unchanged at \$117½ @ 120, but the demand is slack and the metal is difficult to quote. Mexican virgin is quoted at \$112 upward.

San Francisco reports, by telegraph, \$112.50, quiet.

## Gold, Silver and Platinum

It has been announced that the Federal Reserve Board has denied the application of the American Smelting and Refining Co. to increase its gold shipments to Mexico. Gold bars at a rate of \$500,000 monthly have been shipped into Mexico to conform to a decree of the Mexican government that mining concerns shipping gold and silver out of Mexico in ores and base bullion must return the full value of the gold and 25% of the value of the silver in the form of refined gold.

A recent ruling has required that the amount of gold return for silver taken out of Mexico be increased to 50%. Inasmuch as compliance with this order would increase the gold exports to Mexico of the American Smelting and Refining Company to above \$1,000,000, it became necessary for the company to secure the authorization of the Federal Reserve Board to expand its gold shipments. This permission was denied on the grounds that under the existing arrangement Mexico is receiving all the gold that the country needs.

**Mexican Dollars** at New York: May 9, 77; May 10, 77; May 11, 77; May 13, 77; May 14, 77; May 15, 77.

**Platinum**—All supplies having been commandeered by the Government, there is no longer any open market and no sales except to the Government or by the consent of the Government. We quote the Government's price of \$105.

**Palladium**—Commandeered by the Government. Price fixed at \$135.

**Iridium**—Commandeered by the Government. Price fixed at \$175.

## Ore Markets

**Joplin, Mo., May 11**—Blende, per ton, high, \$77.80; basis 60% zinc, premium, \$75; class B, \$55; prime western, \$42.50 @ \$37.50; calamine, per ton, 40% Zn, \$35 @ 25. Average selling prices: Blende, \$43.88, calamine, \$34; all zinc ores, \$43.40.

Lead, high, \$86.95; basis 80% Pb, \$84 @ 80; average selling price all grades of lead ore, \$83.32 per ton.

Shipments the week: Blende, 10,561; calamine, 576; lead, 1652 tons. Value all ores the week, \$620,760.

For the third class, or prime western, ores the price gained strength, much more selling at \$42.50, while large quantities were withheld from the market. Several buyers failed to get the quota they attempted to purchase. While considerable ore selling as class B is equal in grade to ore selling as premium, being used for a class of metal on a lower scale, it must be marketed thus. A like condition exists in the lower classification.

**Platteville, Wis., May 11**—The new basis for the quotation of blende became effective here this week. Blende, basis 60% Zn, \$75 base for concentrates entering into rolled zinc production, but deductions for lead and lime under the new schedule of penalties brought the highest settling price for the week's best product down to \$65 among nine cars of ore of this class delivered. The district's second grade of blende, going into spelter production, sold down to \$45 per ton. No quotations are available for the still lower grades of blende which enter into the manufacturer of oxide and acid or are sent to separating plants to be roasted. Lead ore, basis 80% lead, \$80 per ton. Shipments reported for the week are 2825 tons blende, 119 tons galena and 1513 tons sulphur ore. For the year to date the totals are 47,294 tons blende, 2636 tons galena and 20,037 tons sulphur ore. During the week there were shipped to separating plants 2745 tons of blende.

**Chrome Ore**—Ore of 45% grade is quoted at \$1.50 @ 1.55 per unit, f.o.b. shipping points.



Manganese Ore—Unchanged at \$1.20@1.30 per unit for metallurgical ore, 48% grade.

Molybdenum Ore—After a long interval of stagnation some small business has been done at \$1.25 per lb. of MoS2 for 90% material, a price much below the last previous quotation.

Pyrites—Spanish lump is quotable to those who possess a license from the Government at 17c. per unit on the basis of 98. ocean freight, buyer to pay war risk, less 2% and excess freight. No change is predicted before Oct. 1 unless the War Board makes some modification.

Tungsten Ore—Following the great activity of the last month, the market has become quieter. We quote scheelite at \$24 and wolframite at \$19@24, according to grade.

Iron Trade Review

PITTSBURGH—May 14.

Production of pig iron and steel continues to increase. Comparing March and April, there was an increase of about 5% in pig iron and 2% in steel ingots. Production this month is still heavier. The Institute report indicates that ingots were produced in April at the rate of about 42,600,000 tons a year, a slightly better rate than obtained in either 1917 or 1916. Production this month is probably at rates between 44,000,000 and 45,000,000 tons for ingots and 42,000,000 and 43,000,000 tons for pig iron. The greatly increased pressure for deliveries which the War Industries Board began to exert about the beginning of April was predicated upon the previous rate of production, and the increased proportion of their output that the makers are diverting to war channels, together with the increase in the total of production, is bound to give the war activities much more steel than was hoped for six weeks ago, and a surplus for commercial purposes is likely to be developed eventually. Meanwhile, the only steel shipped for commercial use, not related to the war, is steel that is not suitable for war or near-war purposes, and this amounts to a considerable tonnage. The Steel Corporation's unfilled obligations decreased 314,524 tons in April, against a decrease of 232,049 tons in March. The April decrease represented about 25% of capacity, and, taking shipments at 90% of capacity, the bookings were about 65% of capacity, probably being about two-thirds war and one-third commercial. Some departments make a practice of booking regular customers for additional tonnages as their old orders are filled. It is almost impossible to buy any steel unless one is a regular customer of a mill. The bi-monthly report made in connection with adjustment of the sheet and tin plate sliding wage scale shows that the average invoice price of sheets in March and April was 5.10c., against 5.35c. in January and February and 5.50c. in November and December, when the highest average was shown. The tin plate settlement showed \$8 against \$8.40 and \$8.60, respectively. The wages of the tonnage men in the sheet and tin-plate mills come down a few per cent. in consequence, but they are still double the minimum prices to which the scale runs when realized prices are low.

Pig Iron—The merchant furnaces are completing an organized canvass, at the instance of the Government, to show the uses to which customers would put iron if shipped, the object being to insure a full supply to the most useful industries. Few sales are being made except for war purposes. The market remains at the maximum set prices: Bessemer, \$35.20; basic, \$32; No. 2 foundry, \$33; malleable, \$33.50; gray forge, \$32, f.o.b. furnace, freight to Pittsburgh in the case of the Valleys being 95 cents.

Steel—There is practically no ordinary soft steel offered. Some large producers would be willing to buy billets, perhaps even ingots. Discard steel, while being produced in larger tonnage, is hard to pick up. Soft steel prices remain at \$47.50 for billets, small billets being \$51; slabs, \$50; sheet bars, \$51, and rods, \$57.

Coke

Connellsville—Coke shipments from the region have been increasing slowly, but with better supplies from byproduct ovens the blast furnaces are working fairly well and the chief restriction in pig-iron output comes from a few furnaces still being idle. No furnaces are banked, and few are operating at gaited rates. There is practically no coke offered in the open market, contracts absorbing all that can be shipped. The market remains quotable at the set prices: Furnace, \$6; foundry, 72-hour selected, \$7; crushed, over 1-in., \$7.30 per net ton at ovens.

STOCK QUOTATIONS

Table with columns for N. Y. EXCH. and BOSTON EXCH. listing various stocks and their prices.

Table with columns for N. Y. CURB and BOSTON CURB listing various commodities and their prices.

Table with columns for SAN FRAN. and SALT LAKE listing various stocks and their prices.

Table with columns for TORONTO listing various stocks and their prices.

STOCK QUOTATIONS—Continued

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

MONTHLY AVERAGE PRICES OF METALS

Table showing monthly average prices for Silver 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.

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

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

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

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

As reported by W. P. Snyder & Co.