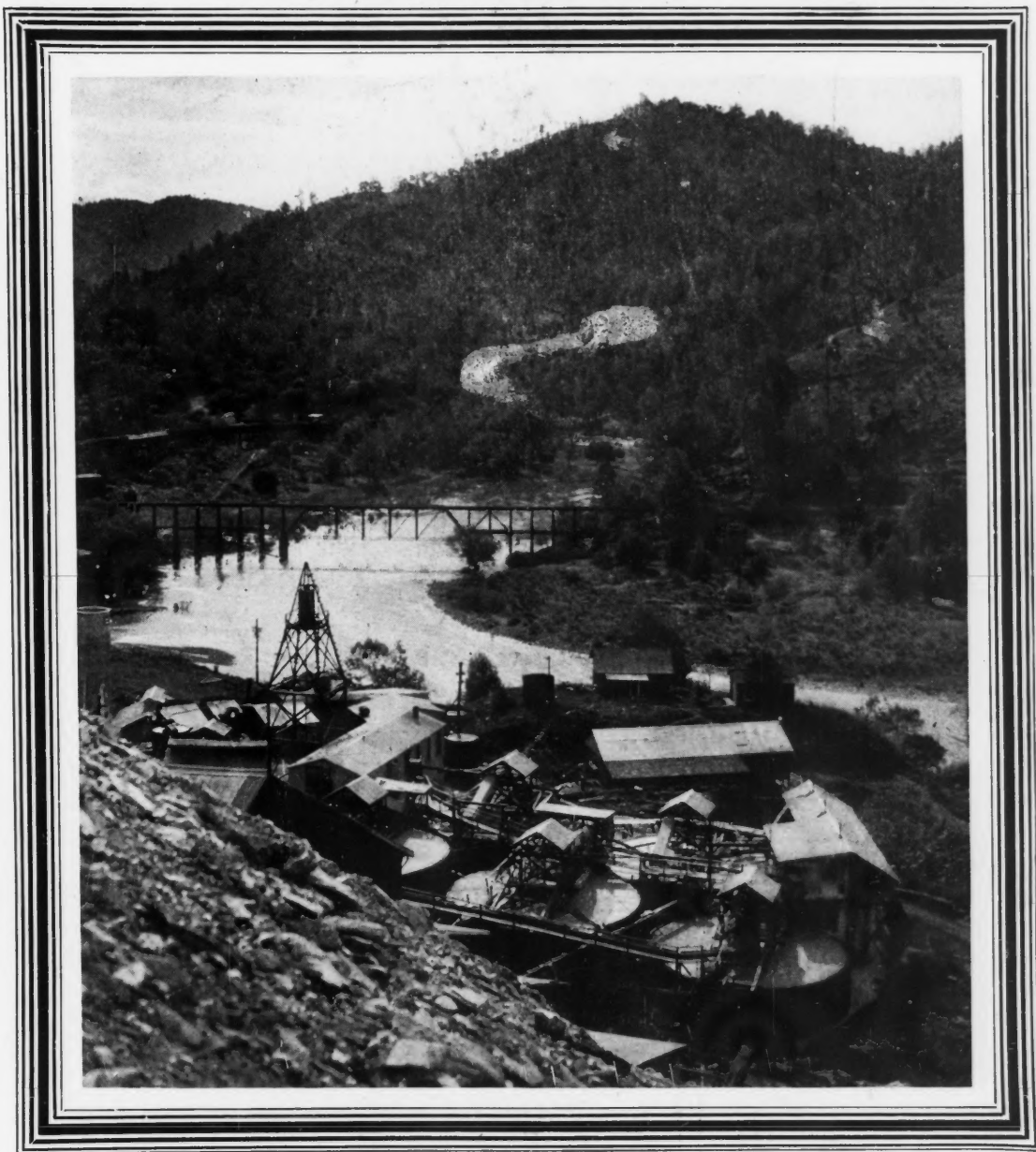


NOV 7 1921

# ENGINEERING AND MINING JOURNAL

A Weekly Journal of the Mining and Mineral Industries

November 5, 1921



*Melones Cyanide Plant, Carson Hill, Cal. Treats Ores from Carson Hill Mines  
This plant handles 500 tons per day*

The October average prices of metals, published on page 752, are decidedly encouraging, representing advances in every case except quicksilver. Silver and platinum show a new high level for the year.

## Gold Mining at Carson Hill, California

By George J. Young

## War Problems in Minerals

## IV—War Minerals Relief Commission

By Philip N. Moore

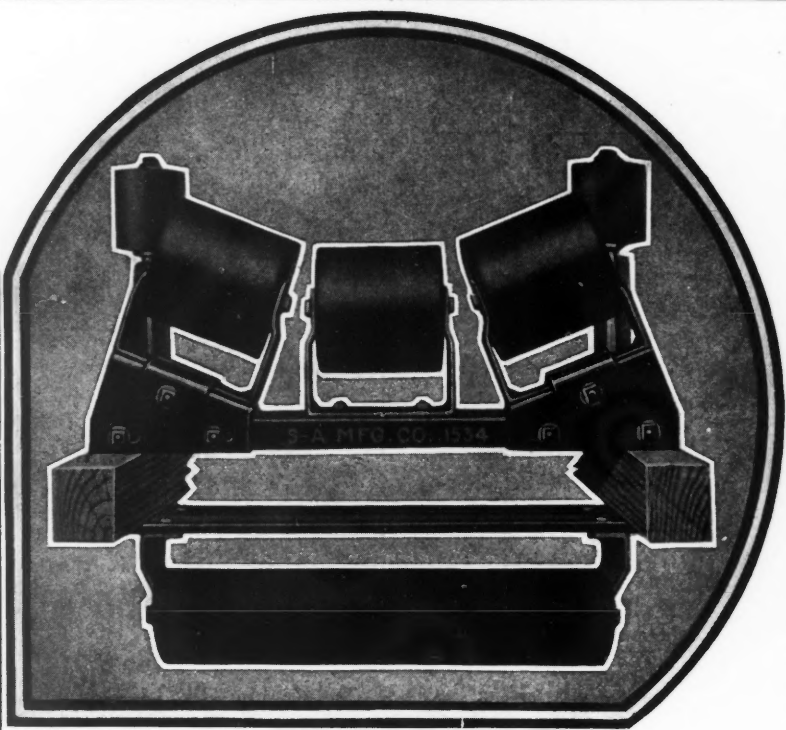
*Biography of C. W. Purington*

Comparisons of the trends in various industries show improvement. Naturally, the status of each industry exerts a bearing on the other. A résumé of business conditions as given on page 755 is of interest.

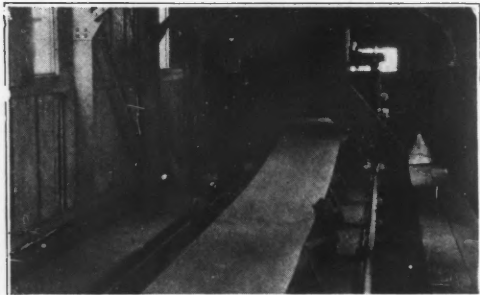
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# Engineering and Mining Journal

*A Weekly Journal of the Mining and Mineral Industries*  
METALS                  NON-METALS                  PETROLEUM

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Consulting Editors

Volume 112

New York, November 5, 1921

Number 19

## The Marketing of Metals and Minerals

ARE OUR SCHOOLS where mining engineers are prepared schools of engineering, or are they schools of mining? Has this puzzling question ever presented itself to the boards of control and the faculties? Are there any schools which intend or pretend to teach mining as an industry, with all the technical and economic aspects given the proper weight?

In considering a mining enterprise there are several main departments. The first question is, how much ore there is or is likely to be, and of what grade. The second is, how it shall be extracted from the earth. The third is, how it shall be treated to produce the metal. The fourth is, where are you going to sell your metal, and whether the market is likely to be steady or unreliable. Four main factors. The first is the peculiar province of the geologist, the second of the mining engineer, the third of the metallurgist. But the fourth—the problem of marketing? Unless the ore can be sold to advantage, there is no use in planning to find it, mine it, beneficiate it. Yet this equally important phase of marketing is not taught in our mining schools; and the mining engineers, metallurgists, and geologists continue to know little about it, to the end of the chapter.

Except for special experts in each mineral or metal trade, most of whom have not been trained in mining, and know or care little about it, there are few who comprehend or have studied the marketing problem of their own product. This is even true of the common metals, and of great organizations; but in the case of the less common mineral products, still less is generally known.

An experienced mining engineer and mine manager some time ago investigated a mine of mixed ores, which contained, among several ingredients, cobalt. At the quoted price for cobalt, and with the other ingredients—such as arsenic—at their quoted prices, he figured a very handsome profit. He had sampled the market qualitatively. He was advised, before going further, to sample it quantitatively, and to try to gage the market's absorbing powers by tonnage as accurately as he had tried to diagnose the ore reserves of the mine. He soon found that, whatever the quoted price, based on actual sales, of cobalt, the mine in question would at once break such prices, for it would produce in one year enough to last the whole United States for many years. Similarly, with arsenic he found that there was much to the science of marketing it, and that, regardless of quoted prices, there were many factors that would actually enter not only into the price that could be obtained but concerning the amount that could be disposed of at the price. In short, the mine was not, marketwise considered, a profitable proposition.

Producers of metals and minerals should understand that quoted prices vary in stability somewhat like the

quotations for stocks in the New York market. For some the quotations yield little to small individual sales or purchases, on account of the magnitude of the whole business transacted; but there are others, in which the dealings are small, where a moderate-sized selling order will break the market.

We believe there is no matter on which it is more important to educate the mining engineer than on the facts and principles of marketing—and merchandising, we are tempted to add. And by the last term we mean following the problem of marketing, as far as practicable, toward the ultimate consumer. We purpose devoting to this work such time and space as we can afford.

In the projected Department of Mines, which is now before Congress, there is provided the establishment of a Bureau of Mineral Markets, which would be devoted to this problem, so essential to our industry. This, of itself, is sufficient reason why the Nicholson bill should be passed. The agricultural industry is provided with such a potent aid, in the Bureau of Markets of the Department of Agriculture.

## More About Those Copper and Brass Stores

OUR EDITORIAL in the Oct. 15 issue, in which we made a plea for the establishment of retail stores handling copper and brass products at reasonable prices, has elicited a letter from the Rome Brass & Copper Co. Mr. H. J. Rowland, sales manager of that organization, calls our attention to the fact that it has maintained a store at 115-119 North Market St., Chicago, for about twenty years. We are glad to mention this fact, and also to make it clear that similar stores or warehouses are maintained by several other fabricators of semi-manufactured copper and brass products. However, these stores are not exactly what we had in mind. The Rome establishment in Chicago, for instance, is in a district largely occupied by warehouses and buildings used for manufacturing. It is designed to supply the trade rather than the retail buying public. Only a limited variety of products are sold, such as sheet brass and copper, brass rods, brazed and seamless tubes, moulding, door rail, angles and channels, electrical copper, roll copper, and rivets and burrs. We understand that copper screening, nails and tacks, wash boilers, kitchen utensils, hot-water tanks and other more highly manufactured products are not carried. We are glad to find, however, that at this store one may buy as little as one sheet of copper for 20 or 21c. per lb., or one length of a rod or tube. That such retail business was accepted by these manufacturers' outlet stores was unknown to us, and we think to many of our readers; certainly to those who have complained to us of being obliged to pay four or five times as much when purchasing from their general supply stores. Apparently no effort is being made to solicit this small business or to make known

to the general public that semi-manufactured copper is available in small quantities at reasonable prices.

The kind of store which we had in mind would be situated in the retail shopping district with attractive show windows to attract the public. These show windows, the salesmen inside, and newspaper and magazine advertising would gradually eliminate the public impression that copper is a luxury. The store would sell either wholesale or retail, the retail prices representing a fair advance over the wholesale cost, but not an inordinate one, as they now often do. What is needed is to persuade Mr. Average Man that copper is something which he should use more of. After paying \$1 for some copper article worth 50c. or less, he feels, without further investigation, that a copper roof for his house is out of the question. The basis of this impression must be removed, and one way to do it is to sell a few thousand stamped copper trays, boxes of tacks, and cast candlesticks at cost.

Let the public get used to the color.

### The Railroads and the Trucks

**T**HE EASTERN RAILROADS, running through the most populated portion of the United States, enjoyed not so very many years ago great prosperity, while the Western railroads, serving the long thinly populated stretches, had hard times and small pickings. New Haven stock was the "safe" investment of the old ladies and solid conservatives of New England; Pennsylvania stock, a little later, was regarded as in the same investment class as Government bonds. Today the situation has changed: New Haven stock has not the remotest chance of a dividend, even the bonds are of doubtful nature, and an impending receivership continually hangs over the road that serves the densest population of the country. Even the security of Pennsylvania stock has been shaken, and its dividends have been decreased. But the long lonesome roads of the West, like Southern Pacific and Northern Pacific, have become sound and steady dividend payers.

It is, in fact, the dense population which makes railroading in the East, especially in New England, a difficult financial problem. It is a region of short hauls, "one continuous terminal," as has been exaggeratedly but trenchantly stated; and this means great expense to the railroads, and a difficulty in covering the cost of hauling freight at so much per ton mile.

The most important development, hinging upon the dense population, is that of good roads and the motor truck. Especially at night, the excellent main highways carry almost continuous lines of great freight trucks, thundering along at thirty or forty miles an hour. Without having access to figures, we do not doubt, from observation, that more freight is hauled by truck between New York and New Haven than by rail.

In the United States in general it is stated that in 1920 motor trucks transported 480,000,000 tons; and naturally most of this is in the short-haul populous districts.

### Latin-American Maps

**W**E CALL SPECIAL ATTENTION to the plans announced in our issue of last week, of the American Geographical Society of New York, for collecting, compiling, and publishing geographic data concerning the countries of Latin America. Those who have traveled in these countries have been astonished at

the almost total lack of accurate geographical knowledge or of even approximately correct large-scale maps, which obtains over great areas. In the United States and Canada we have many surveys, of varying degrees of accuracy; but in general the maps are fair, and sometimes excellent. Lastly, comes the topographical map of the United States, in process of being finely executed in individual small sheets by the U. S. Geological Survey.

In Alaska and in the remoter parts of Canada, determined work by explorers, geologists, and surveyors has steadily attacked the unknown, and persistently hewn the way to better knowledge of geography. Some very excellent cartographic work has been done in some of the states of Mexico, but the surveying and the engineering accuracy fall short of the distinguished delineation skill which characterizes the Mexican draughtsmen. In general, around the shores of the Caribbean Sea, for example, the only worth-while maps are those of the U. S. Coast and Geodetic Survey, which has surveyed the shores and sounded the littoral seas. But back of these shores the rivers are often sketched from the memory of some mahogany cruiser, and the relief is an unknown element. Any mining engineer, traveling in a pitpan, with a few instrumental observations, can produce a sketch map of the average Central American river which is a great improvement over anything recorded or published; and location of latitude and longitude, partial triangulations, even compass traverses tied in to some known point, will be invaluable data for the compiling geographer.

Mining engineers are the most exploratory of the species, and the most competent to make sketch maps and general geographic and topographic observations. We urge them to bear in mind, now and definitely, the work that the American Geographical Society is undertaking, and to constitute themselves members of its army of volunteer scouts. Such a work could really only be undertaken by this one organization, whose contributions to cartography have already been so valuable. Our Federal surveys can, of course, not go outside of the United States; nor can our Coast and Geodetic Survey leave the shores.

Get into correspondence at once with Allan G. Ogilvie, American Geographical Society, 3755 Broadway, New York, and enroll in this foreign legion of cartographic scouts. You will receive in return information, when you need it, which will more than repay you; and eventually at least reconnaissance maps of those backwoods which we have yet to develop.

### The Least Advertised Commercial Earth Product

**P**OSSIBLY among the many mineral products which are produced in the United States our readers know the least about helium. Yet there is a large plant in Fort Worth, Tex., built by the Government at a cost of \$2,000,000, which has recently been completed; and the Government has in storage over \$2,000,000 worth of this material.

Helium is a gas, obtained from natural gas, of which it forms a minor ingredient. It is lighter than air, like hydrogen, and its value is for balloons—war dirigibles specifically—and its unique advantage consists in this, that unlike hydrogen, it is not inflammable.

The history of our knowledge of this element is fascinating—one of the wonders of science. There was

no such thing as helium when you and I were boys, any more than there were airplanes or wireless—at least, there existed no such thing within our world of knowledge. Helium was first found—not in Europe or in America, but in the sun—as a new strange line in the sun's spectrum, in 1868. At least this is one thing for which the prospector will not claim credit, at the expense of the scientist. In 1888, Dr. Hillebrand, of the U. S. Geological Survey, noted a strange gas evolved from certain uranium minerals; and, following this clue, Sir William Crookes finally established the identity of this gas with helium.

Dr. Richard B. Moore, of the U. S. Bureau of Mines, has told the helium story with comprehensive accuracy in the *Journal of the Franklin Institute*, of Philadelphia.

In 1895, helium was detected in the atmosphere, and was later found in mineral springs and in volcanic gases; and ultimately it was found in natural gas, particularly in North America. It is from this last-named source that the gas is being collected in immense quantities by the Government.

It is generally believed that helium cannot long be retained in the atmosphere—that on account of its lightness it must be thrown off into space; and that, therefore, its presence in the atmosphere in constant proportions indicates a steady earth-supply to compensate the continual loss.

Rocks and minerals have been found to contain helium. Its amount, in rocks, is frequently too small to be directly measured; but it is usually found in measurable quantity in those minerals which contain uranium or thorium, such as carnotite, thorianite, and pitchblende. Beryl contains a considerable amount of the element. The saline minerals of Stassfurt, in Germany, such as sodium chloride (rock salt), potassium chloride, carnallite, and kieserite, contain it. Most abundantly it is found in potassium chloride, and it is remarkable that it appears to be nearly eighty times as abundant in the potassium chloride mineral as in the sodium chloride, while the uranium content, with which the helium content of minerals has been supposed to be very closely connected, is relatively reversed, being three times as great in the sodium chloride. In fact, in the saline minerals, there is no evident interrelation whatever between uranium and helium.

In studies of natural gas from Kansas, it has been found that there is a rough ratio of quantity of helium present to that of nitrogen. These researches formed

the first foundation for the belief that an adequate supply of helium could be obtained from natural gas, for the filling of dirigibles.

It has been concluded by Rutherford that the helium atom is the alpha particle which is one of the three disintegration products of radium; and this has been proved by experimentation. It has accordingly become generally believed that to radioactive changes has been due the helium of nature, both in the atmosphere, in natural gases in the earth, and elsewhere. But a theoretical difficulty presents itself. The period of radioactive changes has been definitely determined, and the relative quantity of products obtained. Two thousand pounds of uranium will produce only 110 cubic millimeters of helium per year. Therefore, the accepted origin does not seem to be at all sufficient quantitatively. The total amount of helium already produced by the gas wells of the Petrolia field, in Texas, from which the Government reduction plant draws its supplies, is more than sixty million cubic feet; and the area of the field is only eight or ten square miles. Dr. Moore is of the opinion that it is inconceivable that so much helium could have been produced by radioactive changes within this limited area; and adds that in any event this explanation assumes large quantities of uranium or thorium minerals more or less localized, an assumption for which we have no evidence whatever. This doubt is further strengthened by the presence of helium in non-radioactive minerals, and by the observations in the Stassfurt saline minerals above noted. Dr. Moore significantly remarks, "Are changes going on in nature about which we know nothing, and are these changes as radical and important as radioactive changes, about which we knew nothing twenty-five years ago?"

The amount of helium in the gas at Petrolia, Tex., is 0.93 per cent, among the highest found in the United States. Is it not possible that the amount of this gas will serve as an index of the relative amount of other elements in that portion of the crust whence it is derived? The current theory supposes helium to be an index of the relative quantity of thorium and uranium, in the undercrust; but the considerations stated by Dr. Moore render this doubtful. Do the remarkable relations found in the Stassfurt salts hold good as a rule, or are they exceptional? Is there any connection between potash and helium? We have no doubt that experimental work, in the Bureau of Mines laboratory and elsewhere, may unfold new and marvelous mysteries.



HELIUM PRODUCTION PLANT, FORT WORTH, TEX.

## WHAT OTHERS THINK

### Reasonable Prices for Copper Products

A short time ago an article appeared in *Engineering and Mining Journal* stating that you would like to see stores started in New York, Chicago, San Francisco, and New Orleans, where copper and brass products could be sold in large or small quantities at reasonable prices. Permit us to say that we have our own stores in New York and Chicago and sell our sheet copper and copper products at reasonable prices. In fact, we charge no more for copper out of New York or Chicago than we do from the mill at Pittsburgh.

We have heard at times of sheet copper being sold at 75c. or \$1 a pound, but personally we have never been able to find anyone who paid that price. We have always advocated selling our goods at a reasonable price, and have done so; even during the war, when it was possible to get almost any price for copper, we kept strictly to the published prices, no matter whether the copper which we were obtaining came from Pittsburgh or our stores.

The article states that you are going to give a lot of free advertising to the first copper or brass company to start a retail store with common-sense prices. We are not looking for any great amount of advertising that is free, but we do think that a statement in your column to the effect that we operate stores of the character you advocate, and are willing to sell to anyone at the lowest market prices, would be of service in advertising the fact among your dealers.

In order to help those who are not skilled in the laying of sheet copper roofs, eaves trough, conductor pipe, flashing, and similar material, we have issued a number of booklets which are free to all who write for them.

C. G. HUSSEY & Co.

Pittsburgh, Pa.

[Further discussion of this matter appears on our editorial pages this week. C. G. Hussey & Co. manufacture copper in sheets, plates and rolls, crimped copper, copper bottoms, conductor pipe, eaves trough, rivets, nails, gaskets, ferrules, soldering coppers, elbows and shoes. The New York Store is at 504 W. 24th St.—EDITOR.]

### Nomination vs. Realization

If you remember the thrills of standing on the side lines and watching your football team give its foes a sound trouncing you will understand my enjoyment of your editorial on the methods used by the National Geographic Society in its quest for new members. You said in a most satisfying manner what I have wanted to say for some time.

I had the "honor" of being "nominated for membership in the National Geographic Society by a Member of the Society" about fifteen years ago at the guileless and hopeful age when, diploma in hand, I fared forth for conquest. I recall the warm feeling of gratification at having so soon attained national prominence and honor. The membership fee, then \$2.50, was a trivial formality incident to entering this great fellowship of distinguished Americans.

Disillusionment came a few years afterward. When I had just moved to Washington I received a letter from a pharmacist in Chicago whom I had once coached in crystallography. He said that he had just been notified of his nomination to membership in the National Geographic Society, and as I was the only person he knew in Washington he assumed that I was responsible and tendered his heartfelt thanks for the honor. I did not have the heart to tell him that he had probably been nominated by the stenographer and clerk to the assistant secretary of the society after a catalog of the Medical School had been consulted. But then and there I resigned from a society that dishonored itself by such methods.

Years afterward I subscribed to the magazine, but I have never renewed my membership and never will as long as such Wallingford methods are in vogue. The National Geographic Society has done splendid work. It is the old, old question whether a good end justifies bad means in its attainment. I am old fashioned enough to think that it does not.

S. B. E.

Chicago.

### The Origin of Petroleum

In *Engineering and Mining Journal* of Oct. 15 you publish an article by Hiram W. Hixon on "The Inorganic Origin of Petroleum." I can scarcely understand how the article in its present form passed the critical eye of the editor.

I am not one who adheres thoughtlessly to the principles of organic origin—the organic theory is not unassailable—but Mr. Hixon's arguments are not convincing. In fact, most of them may be refuted by one who has but an elementary knowledge of the facts and principles of geology. For instance, he says, "If petroleum were of organic origin it would have some of the properties of organic oils." Do fossils have any of properties of the organisms by which *they* were formed? Another of his sentences reads, "The salt, petroleum and sulphur are confined to the domes or their immediate flanks." Can any geologist interpret this statement? As a geologist, are you ready to confirm "an absence of 'sands' in the Gulf Coast section?"

Mr. Hixon refers to the foremost work in American geologic literature, but in his hypothesis he neglects one of the fundamental principles discussed in that work, namely a zone of flowage beneath the zone of fracture. And in his final statement he says the "domes and anticlines are not the cause of the accumulation of oil and gas but the effect of that accumulation." How shall we account for the domes and anticlines that are not and never could have been associated with oil or gas?

I think you will agree with me that geologists will always welcome any facts or arguments that will throw new light on the origin or accumulation of petroleum; but the facts must be completely established and the arguments must be well-nigh invulnerable to withstand the bombardment of criticism that is certain to be directed against them.

W. N. THAYER.

Cincinnati.

## Gold Mining at Carson Hill, California

Important Ore Shoots Discovered in Much Prospected and Mined Region of the State—Mine Operated Through Adit—Electric Haulage System—Wide Stopes—Ore Treated By Amalgamation, Concentration, and Cyanidation—Efficient Working Organization

BY GEORGE J. YOUNG

Western Editor, *Engineering and Mining Journal*

IN APRIL, 1899, F. L. Ransome, in the "Mother Lode Folio," published by the U. S. Geological Survey, made the following statement concerning the Carson Hill district:

"On the south slope of Carson Hill there are at least three strong and distinct veins, all more or less curved. They lie chiefly within fissile amphibolite-schists, although some of the orebodies are accompanied by small dikes and streaks of black slate. The Carson Hill mines were extensively worked in early days, and the orebodies

according to the same authority, was being reopened in 1914. There was at this time an adit 1,400 ft. long and a shaft 600 ft. deep. The Finnigan, on the north-east slope of Carson Hill, was also being worked in 1914.

### WAR CLOSES MELONES MINE

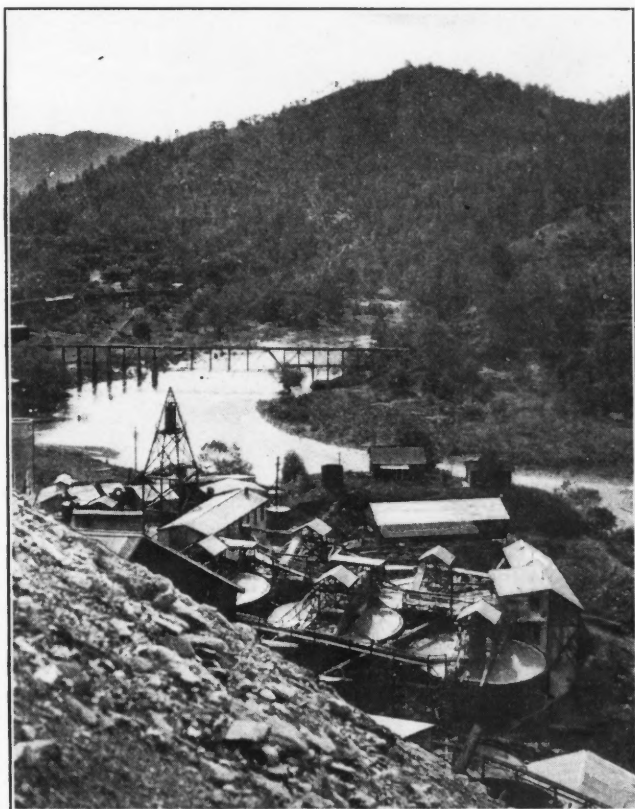
The Melones Mining Co. owns ground extending from the summit of Carson Hill to the Stanislaus River. It had been steadily operated since 1898, but in October, 1918, the mine was shut down, and in February, 1919, the mill also, owing to war conditions. A 100-stamp mill, for cyanide and concentrates; a treatment plant, 1,200-hp. water-power, a 5,000-ft. adit, electrical haulage system and an underground shaft to the 2,550 level were the principal features of its equipment. Low operating costs as well as low-grade ore characterized its operations. The practical exhaustion of the profitable ore within the developed lead caused the shutdown probably as much as the economic disturbance engendered by the war.

The Carson Hill Gold Mines, Inc., was incorporated in 1917, absorbing the Calaveras Consolidated Syndicate, a close corporation formed by W. J. Loring and his associates. The Carson Hill Gold Mining Co. was later formed to take over the Carson Hill Gold Mines, Inc. These successive company changes were due to the absorption of additional mining properties, which eventually included the old Calaveras Consolidated group of claims at Melones, the Iron Rock and Relief Gold mining claims, the Irvine properties, and several additional newly located claims, together with the Morgan, Union, and Kentucky. The mining ground thus brought together includes in the aggregate two miles northerly along the Mother Lode from the Stanislaus River on the south. The Melones property is held under option, and the use of the plant and facilities of this company has been obtained by an independent agreement.

### CALAVERAS SECTION ADIT 2,650 FT. LONG

The Calaveras section is opened by an adit 2,650 ft. long, the portal of which is on the south side of Carson Hill a short distance from the Stanislaus River. The adit develops several ore shoots, one of which is stated to contain 600,000 tons of ore capable of yielding, under conditions prevailing in 1914, a profit of \$1 per ton. Northward of this shoot, which is said to reach a maximum width of 30 ft., another shoot occurs, said to average \$5 to \$6 per ton. This shoot is at the 1,900-ft. point in the adit and 600 ft. below the surface. Northward of this are the old English workings opened up in the early 90's, by an English company, called the Calaveras Consolidated Gold Mines, Ltd. The adit has been extended to the English shaft, 2,600 ft. north of the portal and 600 ft. below the surface. This section of the property has not been fully developed, and its possibilities are in consequence necessarily of some technical and speculative interest.

The Brown mine is the next claim on the north. In



MELONES CYANIDE PLANT

were found to be very rich in their upper portions. There is at present, however, no deep mine in paying operation, although prospecting on an extensive scale is in progress, and it is likely that one or more large mines may soon be working in this noted locality, treating low-grade ores by modern processes."

In 1914, the "County Reports" of the State Mineralogist of California state that the Morgan mine had been idle since 1898. At the time of this report there was a 900-ft. crosscut adit, 400 ft. of drifting on the adit level, and a winze 400 ft. deep. According to the report, in early times a \$300,000 pocket was taken out of the Morgan mine, and in it was the largest single piece of vein gold ever found. During the early 50's gold estimated to amount to \$3,000,000 was taken from pockets in this mine. The Calaveras Consolidated,

early days, Mexicans worked this ground, but the present company has done nothing except to trench the surface, with the result of finding favorable indications of an ore shoot. North of the Brown mine is the Relief mine, purchased recently by the company. This includes the Iron Rock, upon which a considerable amount of development has been done. A large tonnage of low-grade ore is said to be in sight.

#### MORGAN CLAIM DISCLOSES FAVORABLE LEAD

The most important discovery, and the one which vitalized the group of mines as a whole, was made upon the Morgan claim. When W. J. Loring secured the option to purchase the Morgan property he was confronted by an adverse report, and his first endeavor was to find indications that might lead to a valuable orebody, as the purchase price, \$600,000, made it necessary to find something out of the ordinary, for otherwise the property could not have been taken over. A careful search of the upper levels of the Morgan resulted in the discovery of a favorable lead in the Morgan adit on the hanging-wall side of the large quartz vein known as the Bull vein. Sections sampling over \$6 per ton were found on the north side of the crosscut and were drifted on.

At 28 ft. north of the Morgan adit, ore was encountered assaying \$22 per ton. This was the discovery of the high-grade hanging-wall shoot of the Morgan mine. On stopping at this level the orebody proved to be 22 ft. wide and approximately 100 ft. long. The stope was extended to the 200 level and subsequently to the surface. At the surface and lying on top of the Bull vein, ore assaying from \$8 to \$12 per ton was stoped. In the meantime, the ore shoot was picked up on the 550 level, the length of the shoot being 150 ft. and of higher-grade ore. A winze was sunk to the 675 level and still higher-grade ore encountered. Subsequently the shoot was opened up on the 865, 985, 1,100, and 1,350 levels. It maintained practically the same grade and horizontal area at each level. Since then additional levels have been driven.

#### DEVELOPMENT SHOWS ADDITIONAL OREBODIES

It is of interest that the ore shoot lies wholly within the Morgan end line a short distance from the Melones claim. It pitches downward approximately parallel to the end-line plane and consistently maintains its relation to the Bull vein. It occupies the concave side of a curve in the Bull vein.

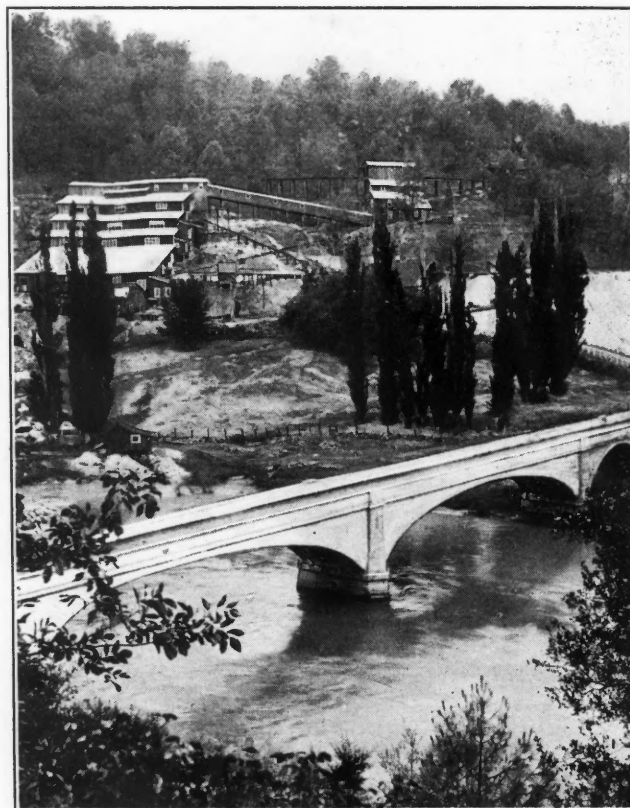
In the development work a number of ore shoots in addition to the hanging-wall orebody have been discovered. One known as the 1,100 flat vein was opened up on the 1,200 level, and a stope of maximum width of 26 ft. and a length of 260 ft. along the level has produced ore of \$12 per ton. The same vein has been encountered on the 1,300 level, with practically the same assays as on the 1,200 level. This vein strikes N. 75 deg. W. and dips 28 deg. to the S. E. Another flat vein known as the 1,600 flat vein has been developed.

In addition, a foot-wall orebody (lying underneath the Bull vein) which was mined by the Melones Mining Co. many years ago, extends into the Morgan claim, and although low-grade as compared with the hanging-wall orebody, it can be cheaply stoped and will yield a profit. This orebody is said to be from 12 to 20 ft. thick.

Although many points of attack in the form of low-grade orebodies present themselves at different places

in the group of claims, the present work has been restricted to the hanging-wall orebody, the two flat veins, and other ore shoots in the Morgan, Union, and Kentucky claims, the work on the Calaveras and other claims being reserved for future operations and better economic conditions.

The Morgan property was purchased in 1918, and mining began on Dec. 28, 1918. In the first year, 72,387



MILL AND CRUSHER HOUSE ON THE MOKELUMNE RIVER

tons was milled, and in the second 105,152 tons. Production for the first two years approximated \$1,000,000 per year. Mining is at present at the rate of approximately 180,000 tons per year. A large ore reserve has been developed. This has been made possible by the contiguous working in the Melones property, which permitted drifts to be quickly extended on the different levels.

#### MINE OPERATION

The mine is operated in two divisions, the Melones adit level at 1,100 ft. marking the dividing level. Above this level the work on the Morgan mine is conducted through a single-compartment inclined skipway and an adit extending to the surface at Morgan Hill. Below the Melones adit level, development and operation are effected through an underground shaft, formerly used by the Melones Mining Co., and leased to the company. The shaft is a three-compartment incline, sunk in the foot wall to the 3,000 level. The hoisting equipment is a double-drum geared hoist, operated by a 250-hp. motor, with maximum hoisting speed of 1,000 ft. per minute, on the main adit level approximately 5,000 ft. from the portal on the south side of Morgan Hill.

The Melones shaft is in a favorable position for the development of the Morgan claim, and it is principally due to this favorable condition that the rapid opening up of the various orebodies has been accomplished.



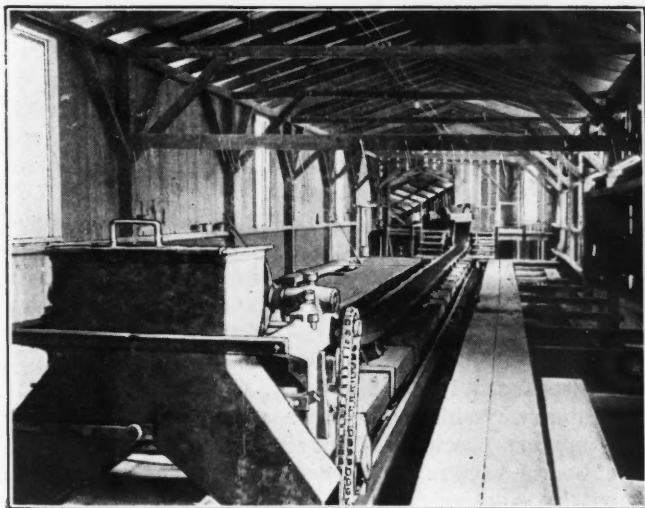
There is comparatively little water, and the ground does not require heavy timbering. Stopes are wide, and the ore is mined by shrinkage or over-hand stoping and filling. Stoppers and jackhammers are used for drilling, and 30 per cent powder used in breaking in the stopes. In drifting and crosscutting Turbos and Ingersoll-Rand No. 148 are used for drilling and 40 per cent powder for breaking. Drifts, raises, crosscuts and shafts are contracted, the contractors buying their powder and the company supplying timbers. Wherever the ore can be measured it is also contracted. Tramming distances are short, and levels are equipped with station pockets for loading the skips.

The hanging-wall orebody has been opened up to the surface, and the two adits provide adequate ventilation. On the lower levels ventilating fans and flexible air pipe supply the ventilation for development workings. Power cables supply current for lighting and power purposes on the working levels. A system of mine telephones connects stations on both shafts to the surface.

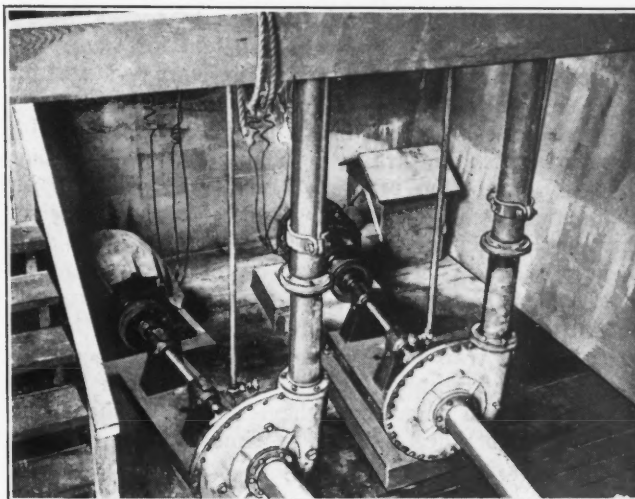
#### ELECTRICALLY DRIVEN EQUIPMENT

Compressed air is supplied by the compressor plant of the Melones Mining Co. on the Stanislaus River. A Laidlaw-Dunn Gordon and an Imperial compressor driven by a 250-hp. motor supply 1,800 cu.ft. of air per minute to the mine. Two additional compressors, both driven by motors, are available at the mine. A 100-hp. direct-current generator supplies current for the trolley locomotive operated in the Melones adit, the machine shop, and sawmill. Electrical power is purchased from the Utica Mining Co.

Tool sharpening, timber framing, blacksmith and machine shops and a storehouse are close to the portal of the Melones adit. Drill steel is hauled through the adit upon a flat car, side-boarded by 6-in. timbers, and distributed to the various levels. At each station drill-steel racks are placed so that an adequate supply can be maintained. Drills are kept in repair by a "machine doctor," who has a repair shop underground and during his shift inspects all drills in operation. A supply of repair parts is kept in the shop, and after repairs are made the drills are tested on the roof and sides of the shop. Both superintendent and foreman were enthusiastic over the success of this system in eliminat-



CONVEYOR SYSTEM AND MILL BINS AT CARSON HILL GOLD MINING CO.



TAILINGS PUMPS ELEVATED TAILINGS TO LAUNDER

ing delays in drill repairs and the maintenance of the drilling equipment in a high state of efficiency.

Transportation from the shaft pockets and chutes to the thirty-stamp mill is by trolley locomotive. The ore is hauled in trains of six to eight nine-ton steel cars. All cars pass over a track scale and are weighed both full and empty. A recording beam is a novel feature of the weighing, the record cards being slipped into a slot in the beam and the weight printed upon them. This reduces the personal factor to a minimum.

During 1920, mining costs were \$2.10 per ton milled for extraction and \$1.03 per ton milled for development. Drifting cost \$15.74, crosscutting \$15.17, and raising \$14.27 per foot. During the first three months of 1921 the costs were \$13.68 for drifts, \$14.42 for crosscuts, and \$13.89 per foot for raises. In 1920, 7,031 ft. of development cost \$19.40 per foot gross and after crediting for ore produced \$15.21 net. Power used in the mine cost 5.9c. per ton for drilling, hoisting, and miscellaneous purposes. The power required is approximately 7.14 kw.-hr. per ton of ore produced. Drill-steel cost was 14c. per lb. for 1½-in. cruciform, used for the stopers, and 18.5c. for 1¼-in. hollow-round, used for the drifters. Approximately 1 lb. of drill steel is used for six tons of ore.

Powder cost 20.78c. per lb. for 40 per cent and 19.28c. per lb. for 30 per cent. For ore extraction, powder, caps, and fuse cost 36c. per ton. It is estimated that the cost per stick of 1½-in. powder, with proportionate cost of caps and fuse, is 13c. Powder is counted out in sticks and is approximately estimated at one stick per foot drilled. During April, 1921, 50,764 ft. of drilling required 50,626 sticks of powder for blasting. The development footage was 530 ft., and ore, filling, and waste totaled 16,200 tons. This gives a powder ratio of 1.56 lb. to 1 ton. It is of interest to note that stemming is not used. Timber costs are 5c. per ton extracted and 12c. per foot of drift.

Transportation from ore pockets to mill cost 18c. for power, labor, and rental of equipment. The power cost for transportation, crushing, and conveying was 15.3c. per ton. The approximate total power required equals 40.31 kw.-hr. per ton milled for mining, transportation, crushing, conveying, and milling.

The ore consists of quartz and schist, in varying proportions, containing free gold and between 3 and 4 per cent auriferous sulphides. It is received in the

crusher bins and fed through gates to two 11 x 26 Sturtevant crushers (steel-plate construction) and discharged upon a conveyor which is equipped with a magnetic head pulley. This conveyor discharges upon a second conveyor, which is equipped with a tripper by means of which the ore is distributed in the mill bin. The amount of iron refuse (tramp iron) removed by the magnetic pulley offers testimony to the efficiency of modern appliances. Drill bits, pieces of broken drill steel, spikes and miscellaneous pieces of iron accumulate in considerable quantity. Mr. Stevenot, the superintendent, said that the stoppages and breakages in one month due to tramp iron were estimated to amount to \$1,400 in lost running time and repairs before the installation of the magnetic pulley. Wood in the shape of wedges, blocking, and broken timbers in surprising amount gets into the mine ore as well as iron. This is removed by the crushermen from the feed chutes and the two conveyor belts.

Crushing is done by means of thirty 1,250-lb. stamps and with approximately  $3\frac{1}{2}$  of water to 1 of ore. The battery product is passed through an 18-in. 60 deg. cone and thence to two 4-ft. cones, spigot products from all three cones going to three Hardinge conical mills (8 x 22, 8 x 30, 8 x 30). These are driven at 35 r.p.m. by a 100-hp. motor belted to a line-shaft placed directly over the conical mill drive shafts, belt tighteners being required on each belt. The main drive is a 16-in. 6-ply belt, and each mill is driven by a 14-in. 6-ply belt. Over each tube mill is a light traveling, hand-operated crane. Cobblestones obtained locally are used in the conical mills. Three-inch white iron liners obtained from a local foundry are used in the mills. Hardinge amalgamators are used on the discharge outlets of the mills.

The overflow from the 4-ft. cones and the discharge from the conical mills are distributed over three sets of 30 in. x 6 ft. silver-plated copper amalgamating plates ( $1\frac{1}{2}$  in. per foot slope,  $2\frac{1}{2}$  oz. silver per square foot) and then flow over twelve sets of plates 24 in. x 12 ft.

The pulp from the lower amalgamating plates is sent to three Diester roughers (5 hp. motor driving tables at 230,  $\frac{2}{3}$ -in. strokes per minute). Concentrates are laundered to the settling bins and tailings pass to six Deister tables (290  $\frac{1}{3}$ -in. strokes per minute). These tables produce concentrates which are laundered to the bins, middlings which are elevated by a 6-in. bucket elevator to a Wilfley table, and tailings. The Wilfley table produces concentrates which are laundered to the bin, middlings which are pumped by a 2-in. centrifugal back to the conical mills, and tailings which are discharged along with the Deister tailing into a large galvanized-iron surge tank. Two 6-in. sand pumps elevate the tailings 50 ft. to the head of the launder leading to the cyanide plant. One pump is operated, the other being in reserve. In addition, two 4-in. sand pumps and another tank are available in emergencies for the same service. All sand pumps are provided with water inlets at the journal boxes.

A 10-hp. motor drives the six Deisters, the Wilfley, and the bucket elevator; a 5-hp. motor the 2-in. middlings-return pump, and a 35-hp. motor the two 4-in. sand pumps. An  $8\frac{1}{2}$  x 10-in. triplex pump driven by a 30-hp. constant-speed motor supplies water from the Stanislaus River for the mill. The launder to the cyanide plant is 1,400 ft. long and placed on a grade  $\frac{1}{2}$  in. per foot.

Upper amalgamating, plates are dressed once per shift, the plates being arranged in pairs so that the pulp can be plugged off one plate while dressing down. The lower plates are dressed once a day. The entire mill is cleaned up three times a month, and plates are steamed once a month. An amalgamating barrel, grinding pan, amalgam press, and the usual clean-up equipment are provided.

The squeezed amalgam is 40 per cent bullion. It is broken up and placed in semi-cylindrical trays  $9\frac{1}{2}$  x  $9\frac{1}{2}$  x  $4\frac{3}{4}$  in. deep, each tray holding 1,100 oz. The usual retort charge is 3,300 oz. The trays are chalked, and the retort is heated for three hours with a wood fire and five hours with a coke fire. The mercury loss in distillation is 1.2 per cent. The retorted metal is melted down in graphite crucibles in a gasoline-fired tilting furnace, sodium carbonate and borax being used for fluxes. The molds are heated and smoked. The bars are approximately 2,000 oz. and run 895 fine. They are sampled by four  $\frac{3}{8}$ -in. holes drilled at opposite ends, two on the top and two on the bottom of the bar.

Shoes last from sixty to seventy-four days; liners forty-four to ninety; dies thirty days; conical mill liners seven months. Cobblestones are supplied locally at \$4.50 per ton and are used at the rate of  $8\frac{3}{4}$  lb. per ton of ore. Average cost of treatment in 1920 was as follows:

	Per Ton, Milled
Crushing .....	\$0.07
Conveying and transportation.....	0.29
Stamping .....	0.16
Amalgamation .....	0.06
Concentration—Delster .....	0.07
Regrinding conical mills.....	0.14
	\$0.79
Concentrate treatment.....	0.28
Tailings treatment.....	0.49
Bullion marketing.....	0.02
	\$1.58

The treatment costs for 1921 are somewhat lower than the figures given in the table.

The tailings from the thirty-stamp mill are pumped to a sand and slime plant at the old milling plant of the Melones Mining Co. This plant is operated by Hamilton, Beauchamp, Woodworth, Inc., under contract with the Carson Hill Gold Mining Co.

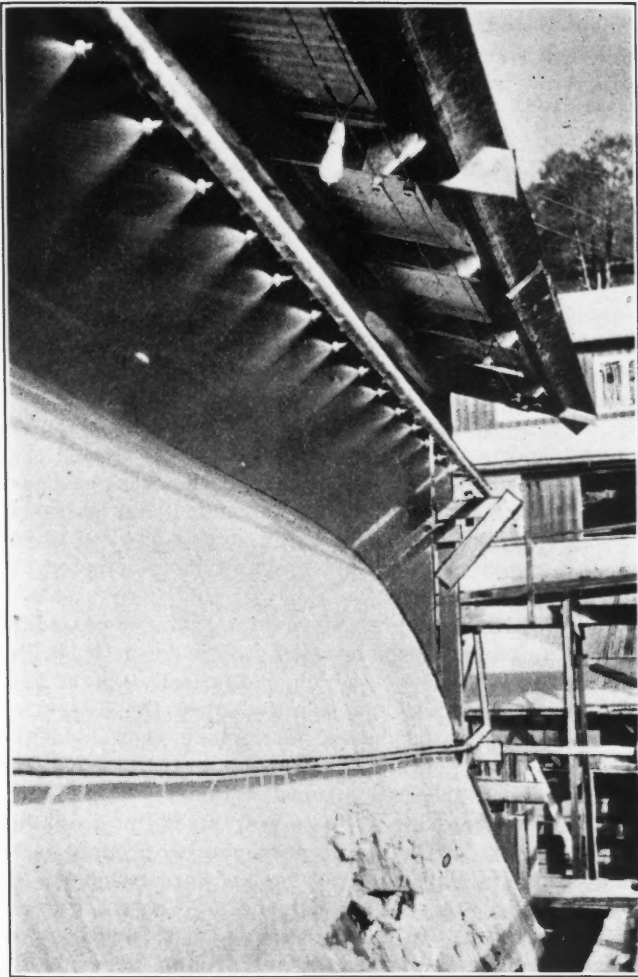
Approximately 500 tons per day at a dilution of 1 to 8 is received and handled by two duplex and two simplex Dorr classifiers. Sands and slimes are separated, the sands being about equal in weight to the slimes. The sands are laundered to sand-leaching vats (seven vats, 38 ft. diameter x 12 ft. deep) and charged by Butters and Meins distributors. They are given an eight- to ten-day treatment, and then sluiced out by means of sluicing water discharged through the distributors, the bottoms of the vats being made with a slope to a central discharge (slope 9 in. in 19 ft.).

The slimes are thickened to a 1 to 1 pulp and pumped by diaphragm pumps to launders, which discharge into Devereux propeller agitators. Aero brand cyanide is used, and two pounds of lead acetate per ton are added to counteract the effect of the soluble sulphides. Air lifts are used upon the agitators. The pulp is pumped and discharged to a 12 x 16-ft. Oliver filter without preliminary washing. It is washed on the filter. The solutions are precipitated by zinc thread in zinc boxes. The Crowe vacuum process is used. The precipitate is cut by sulphuric acid and melted in a pot furnace with the usual fluxes. The final bars are 425 fine, the base metal being principally lead.

The concentrates from the mill are hauled in trucks to a small concentrate plate near the cyanide plant. They are ground in cyanide solution in a tube mill to pass a 200-mesh screen, lime being added to the tube mill. The concentrates are agitated twelve hours in Devereux agitators and washed five times by decantation and settled to 40 per cent moisture and after decantation sluiced out of the agitator. The soluble loss is low.

#### WORKING FORCE

During April, 1921, the ore extraction totaled 12,800 tons, and ore from development 1,321 tons, or a total of 14,178 tons. There were employed 172.52 men for twenty-eight shifts. This equals 2.93 tons per man shift. Excluding construction workers, the mine out-



WASHING SLIME ON FILTER AT MELONES CYANIDE PLANT

put equaled 3.94 tons per man shift. Transportation is effected at the rate of 112 tons per man shift (five men per day); milling at the rate of forty-seven tons per man shift (twelve in mill crew), and ore breaking and conveying at the rate of 281.5 tons per man shift (two men).

Considering that the average tonnage per shift during April was 563 tons, the tons per man shift for each division of the work is high as compared with other California mines, but giving the management due credit for its efficiency, the favorable conditions both underground and on the surface are such as to lead to a higher labor efficiency than in other mines operat-

ing in narrow veins and under less favorable conditions.

W. J. Loring, to whose initiative much of the success of this important property is due, is president and general manager. A. D. Stevenot is superintendent in direct charge of operations. Frank Wagoner is mine foreman and Charles Darroh mill foreman. Acknowledgment is made of the courtesy of Mr. Stevenot and the members of his staff who assisted me in gathering the material for this article.

### The Problem of Mining Brazilian Iron Ore

BY HENRY L. GEISSEL

Written for *Engineering and Mining Journal*

The Brazilian iron-ore deposits are at present attracting greatest attention in Europe. Some time ago one of the largest Luxemburg metallurgical corporations (Burbach-Eich-Dudelingen) acquired extensive deposits of iron ore in Brazil, and several other important European concerns are also said to have been granted considerable concessions recently.

The most important Brazilian iron-ore formation extends in a north-southern direction from the states of Goyaz and Matto Grasso across the states of Minas Geraes, São Paulo, Paraná, and Santa Catharina, up to the State of Rio Grande do Sul. In the State of Minas Geraes, in which some of the leading German concerns have been granted concessions, the foremost ore region, bounded by the heights of Itacolomey, Itabira, and Sierra do Cocaes, extends in an altitude of from 1,000 to 1,500 m. above the level of the sea and in a district of about 480 km. from the port of Rio de Janeiro, over an area which is of no less than 8,500 sq.km.

Up to the outbreak of the war the Brazilian government objected to the exportation of iron ores. For this reason the then (1914) formed powerful German-English-French syndicate, which intended mining and exporting iron ores on a large scale, had to be dissolved. Since the close of the war, however, the attitude of the Brazilian government has undergone considerable change, so that besides German and Luxemburg concerns American, English, French, and Belgian corporations have also acquired concessions.

A great drawback to the exportation of Brazilian iron ores is the lack of proper railroad connections. The only railway line that runs right through the ore fields of Minas Geraes is the Central of Brazil, from the trunk line of which several standard-gage branch lines run to Ouro Preto and Bello Horizonte. An extension of these lines is being considered, but encounters great engineering difficulties, especially on the section running through the Sierra de Mar and Sierra de Mantiqueira. The Central of Brazil is not able properly to handle the mere regular traffic, so that the transportation of the manganese ores (in 1917 equaling 600,000 tons) was much hampered for a time. The Leopoldina Railway also intends extending its system into the interior of the State of Minas Geraes. A third possible line for the transportation of the ores is the Victoria Minas (Diamantina) Railway, the shares of which are almost entirely in the hands of the English Itabira Iron Ore Co. This company has under consideration the connection of Itabira, the center of the iron-ore fields of Minas Geraes, with the port of Victoria (Espírito Santo), so as to be able to export the ores on a large scale.

# War Problems in Minerals

## IV—War Minerals Relief Commission, 1919-1921

BY PHILIP N. MOORE

THE HISTORY of the attempts to stimulate domestic production of minerals needed by the Government during the war, which minerals had been hitherto chiefly supplied from foreign sources, has been given in *Engineering and Mining Journal* by Messrs. Westervelt, Spurr, and Leith, who were among the most influential participants in such work. The comparatively small proportion of the national consumption of such minerals produced domestically was due to their scarcity in the United States contrasted with their abundance or cheapness in other lands. Many of the home deposits worked during the war have been long known and bear records marked by failures. Obviously, it was necessary to offer prices high enough to overcome the handicaps which had prevented continuous production in the past.

The War Minerals Committee, of which Mr. Westervelt, chairman, has furnished the record, had no official authority. No power existed in any department of Government to establish prices of minerals in advance. To create such power was the chief object of the proposed War Minerals Bill. It was intended to establish a Mineral Administration, with authority to contract for and fix prices of the needed minerals, to increase output, and to take such measures as would render their production assured under the difficult conditions then obtaining.

### UNEXPECTED OPPOSITION TO ORIGINAL WAR MINERALS BILL

This measure met opposition in unexpected centers. Not only did some of the great mining organizations of the country antagonize it under the impression that it would interfere with the orderly conduct of their business, but the so-called exponent of the mining industry of the country not only refused support, but opposed it. This body now figures as the friend of claimants under the War Minerals Relief Act, ostensibly in the interest of no one individual, but actually permitting its representative to appear as advocate in appeals for claimants and to conduct propaganda against rulings of the officers intrusted with the construction and execution of the statute.

There can be little doubt that had the proposed War Minerals Bill been enacted promptly at the time it was first offered, none of the unfortunate results ending in the enactment of the War Minerals Relief Bill would have occurred, because there would have been definite Government commitments which would have protected the market and made the situation clear.

The history of the failure of attempts to control the market by indirection, which ended in diverse rulings by different committees, with a practical annulment of an agreement made by one board through importation permits authorized by another committee, has been detailed by Mr. Spurr. The result was to break the market for both chrome and manganese several months before the Armistice, with a loss to producers who had prepared to increase output on the faith of assured limited importation.

To this extent exists moral claim upon the Government for reimbursement of loss, since only by promise of import restrictions was any governmental protection of price attempted.

In the late summer of 1918, the Bureau of Mines, recognizing the pending collapse of the market, endeavored to check development of additional manganese mines, and through its agents advised producers to proceed with caution. With the end of the war, all prices collapsed and producers faced losses where great profit had been expected.

### HISTORY OF THE WAR MINERALS RELIEF MEASURE

Quickly following, the larger producers of the stimulated minerals, chiefly chrome and manganese, organized to urge upon Congress their claims for relief. Asserting that the Government propaganda which urged increase of mineral output carried an implied contract to absorb production, the organization began an energetic effort to secure legislation to compensate the losses of its members. The campaign for the increase of production had been directed to other minerals than those whose producers initiated this campaign. These had suffered corresponding losses, but the producers of chrome, manganese, and pyrite were in evidence. It is related that in the difficult days when the fate of the relief measure hung in the balance, a Senator demanded that losses for tungsten be included in the list, under an implied threat of such opposition as would probably have defeated the bill. It was included.

The proposed measure followed the ordinary procedure of private or semi-private relief bills. An active lobby was sent to Washington, which energetically sought publicity for the claims and enlarged upon the distressed condition of the producers, for which they held the Government responsible.

The bill, as originally drawn, authorized the Secretary of the Interior to pay net losses in acquiring property or in producing or preparing to produce manganese, pyrite, chrome, or tungsten, in consequence of the published request or demand of certain governmental agencies. In the debates which followed, objection was made to the clause authorizing payment for the purchase of property, or including losses through published request. These were ultimately stricken out, and the bill was passed without them. The law also forbade payment of merely speculative losses or unless they had been incurred upon property carrying ore in sufficient quantities to be of commercial importance.

### BILL FINALLY PASSED AS RIDER TO INFORMAL CONTRACTS ACT

In its course through Congress, the measure followed the usual procedure of claim bills. It met the support of representatives from the mining states, whose constituents were most interested and were the proponents of the measure. These representatives in turn gathered to their help those with similar interests from other states. The measure as drawn was as liberal as they

desired. Still following the common path, it met opposition from those representatives who were uninterested and naturally indifferent or antagonistic. This was abated by one and another amendment limiting the scope of the measure, which amendments were accepted by proponents' representatives as the only course under the circumstances. Its progress through the two houses of Congress met serious opposition. Almost certainly the majority were indifferent or antagonistic, and only by the parliamentary maneuver of attaching it as a section of, or rider to, the Informal Contracts Act, an important and generally desired measure, which was seriously demanded by public opinion, was its passage secured.

Opposition to it at the time would, in all probability, have brought defeat had the measure been squarely before Congress, as a bill offered on its own merits. As passed, it differed radically from that originally written in accordance with the wishes of the claimants. Restrictions had been inserted which materially limited its intended benefactions.

#### BUREAU OF MINES SELECTS COMMISSION

The act placed authority to compensate for loss in the Secretary of the Interior, without appeal, expressly denying jurisdiction to any court. The Secretary could, of course, give no personal attention to investigation of claims. He determined upon the appointment of a commission of three. The Bureau of Mines, intrusted with the selection of the staff of engineers and auditors to examine properties and accounts of claimants, placed the responsibility upon Mr. J. E. Spurr, as Chief Engineer, who chose the able and diligent body of men comprising nearly twenty engineers and half as many auditors.

This commission, at first appalled by the indefiniteness of the statute, by the fact that it contemplated relief for very ill-defined and non-definable conditions where absolutely no contract existed, and where plaintiff's testimony as to motive and unwritten plan must necessarily have consideration, sought advice from the Solicitor's Department, the legal adviser to the Secretary, concerning the meaning of the statute. The earliest and most important request was for construction of the words: "in compliance with the request or demand of the Secretary of the Interior." It will be recalled that originally the bill included the words: "published request," which were stricken out.

The Solicitor of the Interior Department rendered an opinion to the Secretary, which, referred at once to the Attorney General, was confirmed by him.

#### ATTORNEY GENERAL DEFINES STATUS OF "REQUEST"

The Attorney General, in his opinion, mandatory upon the commission, construed the words to mean a specific request, which in turn necessarily meant a personal request, and therefore rejected advertisements and public propaganda. How it would have been possible to have entertained any other construction is difficult to understand. It has been asserted, although the report is without strict corroboration, that, after the passage of the act, a certain producers' association in a Western state sought from its distinguished counsel an interpretation of the law, which was rendered before the opinion of the Attorney General above quoted. It is said to have been almost exactly to the same effect.

Though this construction has been criticized as narrow, technical, and in no sense conveying the intent of Congress, it has not been successfully attacked by any legal authority equally distinguished.

It is to be noted also that the statute used the words: "in compliance with." It is clear, therefore, it was incumbent upon the claimant to prove affirmatively that he followed some policy, or made some development, which was in compliance with the request of Government authority, and that his losses resulted therefrom. If he only carried to completion a plan previously formed, making no change in his operations as the result of governmental request, he had, under the statute, no claim.

#### CLAIMS FOR SPECULATIVE LOSSES INVALID

The law also forbade payment of merely speculative losses and of losses upon properties which did not carry ore in sufficient quantities to be of commercial importance. This phrase offered opportunity for much debate as to the meaning of the term "commercial importance." In its earlier rulings, the commission, with the Secretary's approval, defined a property of commercial importance as one carrying ore in sufficient quantity and of high enough grade to have afforded a reasonable probability of profitable operation during the expected time of the war; holding, further, that at the time most of the operations which resulted in claims were undertaken, the general expectation of the war was for two years.

This definition gave the claimant the benefit of war prices, charging operating expenses with war-time costs, and held it to be a commercial proposition if the evidence indicated that within two years under such conditions its operation could have been profitable. This definition was never seriously attacked by any claimant, but later, through a ruling of the Solicitor's Department, which was accepted by the Secretary, the commission was practically constrained to hold as of commercial importance any property which had produced a ponderable body of commercial ore during the war, no matter whether this had been shipped, whether it could have paid expenses, or whether the tonnage mined had exhausted the property. It will be conceded that this definition was liberal.

The prohibition of payment for merely speculative losses was not of great importance in the work of the commission. Though undoubtedly many claims presented where payment for property was requested were largely inspired by speculative motives, they were nearly all dealt with upon different bases. Only two claims were denied because of speculative character. These, in both cases, asked compensation for the purchase of several properties on which claimant did practically no productive work, it being held by the commission, from all available testimony, that whatever work had been done was for the purpose of development, dressing up for sale. Practically no ore was shipped from them.

#### COMMISSION PROCEDURE

A large percentage of claims asked compensation for the purchase of property as well as for losses in developing and operating. It was held that no authority to compensate for property was given by the statute, but payment was repeatedly made for mill construction, less salvage value, as well as for mine expenses. Some

claims, really speculative, for purchase of properties, followed by a little prospecting but no production, were denied for this reason, which might have been rejected for their speculative character.

If the cases submitted by the claimants, either in their original file or at hearings, showed that claimant had received a specific request for production which led to his loss, or if his statements were not complete and full, his property and accounts were examined by engineers and auditors. Opportunity was given to the claimants to read and answer the reports of these officers and to furnish rebutting evidence if so desired. Claimant was allowed to appear in person or by attorney, or both. The utmost latitude of appeal was given to him, and time after time cases were delayed for months, waiting for claimant to say his last word. Appeals were heard by the commission against its own findings, appeals were taken from the commission to the Secretary, referred by the Secretary back to the commission for further testimony, and again heard by the Secretary; in fact one conspicuous case was heard by the commission three times, by the Solicitor twice, by the Secretary three times formally, together with many informal discussions which were not recorded.

#### HEARINGS IN THE WEST

That access to the commission might be facilitated and made less costly, the commission made a journey to the Pacific Coast, involving nearly three months' time, at which hearings were held at St. Louis, Little Rock, Tucson, Los Angeles, San Francisco, Medford, Portland, Baker, Spokane, Butte, Salt Lake City, and Denver.

At all times the door was open to the claimants to present testimony. It was not closed until the Secretary had made his recommendation. Great liberality was exercised by the commission as to what constituted a Government representative. Under the construction of the law by the Solicitor of the Department, the commission held that any one who had attended a meeting called by Government officials for the purpose of stimulating the production of minerals, who had there been asked to go back home and spread the gospel of production, and subsequently urged individuals to increase their production, was a representative of the Government, and the claim of any one receiving from him request to increase production could be considered by the commission. It was further held that a member of an audience at a public meeting addressed by a representative of the Geological Survey or the Bureau of Mines, although he had no other personal contact, had received request which entitled his claim to consideration. It was also ruled that members of state geological surveys which were co-operating with the U. S. Geological Survey were representatives of the Government for the purpose of increasing production of minerals, and that their requests should be recognized.

Many claims were presented where claimants admitted that they had received no specific request from any Government representative. Necessarily, such were rejected. Other claims were brought before the commission where, in the original presentation of claim, applicant stated that he had received no Government request or demand; and yet, on appeal, under the constructions above noted, he was allowed to abandon his own sworn statement, to present new proof, and on the strength of it, to reverse himself and be given compensation.

Promptly after the enactment of the law, claimants were solicited by claims attorneys, seeking representation of claimants for a fixed percentage of recoveries. The members of the commission were frequently asked for their advice concerning employment of attorneys. Great caution was exercised in reply, but where the direct question was put, asking if attorneys were necessary, the reply was frank. A very large proportion employed none. Many of the larger claimants naturally did so, but in few instances only is it believed that their services were worth the cost. On the contrary, a large part of work done by them was absolutely wasted, as it consisted of arguments addressed to the commission controverting the legal opinions of the Attorney General, the Secretary of the Interior, or the Solicitor of the Department, all of which were mandatory upon the commission. Such arguments were a waste of time, and many hours were lost through them.

In a few of the larger cases attorneys' services were clearly resultful, but it was the endeavor of the commission to give as detailed study to the claim of the un-attorned prospector as to that of the great corporation. Some of these even suffered from too much legal assistance, and following awards there came disagreements with their representatives. In one instance the corporation employed an old constitutional lawyer, who haunted the offices of the commission for days at a time, buttonholing engineers and examiners and making to the commission constitutional arguments and definitions of ore based upon the "Encyclopedia Britannica," until the staff dreaded his coming. An award of about \$40,000 was made in the case. Some weeks later, a member of the staff received a request from the claimant, asking if he would be willing to testify concerning the value of the attorney's services in the issue, as, after collecting the award, that gentleman had not only deducted an expense account of about \$2,500, but had withheld one-half of the remainder as his fee.

#### COMMISSION HANDICAPPED BY PROVISIONS OF RELIEF ACT

Throughout, the measure made the common record of claim bills, a story familiar to old departmental employees who have seen claims come and claimants go for many years. The act, as amended against the wishes of the proponents, passed to an administrative body for execution; that body, bound by the wording of the law, was powerless to reinsert into the measure the much-desired terms which had marked its writing by the claimants, and which many of them, at least those who were not present at Washington, did not realize had been eliminated by Congressional amendment.

The auditors and engineers who remained in the service longer than a probation term were all men of maturity and experience, skilled in their respective lines. In the course of their work, about six hundred properties were examined by engineers, and practically the same number of audits made. In cases where the statements of the technical staff were disputed, audits were not infrequently repeated, and on occasion second examinations were made. Engineers and auditors were instructed to convey to the commission all facts favorable or unfavorable with regard to the properties examined. In the large number of cases, claimants accepted without protest the statements of both.

Claimants submitting their losses to the commission for adjudication may be roughly divided into classes as follows:

First, and the great majority, were small operators or prospectors—men who either had never been engaged in the production of these particular minerals before the war, or who undertook production anew after the Government request. Though this class embraced much the largest number of individual claimants, the average of their claims was relatively small, although a few very large ones were presented. The aggregate of their claims was also less than the total of the other two classes. Many cases of this kind occurred where men, who had begun their operations, incited by the active demand, high prices and chance for profit, meeting some Government representative, received a request to increase production. These naturally were difficult to adjudicate for lack of any measure of the plans of the claimant before he received Government stimulation. In most cases, however, where there was plain evidence of Government request, claimant's losses were considered with liberality, if he could show any increase whatever resulting therefrom. There were also within this class a few large operations, some of which were unmistakably instigated by personal request and even insistence of Government officials.

The second class included producers established in the business before the entry of the United States into the war. These were naturally familiar with the industry and could make no claim of patriotism for entering the business. Having acquired the idea that the Government was in some way responsible for and was ready to compensate their losses, their memories naturally minimized the extent of their earlier operations and stressed the increase brought about through Government stimulation.

Only such portion of their losses in excess of the rate of their operations before receipt of Government request could properly be considered by the commission. The justice of this position has been accepted by the large majority of claimants, but, in some cases, it was stoutly maintained that entire losses after Government request should be considered, upon the theory that had they not received such request they might have ceased operations.

#### DEALERS AND BROKERS' CLAIMS DIFFICULT TO ADJUST

A third class of claimants, not only numerous but difficult to deal with equitably, was composed of those who were primarily dealers or brokers in the minerals in question—men who were thoroughly familiar with the market, who endeavored to increase their tonnage of ore handled, by mining. Cases were before the commission where the only risk that the claimant assumed was that which came through advances to prospectors and small miners, who took the mining chances themselves, but contracted to deliver the ore to claimants at fixed prices. More than a few of these developed where claimants had made handsome profits in their trading operations, but, losing money in their mining ventures, asked payment of losses by the Government. Equitably, such have no merit, because the production was subsidiary to the trading, and the whole earnings in both should have been taken into consideration. Unfortunately for the Government, however, it was ruled that the commission could deal only with losses from "producing or preparing to produce." Therefore, some recommendations for award were made to claimants whose trading operations had been largely profit-

able. These, of course, only served to increase the total gains already made.

The commission held throughout, that the entire producing operations of claimants should be taken into consideration, and that they should not be allowed to select from their various operations those which were unprofitable, and ask compensation from the Government. This position also brought loud protests, but it was affirmed by two Secretaries. The commission also ruled that it could go behind the corporate alias of any claimants and deal with the losses of the individuals forming the corporation or firm, adjusting as the total results of the enterprises in which they were interested demanded.

#### AN EXAMPLE OF WAR-MINERAL FINANCE

One interesting example in which this principle was asserted was where four individuals were joined in a venture which undoubtedly lost money. The story runs thus: A certain owner of an idle mill which had been built to concentrate zinc ore procured a lease on a property in another district, containing one of the classes of mineral covered by the statute. He undertook to move his mill to the other property, to be used in concentrating the ore of the new lease. To secure funds, he sold a one-eighth interest in the joint enterprise to another man for \$1,000. This did not last long, and additional funds were sought. Another eighth was sold for \$2,000. This sum soon proving insufficient, and the prospects of the enterprise improving, one-fourth of the joint enterprise was sold to another for \$6,250. The end of the war brought the enterprise to a collapse. A claim for about \$15,000 was presented. Only three of the partners presented claim for losses. The purchaser of the one-eighth for \$2,000, having, in other enterprises in the same district, earned profits greater than that amount, felt that he could not conscientiously present a claim, and therefore the commission should not consider his share of the loss. The commission, hearing the case in open council with claimants, took the position that as the gentleman owning the mill and the lease had not contributed any of the money which was lost, he was no worse off with his nearly completed mill and the lease than at the beginning. It was therefore suggested that compensation of \$6,250 and \$1,000 be made to those who had furnished money for the enterprise and that he receive back his mill and lease. He demurred to this, insisting that the mill was of no value where located and that he should at least receive enough to move it back to its original situs. The commission thereupon recommended an award of \$1,500 to him, \$1,000 to his first partner, and \$6,250 to the fourth, which awards were accepted. It is reported that the gentleman sold his lease and mill for several thousand dollars a few months after this award was made to him.

#### 1,203 CLAIMS PRESENTED

The 1,203 claims which officially reached the commission were of interesting diversity. A common quality was that of including every item which indirectly or collaterally might be construed as an obligation of the Government. This was done in numerous cases, and frankly stated under cross-examination by claimants, because they thought it was incumbent upon the commission to decide what was admissible; therefore they put every item in, leaving it to the commission to make eliminations.

A great variety of claims, on the face of them outside of the law, were presented, such as claims for metallurgical losses. Commercial losses were also sometimes asked. In one instance the city manager of a beautiful small Western city presented a claim for \$10,000 for loss on manganese ore taken from the city park, which had been sold and shipped to a customer, who failed after the shipment was made. Justice to this claimant demands the added fact be stated that he later apparently thought differently of the matter. The claim was not pushed.

Many cases came before the commission where the total operations had been profitable, but in which individual properties had made losses. For these compensation was sought. Promoters sought compensation for loss of time engaged in unsuccessful endeavors to finance properties which were expected to produce but were never sold. Operators apparently in doubt as to the latitude permitted to the commission asked for adjustment of losses made before the entry of the United States into the war. Claims were made for traveling expenses, other money expended, and for personal compensation at very liberal rates while engaged in securing options upon property which was never purchased and which made no production.

One claimant, engaging in the spring another, whom he called his foreman, procured an automobile, traveled unsuccessfully a large part of California, across the continent, and finally settled upon a property in Arkansas, twenty miles from the railroad, from which no shipments were made. This gentleman sought full-time compensation for his companion under the title of foreman, at the rate of \$6 per day, and also asked for payment for an automobile worn out in the search.

#### "CLAIM HABIT" RESPONSIBLE FOR GROTESQUE DEMANDS

The claim habit of mind takes on most unexpected phases. It would seem that once the idea of governmental responsibility entered the brain of one who has made a loss, sense of proportion vanished. Some of the claims asking payment for the purchase of property illustrate this. In one, over half a million dollars was asked as the purchase price in 1918 of a well-known old mine, which had been on the market for years without purchaser. The mine today is again idle.

In one case compensation for construction of a railroad was insisted upon, the rails for which had been purchased before the receipt of any Government request or demand.

The attitude of claimants was also interesting psychologically. The majority of those disallowed were, of course, dissatisfied. Their responses to denial or reduction were as variant as their natures. In some, the criticism was bitter and personal, the commission apparently being held responsible for the law and the construction thereof. In others, keen appreciation of the courtesy and evident desire of the commission to deal fairly was expressed. In one instance where claimant had asked for \$19,000 and received an award of \$6,482 he replied, as follows:

"I will say that we will accept the award without comment or protest of any kind, as we feel that the award is entirely just and most fair in every respect. Speaking for Mr. ——— and myself, I wish to say that our treatment from the commission has been most considerate and courteous and gentlemanly in every way, and we wish, at this time, to express our appreciation of this fact."

In another case, denied *in toto*, claimant replied as follows:

"The ——— Company in operating its property during the years 1917-1918 was not performing work in compliance with any specific request or demand from any department of the Government. Although loss was sustained as mentioned in the claim, there was never any disposition on the part of the company to hold the Government liable for any part of said loss. The purpose in filing the claim was merely to protect the company's rights, if any, to participate in the distribution of the relief fund. The ——— Company does not see that it has any ground for taking exception to the commission's decision to grant no award and wishes to take this opportunity to thank the commission for its careful consideration of the claim and the full explanation contained in the above acknowledged letter.

President."

Another claimant who had been refused wrote at length. A portion of his letter is as follows:

"Under the law, as worded, it is hard to see how the Attorney General could rule otherwise; the law which called for such a ruling is a humbug and should never have been enacted, for the following reasons: . . . So self-interest and patriotism both impelled us not only to mine known deposits, but to go out and hunt others and supply the demand.

"Now, the same law of supply and demand which speeded up the mineral production was felt in all other basic products; hence it was a bad law and against public policy to make fish of one and flesh of another after close of hostilities.

"But the discrimination in this case was even worse, for the law not only discriminates in favor of certain minerals, but selects certain firms and individuals already engaged in production as the beneficiaries of an eight million dollar appropriation as against those who went in to supply the demand, discover and open new mines, and met, or prepared to meet, the emergency with far greater risk of loss than those who were already in the business and had only the risk of oversupply to encounter, which risk finally overtook all alike. Hence, any law enacted for relief should have been so drawn as to be fair to all interests involved, but it should never have been on the statute books in any event.

"So this was somewhat the spirit in which we were taking hold of this manganese proposition; one must be able to show prospective profit in these things or capital cannot be interested; furthermore, these enterprises must realize enough to carry themselves or they become more or less a dead weight on other producers. I have no doubt my associates felt pretty much as I did, but some felt that so long as the Government was generous enough to offer relief where losses had been sustained, we would state our case fairly and accept cheerfully any decision that might be made.

"Of course, we saw the joker in the bill for relief, but took chances, much on the principle of the fellow who, accused by his friend of 'drawing the long bow' when he stated that he had seen buffaloes climb trees after grapes, replied that he knew it is not generally understood that buffaloes climb trees, but when a buffalo is after grapes, the Lord only knows what he will do, and so with Congress in a Presidential year."

Another claimant who had been refused, after writing his acceptance of the rejection and his entire disapproval of the law, upon the ground that it was discriminatory, inclosed the following copy of a letter to a Washington attorney, who had sought to represent him before the commission:

"Dear Sir:

"Your favor of April 29 inclosing amended Bill for Relief of Producers of War Minerals is at hand; also your offer to look after our interest for a retainer of \$25 and 20 per cent of recovery, is before us, for which we thank you. In reply will say that your proposition does not appeal to us, for the following reasons:



"Both the original bill of March 2, 1919, and the proposed bill (S. 4259) amending the same, are based on the fact of an existing *contract* or understanding with the U. S. Government, either direct or implied, by the claimant for the production of war minerals, etc. We had no such contract or understanding, and so stated in our papers, and on these papers we must be judged in any court, but, assuming that our claim was entirely just, and that we had a contract with the Government—which for some reason had been ruled out—by those administering the act of March 2, 1919, the so-called amendment provides no relief except in *words*; for it is generally understood by the public that the U. S. Court of Claims, to which it would be assigned, is merely the Limbo to which Congressmen send claims of persistent constituents, well knowing that to be the last of them, and the said constituent may, thereby, also have the grim satisfaction of being a man who has a *claim against the Government* which he can pass on down to his descendants, and give him the excuse also to pat his Congressman on the back and vote for him as long as said Congressman is available. No—we want none of this nonsense, and feel quite sure our so-called claim was very properly ruled out under the law."

#### MANY APPEALS TO SECRETARY

In many cases claimants who were denied responded with complaint or appeal to the Secretary direct. Some of these were reproachful or abusive, some were fairly pathetic in expression of disappointment which was clearly genuine, revealing an absolute misunderstanding of the terms of the law on the part of claimant; and some were so persistent and unintelligent that they only worked harm to the authors.

One notable case was that of a foreign-born citizen, who accompanied his papers with letters direct to President Wilson and Secretary Lane. In both of these his loyalty and service to the Democratic Party were stressed. When the opinion of the Attorney General was announced he addressed an appeal to that officer, reproaching him with the disastrous effect such opinion would have upon the Democratic Party.

Examination by engineer and auditor developed that it was doubtful whether he had ever received any Government request, and, in any event, he had suffered no operating loss. The only loss, if any, was involved in the purchase of his property. Following refusal, he, at intervals, addressed letters to the Secretary, suggesting in one that if his claim could not be paid, the Government might lend him \$25,000 to develop a silver mine; in another, that he might have the use of some of the unused Government machinery, and, finally, that he be appointed Minister to his native land, on the strength of the fact that he understood the language. When the new administration came into office, he appealed to the Secretary, referring him to certain well-known Congressmen for evidence of his standing in the Republican Party.

These various letters carried intermittent criticisms of the commission itself, of the commissioner who had heard him personally, and especially of the commission's auditor.

#### COMMISSION'S DECISIONS GENERALLY ACCEPTED GRACEFULLY

It is due the great mass of claimants to state that few of the "kicks" against the decisions of the commission were as voluminous or unintelligent. The complaints and even reproaches with which the commission felt sympathy were those of the real prospectors who told of their efforts to discover and develop the desired minerals. Some of these were clearly genuine. In numerous cases the commission was able to make awards

to such men, and a few grateful letters from old prospectors who were really in need of their small awards were welcome episodes. Few prospectors really appreciated the limitations of the statute, and therefore when denied, reproached the commission as if it had written the law, or could read into it conditions not existent.

Reviewing the more than twelve hundred claims before the commission, the conclusion is reasonable that despite possible moral obligation toward some, where the Government request was direct and effective, the legislation was, on the whole, inequitable and unwise. It was inequitable because it did not include the producers of all the scarce materials, and other needed non-mineral staples, production of which various Government agencies attempted to increase. It was unwise in that it attempted to compensate for losses not covered by contract and impossible to consider with fairness both to the Government and the claimant, on account of the impossibility of strictly limiting in words, so as to protect the Government, the conditions under which claimant should be entitled to relief. No contracts existed. The rule of construction is that remedial statutes shall be liberally construed. This being so, the unscrupulous claimant had a great advantage of the Government in pressing his claim, because he stressed patriotic motive and made statements which it was impossible to controvert.

#### "FIFTY-FIFTY" PATRIOTISM

Of the total number there was a share of claims absolutely inequitable. Of course these commonly attempted to get the utmost possible from the Government. Claimants were often asked at hearings what portion of their loss was due to business motive and what to patriotism. There was often unwillingness to answer, but, pressed to reply, the majority acknowledged that motives were mixed, and if it were necessary to value them, they should be about fifty-fifty.

To my knowledge no similar remedial statute has ever passed. If it be not possible to establish some absolute measure of indebtedness, or to show some contract, it were better, for the sake of the public purse and national morality, that no such law be enacted.

This brings up the pending proposal, instigated by some of the same interests which urged the first, to "liberalize" the law; throwing open, in the words of the proposed measure, which has already passed the Senate, "relief to all those who in response to any personal, written, or published request, demand, solicitation or appeal, from any of the governmental agencies mentioned in said act," complied with said governmental request.

It would make for the ease of adjudication if the proposed measure were simply to say that every claimant who has already filed shall be entitled to whatever loss the auditors and engineers, working under a commission, shall determine him to have suffered. With the gate thrown wide open to those described above, there will be no means of disproving a claimant's statement. His affidavit to the fact that he may have seen a poster on a tree in the Siskiyou Mountains, which announced the Government's need for chrome ore, or the appeal of Secretary Lane to "Discover America" and, having read, embarked upon a prospecting or developing enterprise which resulted in loss, must be accepted, because the contrary cannot be proved.

Under the present statute, wherever claimant has asserted request or demand from a Government repre-

sentative, which induced his loss, a definite date has been called for, and such Government representative has been asked to confirm his statement. In most cases, if true, he has done so. This has been possible, because both the Bureau of Mines and Geological Survey representatives keep record of their daily journeyings, from which exact dates can be secured. If claimant on that date received such a request, his losses previous to that time cannot be considered, and an exact starting point is established from which the accountants may determine loss. With the so-called liberalized wording no such process will be possible. It will involve payment, in addition to some worthy claims which have been denied under the present statute, of many hundreds of thousands of dollars of losses which have no equity whatever, for which only ordinary business motives were responsible, and which should be carried by the miner who knew the risk and really undertook it independent of any Government appeal.

The commission appointed by Secretary Lane to act as his advisers in the execution of this law consisted of Ex-Senator Shafroth, of Colorado; Ex-Representative Foster, of Illinois, and the writer of this paper, mining engineer. None of these solicited the appointment. In two cases at least it came as a matter of absolute surprise.

Within a few months after appointment, Mr. Foster died, and Mr. Horace Pomeroy, of San Francisco, mining engineer, was appointed; also without his own initiative.

To the best of my knowledge and belief, question of political faith had no influence; certainly it had none in the selection of the two engineers, as, oddly enough, it developed that both of them were Republicans; and the much-criticized commission therefore, acting under a Democratic administration, was in majority Republican.

#### "POLITICS NOT RIGHT"

An amusing incident in this line happened when a mountain Republican from the South appeared before the commission in support of a claim for losses upon two little non-commercial properties, when the evidence before the commission showed that he had conducted a large and profitable operation upon another. Being denied, he protested that he knew the reason to be that his politics were not right. I sent word to him that I, the only Republican member of the commission at that time, had written the disallowance.

Political appeals were of course constantly made, influence of Representatives and Senators was freely sought, and more or less—generally less—cordially supplied.

Commonly it was easy to read that the service was rendered to constituents more from sense of political duty than from real sympathy. In fact, a Senator replied to a commissioner who offered sympathy over the many calls upon his crowded time, that, "if they did not do it, they would not come back." One claimant incautiously wrote an associate that if they did not bring political influence to bear he feared "they would never get anywhere with their claim." The associate gave a copy of this letter to one of the commission's engineers, which in due time appeared in the official files of the case.

At the hearing the letter was read to claimant, and he was asked to explain.

Another claimant, a power in politics in his own domain, receiving and accepting, with the statement that he would make no appeal, an award of nearly \$60,000, in the presence of his Senator, an influential Democrat, returned home and wrote his Senator a long letter of criticism of the commission, closing: "Of course, the commission could not get away with it if one could get at them. The commission is pretty well entrenched in Washington. It takes courage, money, energy and time to fight, even if you get to Washington. They seem to have the backing of the administration. It would be good politics if the Democratic administration threw them out."

The commission, at time of its resignation, in May, 1921, had made recommendations upon all claims before it. If these be approved by the Secretary there should remain from the original appropriation of \$8,500,000 for awards and administration, a balance of about \$4,750,000, which can be turned back into the Treasury. The amount asked in the claims was over \$18,000,000. Administration expenses were less than 2½ per cent of the amount considered, but, of course, a larger percentage figured on the awards.

#### SURVEY AND BUREAU OF MINES OF GREAT ASSISTANCE TO THE WORK

In cases where awards were made the average amount recommended was about 38 per cent of the amounts asked.

The officers and staff of the Geological Survey and the Bureau of Mines were at all times ready to assist the commission. They rendered priceless service to it by accurate testimony as to incidents and dates. As impartial witnesses, their testimony and records often established facts in the absence of which awards otherwise would have been long pre-dated. Also, they disproved claims which would have involved many hundreds of thousands of dollars. In many other cases, perhaps the majority, they confirmed and gave exactness to the statements of stimulation made by claimants, thereby rendering award possible.

It has been a pleasure to me to work with them, and by personal contact, almost within the organization, to appreciate the conditions and problems of their work and to realize the high character of the personnel.

#### Minneapolis Station Studying Drill Steel

At the U. S. Bureau of Mines North Central Experiment Station, in Minneapolis, investigations are being conducted regarding drill steel and carbon steel and the reduction of iron oxide. At this station, the problem of the flow of heat from the walls into the charge of a byproduct coke oven has been solved analytically, and the rather tedious numerical solution of the values of the Fourier's series involved is nearly complete.

#### Experimental Work on Zinc Concentrates

Encouraging results have been obtained at the Mississippi Valley Experiment Station of the U. S. Bureau of Mines in the flotation of sludge table concentrates from the Wisconsin zinc district. Work is being done on the distillation and fractionation of certain crude pine-wood oils in the hope of finding a substitute for the oil used in the Wisconsin zinc flotation work.

## Mining Engineers of Note

### Chester Wells Purington

**I**N 1880 OR THEREABOUTS Mr. Purington remembers having become interested in geology to the extent of breaking up pieces of Maine granite on one of the barren hill farms of Sidney, to see what was inside. Being at the age of nine, the damage done was not considerable. Why a training in classical languages at the Boston Latin School should have led to an attempt to learn petrographic geology at Harvard, and why this in turn should have eventually landed him in eastern Siberia, engaged in gold gravel mining, are matters which the education specialist can puzzle out for himself. Born within hearing distance of the big bell on the Rice Grammar School in Boston, in 1871, Chester Wells Purington left Harvard in the class of '93. From 1894 to 1897 he served on the economic staff of the U. S. Geological Survey, first as assistant to the late George F. Becker. In 1895 Mr. Purington was a member of the Survey expedition to the coast of Alaska and the Aleutian Islands, and visited the Alaska Treadwell gold mine. Here he was first impressed with the importance of mining costs and the economies which could be attained by careful organization and unflagging attention to detail. It was the impression produced by this experience which inclined future activities to the examination of gold deposits and the mining of gold.

In 1896, as associate of Whitman Cross, Mr. Purington mapped the precious-metal veins of the Telluride district in Colorado. In 1897, a first trip to eastern Russia was made, following his resignation from the Survey. Then followed professional examinations in South America, and in the Perm, Orenburg, and Yenesei districts of Russia and Siberia until 1900, when two years were spent in work as a mining laborer, first at a hydraulic mine in southern Oregon, and then at Camp Bird, in Colorado. When Beatty and Harold Titcomb were examining the Camp Bird for sale, Mr. Purington was battery man in the sixty-stamp mill.

From 1902 to 1907 Mr. Purington was consulting engineer in Denver, in partnership with Godfrey Doughton. During this time the firm made examinations in Mexico, the principal one of these being the Cananea

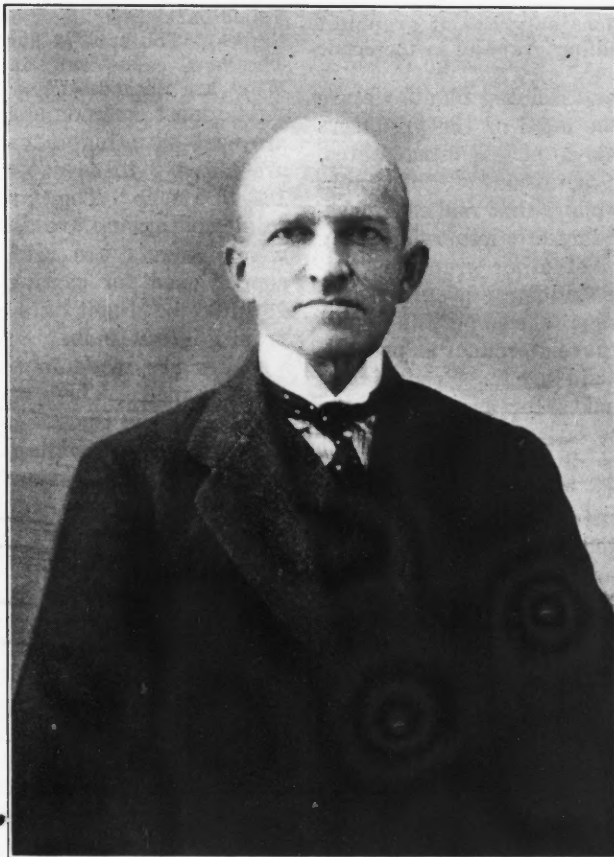
Consolidated, where, as assistant to John Farish, Mr. Purington made a complete geological examination of the property, with the object of determining the position of further orebodies in Capote and adjoining mines. In 1904 he was engaged on special report work by the U. S.

Geological Survey on the costs and methods of alluvial mining in Alaska. He made an examination of hydraulic workings in the Crow Creek district of Alaska in 1905, followed by the examination in 1906-07 of the extensive phosphate deposits of Wyoming, Idaho and Utah for Edward Harriman. In 1907 Mr. Purington began a series of examinations in eastern Siberia for British companies. He made an examination in 1911 of the Pioneer Mining Co., property at Nome, Alaska; in 1912, gold and tin properties in the Trans-Baikal district of Siberia for the Russo-Asiatic Bank of St. Petersburg, and during 1913-15 installed Alaskan methods of mining and washing gravel at the property of the Lenskoie Gold Mining Co., in the Witim district of the Yakutak government. During 1914-18 he was consulting engineer to the Lena Gold-

fields, Ltd., in the Irkutsk province of Siberia.

During 1917 in association with other engineers familiar with Russian conditions, Mr. Purington furnished to the Government evidence of the necessity of dispatching an expeditionary force to Siberia in *December, 1917*, to save the Russian commonwealth. The efforts to convince President Wilson failed, with the result now apparent.

In 1918, Mr. Purington served with the Military Intelligence staff at Washington, and was also in the service at the U. S. Bureau of Mines in England and at Paris, in the preparation of a report on steel-hardening metals. From 1918 to the present he has been engaged in the exploration of the northwest Pacific littoral region, mainly in the Kamchatka-Okotsk districts of Siberia. He is on the directorate of two British companies, namely the Ayan Corporation, Ltd., and the Far Eastern Development Co., Ltd., and is a director of the Aian Gomei Kaisha, a Japanese company. In 1920 he visited the Toi and Taio gold mines, in Japan.



C. W. PURINGTON

## CONSULTATION

### Graphite Marketing

"Is there a graphite refining plant in the United States, where is it located, and what is its name?"

"Where is the market for graphite in the United States?"

"How do you distinguish between crucible and lubricating grades of graphite?"

"What are the present quotations on prices of graphite?"

"If you know of a concern handling graphite in the crude please give us the address of same."

The only graphite cleaning and refining plants we are aware of in this country are the mills of the producers in Alabama, New York, Pennsylvania and other states, and the factories of the various manufacturers of graphite products. We know of no plant that makes a practice of handling the product of domestic miners, refining and selling it, to the exclusion of other graphite business. The domestic graphite industry is practically dormant at the present time, but when operating, producers endeavor to turn out as pure a product as possible and generally have a mill to aid them. Producing a finished product at the mill makes for a saving in the present heavy freight charges.

The market for graphite is divided into five large classes: crucible manufacturers, who are estimated to consume 45 per cent of the entire consumption of foreign and domestic graphite used in the United States; foundry facings, accounting for about 25 per cent, lubricants, 10 per cent; pencils and paints, 5 per cent; stove polishes, 5 to 10 per cent, and other uses the remainder. A large amount of cheap graphite imported from Ceylon, Mexico, Korea, Bohemia, and other places furnishes strong competition to the relatively high cost domestic product. In 1920 a net importation of about 20,000 tons of graphite was made compared with a total domestic production of 8,610 tons.

Graphite suitable for making crucibles should be of the crystalline variety and high in purity. Specifications vary widely but the standard of purity ranges between 85 and 90 per cent graphite carbon, and from 125 mesh to 86 mesh for the lower limit of size. During the war it was recommended that a screen analysis of No. 1 flake should show 3 per cent over 35 mesh, 50 per cent over 65 mesh, and 100 per cent over 100 mesh.

Lubricating graphite must be free from abrasive materials. The particular variety of graphite used is not of prime importance, flake, amorphous, and artificial all being used. Frequently it is combined with oil. The crystalline and amorphous grades of the mineral are, with the exception of crucible manufacture, rivals. The U. S. Geological Survey states that in a dull market the advantage goes largely to crystalline or flake graphite, much of which is purer than the amorphous variety. Moreover, for several uses the fines and dust of crystalline graphite that are produced in the preparation of crucible flake may be sold as a byproduct at prices with which amorphous graphite cannot profitably compete.

Graphite quotations are given in the market section of *Engineering and Mining Journal*. A list of graphite consumers will be gladly furnished subscribers who ask for it.

### Commercial Shapes of Copper

"Your opinion is requested as to what constitutes the usual commercial shapes of copper."

"What are 'bowl cakes' and is this a commercial shape; in what way does a 'bowl cake' differ from a 'cake'?"

"Would you consider copper billed as 'round bars' or 'rolled bars' (not 'ingot bars' or 'wire bars') as commercial shapes? The bars in question average about 300 lb. each. The 'bowl cakes' vary in weight from 60 to 190 lb. each. What are 'cathodes'?"

The most common shapes of copper sold to consumers are wire bars, ingots, cakes, and ingot bars. Wire bars are about 3 to 4 in. square and vary in weight from 135 to 500 lb. They are tapered at the ends to facilitate drawing and are used in the manufacture of copper wire. Ingots are relatively light notched shapes of copper used for casting purposes and weighing about 18 to 22 lb. Ingot bars are similar to ingots and weigh from 55 to 110 lb.

Cakes are made in three shapes, square, round and bowl shaped. They weigh upwards of 100 lb. The square cake is the commonest and is furnished by producers without premium. The round cake is demanded occasionally by consumers and commands a premium. The bowl cake was manufactured in considerable quantities during the war but sales have been infrequent since then. It has always been considered an unusual shape and premiums are charged for its manufacture.

The terms "round bars" and "rolled bars" are unfamiliar. They are not generally applied to copper cast by a copper refinery. It may be that the designations cover billets or cylindrical shapes of copper used in the manufacture of copper tubes or, perhaps bars which have been rounded in the rolling mill.

Cathodes are essentially rectangular flat shapes of refined copper taken from electrolytic refining tanks. They are generally melted into one of the ordinary shapes mentioned above. Anodes are the unrefined shapes placed into the tanks. Cathodes are usually sold at a small discount under the price for the commonest grades of electrolytic copper.

### Water-Cooled Pipes for Blowing Copper

"We are using a magnesite-line reverberatory furnace for converting our high-grade matte (55 to 65 per cent copper) to 'Best Select' copper. The matte is brought forward to pure copper by the use of a Welsh process which takes advantage of the fact that raw and oxidized matte, when mixed and heated, react to produce metallic copper. We have been considering the substitution of the blowing process for the mixing of raw and oxidized matte. As this blowing would necessitate a much longer time of treatment than is required in ordinary refining, we thought it might be advisable to water-jacket the pipes used for this purpose, in order to make them last longer and thus reduce the cost. It occurred to me that although water-jacketed pipes are not now used, they may have been at some previous time, and it would be interesting to discover why they were abandoned."

Having had no experience in the use of water-jacketed pipes for the purpose mentioned, we refer the inquiry to our readers.

## HANDY KNOWLEDGE

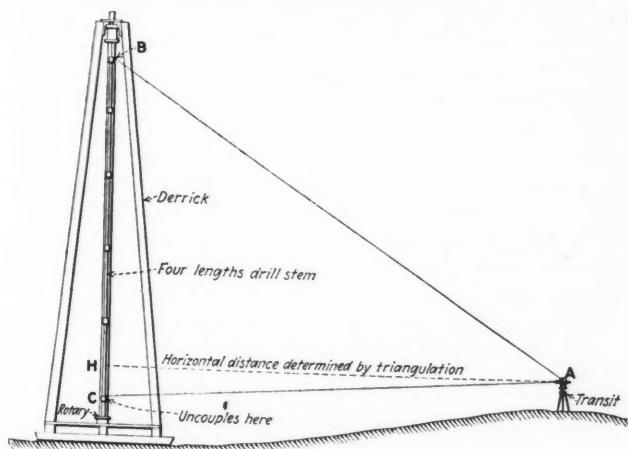
### Measuring Depth of Well With Transit

BY A. G. WOLF

Written for *Engineering and Mining Journal*

A wrinkle in surveying which may be of interest to oil men in fields where drilling by the rotary method is practiced is that of determining the depth of a well by means of a transit. There is no advantage in applying this method to any well where direct measurement is permitted. Many times, however—in fact more often than not—permission is not granted. This is especially true where one company desires to know accurately the depth of an oil-bearing stratum in an adjoining property.

Of course, the number of lengths of drill stem can be counted with the aid of field glasses if the well is at



MEASURING DEPTH OF WELL WITH TRANSIT

some distance from the nearest property line, and a fair approximation of the depth obtained. But there is no way to tell how many lengths of 20-ft. and how many of 21-ft. or 22-ft. drill stem there are in the string. A much closer measurement can be obtained with a transit.

First, a base line must be established. Then, knowing the length of the base line, the distance from either end to the well can be determined by triangulation. Also the exact location of the well can be determined if the co-ordinates of the base line monuments have been obtained.

The transit work in determining the depth of the well is best done while the drill stem is being drawn from the hole. Make the set-up over one of the bench marks. Read the vertical angle to the top of the rotary, and then to the top of the kelly-joint (or groove-stem or grief-stem, as it is variously called) at the time drilling stops. The length of "kelly" out of the hole can then be calculated from the horizontal distance to the well and the vertical angles. When the kelly-joint is elevated and while it is being unscrewed the vertical angles to its top and bottom must be read to determine its full length. Then the stem will be hoisted so that four lengths are clear of the rotary, provided the usual 112-ft. derrick is used. A shot must then be taken at the

top of the collar or top of tool joint on the topmost length, the vertical angle recorded, and a second shot at the corresponding point on the length of stem in the rotary. These shots must be taken in this order, for there is plenty of time to catch the second sight while the set of four lengths of drill stem (a "fourble" in the driller's vernacular) is being unscrewed.

This operation is repeated on each "fourble" as it is drawn from the well, the last shot being taken on the bottom of the bit. To calculate the depth, then, there are two sets of right triangles to solve in which one oblique angle is known, angle HAC and angle HAB (see sketch) and the length of one side HA, is known.

The vertical distance is in error if the vertical angles have been incorrectly measured, and this error varies directly as the horizontal distance of the transit from the well. It is, therefore, necessary to get as close as possible. It is also necessary to get on the side of the derrick opposite the draw works or the pumps, or else the top of the rotary will be invisible. With careful work the depth of the well can be determined to within a foot.

### Weights for the Drafting Room

BY ROY H. POSTON

Written for *Engineering and Mining Journal*

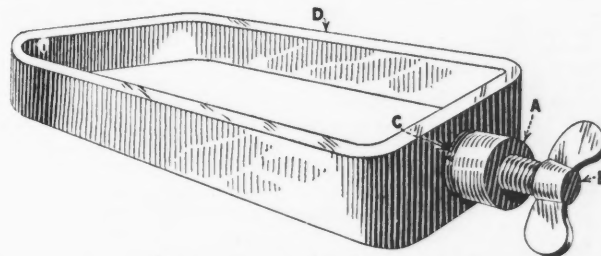
A good weight for holding down large drawings, maps, and the like, that cannot be held in place with tacks because of the resulting holes, may be made from a 3-in. length of standard  $1\frac{1}{2}$  x  $1\frac{1}{2}$ -in. square iron with the edges rounded. This should be covered with white adhesive tape wrapped diagonally. Such weights are small enough not to be in the way of the draftsman and are big enough to answer all requirements.

### A Transit Tripod Leg Clamp

BY ROY H. POSTON

Written for *Engineering and Mining Journal*

In the illustration presented herewith a clamp of a transit tripod leg is shown. A is a brass bushing which is tapped into D and threaded inside to receive the thumbscrew B. Constant use of the thumbscrew causes



TRANSIT TRIPOD LEG CLAMP

the bushing to become loose at the joint C, and this often results in considerable annoyance and occasionally renders the clamp unfit for use until repaired. To avoid this, solder or braze the joint C and oil the thumbscrew often, and this condition will not occur.

# THE PETROLEUM INDUSTRY

## California Shows Decreased Production During September, Due to Strike

Production of petroleum in the United States in September, according to the U. S. Geological Survey, decreased more than 3,000,000 bbl. as compared with a thirty-day period in August, the daily average for the month being less than for any month since May, 1920. The greatest falling off was in California, where the daily average production was reduced more than 60,000 bbl. by the strike in the oil fields. Daily average production also decreased in all the other states, except Louisiana, Montana, New York, Colorado and Tennessee, in which slight increases are reported. This reduction in production was accompanied by a decrease of 164 producing oil wells completed during the month, which numbered only 788, as contrasted with 2,185 oil wells completed during September, 1920.

Imports of crude oil during September, amounting to 9,138,456 bbl., increased more than 5,500,000 bbl. over the abnormally low imports in August, owing to changed conditions in Mexico in regard to taxes. Exports of crude oil amounting to 880,573 bbl. were normal. Stocks of Mexican petroleum held in the United States by importers increased 2,000,000 bbl., and net pipe-line and tank-farm stocks east of California increased a little more than 1,000,000 bbl., and California stocks decreased about 180,000 bbl.

The estimated daily average consumption of domestic and imported petroleum, 1,389,667 bbl., increased slightly more than 15,000 bbl., so that the net result for the month was an increase in stocks of 3,000,000 bbl.

The accompanying figures, compiled from company reports, show the quantity of petroleum removed from producing properties. Oil consumed at the leases is not included.

## The Pasquai Hills, Manitoba, Oil Field

SPECIAL CORRESPONDENCE

Several new companies and syndicates are preparing to operate in the Pasquai Hills oil field, in northern Manitoba. G. E. Ames, representing a syndicate of Minneapolis capitalists, has staked a large area, and a rig will be sent in immediately. The Brunne Oil & Gas Co., organized by J. A. Anderson, of Minneapolis, has taken up a lease on the Cracking River, some distance from the Man River, but showing the same shale formation which extends throughout the district. The North Battleford Oil & Gas Co. has installed an electric-light plant at its camp and will put on two shifts of drillers at an early date.

## Cat Creek Zone Extended

SPECIAL CORRESPONDENCE

The Frantz Corporation, a subsidiary of the Elk Basin Consolidated, recently brought in what is known as its "River" well, at a depth of 1,041 ft. in the second sands of the Cat Creek field, extending the proved productive zone of the structure a mile and half further east. The well is showing a flow of 350 bbl. Cat Creek field last month topped all its production records, pipe-line measurement of the Elk Basin showing output through its line along of 131,724 bbl. October is expected further to improve upon these figures.

## Refinery Statistics for August 1921

The Bureau of Mines' report of refinery statistics for the month of August, compiled by H. F. Mason, shows a total of 299 petroleum refineries in operation, with a daily capacity of 1,706,800 bbl. of oil. The number of plants operating is the same as in July, but the daily capacity was less by 14,750 bbl.

PETROLEUM PRODUCED IN THE UNITED STATES IN AUGUST, 1921, SEPTEMBER, 1921, AND SEPTEMBER, 1920

State	August, 1921 (a)		September, 1921		September, 1920	
	Total	Daily Average	Total	Daily Average	Total	Daily Average
Oklahoma.....	10,226,000	329,871	9,714,000	323,800	9,093,000	303,100
California (b).....	10,026,000	323,419	7,894,000	263,133	9,128,000	304,267
Central and Northern Texas.....	5,265,000	169,839	4,710,000	157,000	5,743,000	191,433
Coastal Texas.....	2,873,000	92,677	2,796,000	93,200	2,144,000	71,467
Kansas.....	3,332,000	107,484	3,005,000	100,167	3,615,000	120,050
Northern Louisiana.....	1,807,000	58,291	1,793,000	59,766	2,644,000	88,133
Coastal Louisiana.....	133,000	4,290	128,000	4,267	132,000	4,400
Arkansas, (c).....	1,900,000	61,290	(c) 1,400,000	46,667	.....	.....
<b>Wyoming</b>						
Salt Creek.....	1,001,000	32,290	826,000	27,534	929,000	30,967
Big Muddy.....	148,000	4,774	136,000	4,533	184,000	6,133
Rock Creek.....	88,000	2,839	106,000	3,533	147,000	4,900
Grass Creek.....	99,000	3,194	93,000	3,100	129,000	4,300
Flk Basin.....	45,000	1,452	47,000	1,567	66,000	2,200
Other districts.....	91,000	2,935	156,000	5,200	118,000	3,933
<b>Total Wyoming.....</b>	<b>1,472,000</b>	<b>47,484</b>	<b>1,364,000</b>	<b>45,467</b>	<b>1,573,000</b>	<b>52,433</b>
Illinois.....	846,000	27,291	806,000	26,867	903,000	30,100
Kentucky.....	786,000	25,355	725,900	24,197	765,000	25,500
West Virginia.....	681,000	21,968	613,000	20,433	672,000	22,400
Pennsylvania.....	675,000	21,774	602,000	20,066	626,000	20,867
Central and Eastern Ohio.....	444,000	14,323	417,000	13,900	453,000	15,100
Northwestern Ohio.....	183,000	5,903	172,000	5,733	187,000	6,233
Montana.....	119,000	3,839	137,000	4,567	37,000	1,233
Southwestern Indiana.....	78,000	2,516	73,000	2,433	60,000	2,000
Northeastern Indiana.....	24,000	774	21,000	700	26,000	867
New York.....	86,000	2,774	88,000	2,933	78,000	2,600
Colorado.....	9,000	290	9,000	300	9,000	300
Tennessee.....	1,000	32	1,100	37	1,000	33
<b>Totals.....</b>	<b>40,966,000</b>	<b>1,321,484</b>	<b>36,469,000</b>	<b>1,215,633</b>	<b>37,889,000</b>	<b>1,262,966</b>

(a) Revised. (b) Average of figures reported by Standard Oil Co. and Independent Oil Producers' Agency. (c) Estimated in part.

## Technical Papers

**Metallurgy on the Rand**—*The Mining Journal* (15 George St., Mansion House, London, E. C. 4; price 8d.) is running a series of articles by Denny Brothers on "The New Developments in Ore Treatment on the Rand." The first article appeared in the Oct. 1 issue. Present practice on the Rand includes the following operations: 1. Coarse crushing. 2. Sorting. 3. Fine crushing. 4. Stamp milling. 5. Amalgamation process, taking the entire pulp from stamp mill. 6. Classification and separation of coarse material to go to tube mills. 7. Tube-milling of coarse material and secondary amalgamation treatment of finely ground products. 8. Separation of sand and slime. 9. Separate treatment of sand by percolation methods with cyanide solution. 10. Separate treatment of slime in cyanide solution by decantation method or filter pressing. 11. Extraction process for recovering the gold from cyanide solution.

The all-sliming process which has proved successful at Springs Mines and which seems to merit adoption generally, eliminates: 4. Stamp milling. 5. Amalgamation process. 7. Secondary amalgamation process. 9. Separate treatment of sand. 10. Separate treatment of slime. In place of these are substituted the following: 4. Finer crushing and increased fine-grinding capacity. 5, 7, 9, and 10. (a) Circulation of cyanide solution through the whole operation of fine-grinding classification. (b) Reduction of all the ore to 150 to 200 mesh. (c) Agitation of the pulp in suitable tanks. (d) Separation of the gold-containing cyanide solution from the treated fine material by filter pressing. The objects of the modifications are: 1. Substantial reduction in capital outlay on plant. 2. Substantial reduction in labor and supplies in operating costs. 3. Appreciable increase in recovery. 4. Improved control and checks throughout the operations. 5. Safety from theft.

In the Oct. 15 issue the series is continued with a two-page article on the subject of crushing.

**Concrete**—The University of Illinois had issued two bulletins on the subject of concrete. No. 34, (price 20c. from the Engineering Experiment Station, Urbana, Ill.) is a thirty-nine-page booklet entitled "The Thermal Conductivity and Diffusivity of Concrete." The absolute thermal conductivity of a number of standard concrete mixtures was determined, from which was calculated the diffusivity, or thermometric conductivity. Bulletin No. 35, sixty-three pages, price 30c., is entitled "Studies on Cooling of Fresh Concrete in Freezing Weather" and throws some light on the behavior of fresh concrete at low temperatures, and the necessity of protection or other precautions.

**Mineral Resources**—Recent separates of "Mineral Resources of the United States" to appear include: "Iron Ore, Pig Iron and Steel in 1919," thirty-one pages; "Stone in 1919," thirty-six pages; "Zinc in 1919," eleven pages; "Antimony in 1920," eleven pages; and "Lead in 1920," ten pages. Copies may be obtained on request to the U. S. Geological Survey, Washington, D. C.

**Zirconium**—The most complete book on zirconium which we have seen has

recently been published by the U. S. Bureau of Mines as Bulletin 186, Mineral Technology 25. A general historical discussion of the preparation and commercial uses of zirconium and its compounds is given in Part I. Part II is devoted to the results of the experimental work which was performed. The topics covered include Ore Fusions, the Preparation of Pure Zirconium Compounds, Methods of Analysis, Amorphous Zirconium, Coherent Zirconium, Zirconium Alloys, and the Use of Zirconium Dioxide as a Refractory. Part III describes the furnaces used, and Part IV is a very complete bibliography of twenty-five pages on the metal and its compounds.

Sintered or coherent zirconium is very resistive to acids, and can be used for electrodes. Zirconium steels have been suggested for armor plate and automobile parts, and nickel-zirconium alloys for high-speed cutting tools and cutlery. Zirconium oxide has been recommended as a refractory, an abrasive, a pigment in paints, and as an opaquing agent in enamel ware. The salts have been used in the textile industry as a mordant, and also for weighting silk.

The 152-page book may be obtained free of charge on request to the U. S. Bureau of Mines, Washington, D. C.

**Utah Minerals**—A pamphlet entitled "Utah's Mineral Wealth," compiled by Thomas Varley, C. S. Stevenson, and W. Spencer Reed, of the Salt Lake staff of the Bureau of Mines, has been printed under the auspices of the Salt Lake City Commercial Club. The book, which contains thirty-one pages of text, is furnished with attractive photographs, maps, graphical representations, and curves, showing the development of the mineral industry of the state. Utah, from 1865 to 1920, produced \$1,290,391,261 from mining. It is at present the producer of one-fifth of the silver, one-sixth of the lead, one-eighth of the copper, one-eighth of the potash, and one-tenth of the vanadium supply of the world. The purpose of the book is to make known Utah's place as a mineral producer, and also the possibilities offered for profitable investment.

**South African Mining**—The Annual Reports of the Secretary for Mines and Industries, and of the Government Mining Engineer, Union of South Africa, for the year 1920 have been published bound together in a book of about 200 pages with a large number of plates and tables. A large amount of descriptive and statistical information is given concerning the gold and diamond mines of the country. The book may be obtained for 10s. 6d. from The Government Printing and Stationery Office, Pretoria.

**Pyrite in S. Carolina**—U. S. Geological Survey Bulletin 725-F, fourteen pages, is descriptive of pyrite at the Haile mine, Kershaw, S. C., with a note on pyritization at the Brewer mine near Jefferson. The Haile mine is an old gold mine and is roughly estimated to have 100,000 tons of pyrite ore and concentrates in sight, and to contain about 600,000 tons. Copies may be obtained on request to the Survey at Washington, D. C.

**Precious Stones**—*The Journal of Indian Industries and Labour* for August (price Rs. 1-8 from Superintendent of Government Printing, Calcutta) contains a twenty-two-page article on

Indian Precious Stones. The principal gems produced are the diamond, ruby, sapphire, spinel and jadestone. Statistics, methods of recovery, and references to production of artificial stones are included.

**Diesel Engines**—*Lubrication* for September (free on request to The Texas Co., 17 Battery Place, New York City) contains a twelve-page article on the four-cycle air-injection type of Diesel engine. Discussion includes Advantages and Disadvantages, Fuel Consumption and Cost, Fuel Injection, Air Compressors, Compressor Lubrication, Fuel Pumps, Cylinder Arrangements and Construction, Methods of Starting, and Cooling of Pistons and Exhaust Valves. Several different types are described with the aid of illustrations.

**Flotation**—Pamphlet No. 2 of the Idaho Bureau of Mines and Geology, Moscow, Idaho, is a six-page discussion of the effect of size of mineral particle on flotation. It may be obtained on request.

**Oil Shale**—*Report of Investigations*, Serial Number 2,277, obtainable from the U. S. Bureau of Mines, Washington, D. C. on request, consists of a selected bibliography on oil shale, compiled by E. H. Burroughs and M. J. Gavin.

**Gold Milling**—The amalgamation and cyanide mill of the Gold Bullion mine in the Willow Creek district of Alaska, is described in a four-page article in the Oct. 29 issue of the *Mining & Scientific Press*. (San Francisco, Cal.; price 15c.)

## Book Reviews

**First Aid and Rescue Work in Mining.** By Louis G. Irvine. Cloth; 5 x 7; pp. 355; illustrated. Published by the South African Red Cross Society and distributed by the *Mining and Scientific Press*, San Francisco. Price \$2.

This book is divided into two parts: Part I, a general course in first aid; and Part II, first aid and rescue work in mining. Part I covers the subject in a manner that does not differ appreciably from the general type of instruction in this work. However, the illustrations are particularly clear and show the different dressings and figures in a most understandable way. Part II, relating to first aid and rescue work in mining, contains quite a complete treatment on the work as conducted at metal and coal mines in accordance with South African practice. This does not imply that such methods can be applied only locally, for the entire subject matter has a wide application and will be found useful to any mining organization.

**Oil-Field Practice.** By Dorsey Hager. First edition; composition binding; 5½ x 7½; pp. 310; illustrated; 1921. McGraw-Hill Co. Price \$3.

"Practical Oil Geology," an earlier book by the same author, covered the elements of oil geology in simple form. There is necessarily some overlap of the subject matter in the two volumes, but the approach of Mr. Hager's latest book is from the standpoint of development methods and deals largely with operating problems. The information will be found to be of practical value and the several tables are well selected for the use of the oil operator.

# ECHOES FROM THE FRATERNITY

## SOCIETIES, ADDRESSES, AND REPORTS

### The Education of the Mining Engineer

New York Section of M. and M. Society Discusses Problems of Educators

An enthusiastic meeting of the New York Section of the Mining and Metallurgical Society of America was held Friday evening, Oct. 28, at the Harvard Club, following the regular section dinner. In the absence of C. M. Weld, chairman, Sydney H. Ball, vice-chairman, presided and announced that the discussion would cover the report made by the Committee on Technical Education.

Allen H. Rogers, chairman of that committee, briefly reviewed the report and pointed out the difficulties that had been encountered in its preparation. H. A. Guess, in remarking upon the report and detailing his experiences with technical graduates, stated that his objection to some types was their lack of thoroughness. He defined the ideal young engineer as being a "self-starter with four cylinders." He should have "character, horse-sense, energy, and technical knowledge." With the addition of "two cylinders"; namely, leadership and culture, the product would be that much more desirable. L. C. Gratton, the third member of the committee, spoke briefly on their work.

Dr. F. W. McNair, president of the Michigan College of Mines, said that he wished to correct the impression, that seemed to be indicated by the report, that the course at Houghton was shorter than the four-year courses at other institutions, for although the work actually consumed three years, the time expended was equivalent to that given at other colleges in four. He emphasized the point that "reaching" the student was more important than the content of the course and classified specialization as being largely due to opportunity. Lectures, he believed, were justified under three conditions—for the announcement of new developments, for purposes of demonstration, and when the speaker was particularly well fitted for the task of lecturing. His ideal institution, he said, would be one bounteously endowed, free from politics, and where a concentrated study of the classification of the students could be made.

Prof. R. M. Raymond, of Columbia, spoke on the adaptability of the young engineer in handling foreign labor. His success, said Professor Raymond, would depend on his experience and personality, and it was most necessary that his contact be sympathetic at all times.

Prof. E. S. Moore, of Pennsylvania State College, referred to the work of the teacher at mining schools as the "prospecting, developing, and refining of the product." Requirements of teachers should be that they are progressive and that to obtain the best results from the students they must secure their enthusiasm. There was no reason, he said, why English and culture should not be the same in mining schools as in other institutions, but maintained that much of this should be obtained in the public schools and at home.

Prof. A. W. Walker, of Columbia, reviewed briefly the discussions on mining education recently presented at the American Mining Congress meeting. The suggestion of a so-called standard course was found to be impossible, due to a diversity of opinion as well as the difference surrounding various conditions. The six-year course, recently instituted at Columbia, will be watched with interest, said Professor Walker, who also expressed the opinion that he did not regard it as essential that a mining school be located in a mining district.

Prof. C. H. Warren, of the Massachusetts Institute of Technology, stressed the need of securing men on the teaching staffs who have had actual and adequate experience in the field. Modern languages, he maintained, could be left to the preparatory schools and made optional for later work, placing more weight on entrance mathematics.

Prof. J. F. Kemp, of Columbia, defined a technical course as a "short-cut to experience." Teachers, said Professor Kemp, must keep in touch with modern practice and so hold the attention of pupils. He also called attention to the importance of geologic maps and studies in the education of the young engineer, and suggested that this subject be given more prominence than had been allowed by the committee's report.

Prof. Arthur M. Green, of Rensselaer Polytechnic Institute, urged the importance of turning out men who can think and solve problems, and stated that such work required the services of men who were masters of their own branches.

Prof. Robert Peele, of Columbia, also endorsed the six-year course and was quite emphatic in his opinion that the four-year course was no longer sufficient for the needs of the mining engineer of today. Many of the schedules supposed to be in force at different schools had not been followed, said Professor Peele.

Dean George B. Pegram, of the School of Mines at Columbia, commended the report of the committee, and made the suggestion that its circularization among prospective students would be of value. In his opinion engineering education of today, generally speaking, is being conducted along the right lines, and he made the suggestion that such courses should be varied rather than an attempt made at standardization. Professor Pegram also wished to know if there were too many or too few engineers being turned out from the mining schools.

Prof. G. V. Wendell, of Columbia, emphasized the necessity of strengthening foundations and developing personalities. The young engineer does not, he believes, have "time to think," so that the greatest good can be accomplished by a good grounding in the basic subjects.

Following these speakers, J. A. Church, Jr., made a motion to the effect that it be recommended to the Council of the society that a referendum be taken on the following points: Length of course

(three, four, five, or six years); teaching of English; teaching of foreign languages; too many or too few engineers, and economics. This motion was seconded by S. H. Dolbear.

In the discussion following, L. C. Gratton stated that he regretted that only one side, that of the "producer" or educator, had been presented. He agreed that wider foundations in the general sciences were necessary but hoped that some practical way of starting specialization could be found.

At the Montana School of Mines, said Charles W. Goodale, the students are given an opportunity of working two shifts per week in the Butte mines, and this practice has been very effective.

The meeting was notable for the clearness of the opinions expressed. Although some of the points, such as the actual length of course, location of schools, and inclusion of subjects, were not agreed upon by the speakers, all were in accord that certain fundamental learning and technique are necessary for the success of the mining engineer's education.

### Present Status of the Wet Stopping Drill\*

The Mine Inspection Department of Utah believes that the adoption of wet stopping machines will be of advantage both to the mining companies and to the employees. It is not necessary to explain the dangers to the miners' health which arise from drilling dusty holes.

The Utah Consolidated Mining Co. and the Tintic Standard Mining Co. were the pioneers in Utah in the testing of wet stoppers, and their satisfactory experience caused further tests, with the result so gratifying that it can be stated that the day of the dry stopper is passed.

Most of the drill manufacturers now have on the market, or soon will have, two types of wet stopping drills, one a hand-rotated type, weighing 60 to 70 lbs., and the other an automatic or self-rotating type, weighing from 95 to 115 lbs.

Each mine has problems of its own, and each superintendent knows best how to meet the conditions and select the machine adapted to his use, so that no one type of wet stopping drill is recommended.

Before any tests were made by the State Inspection Department it was found that one mine had the following experience in testing wet stoppers against the old dry stoppers:

First—In raising a three-compartment shaft in exceedingly hard siliceous limestone, it took sometimes six shifts to get in a round of holes with a dry machine, and many bits were stuck, whereas with the self-rotating wet stopper only two shifts were required.

Second—In a two-compartment raise, requiring about 120 ft. of holes, it took

\*Abstract of an address delivered recently by H. G. Snyder at a meeting of the Utah Metal Mine Operators' Institute, Salt Lake City.



two shifts with a dry machine, and only one shift with a self-rotating wet machine.

Third—The drilling speed of the self-rotating wet machine was approximately double that of the hand-rotated dry machine, in hard ground.

These results appeared so favorable to the wet machines that further tests were conducted, using the Denver Rock Drill 75, wet, self-rotating; the Sullivan DT-44, wet, hand rotated, and the Denver Rock Drill 16-V, dry, hand rotated. It was found that in medium hard limestone the self-rotating wet machine averaged 1.306 ft. per minute actual drilling time; the hand-rotated wet machine averaged .956 ft. per minute, and the hand-rotated dry machine averaged .645. In sulphide ore, the wet, self-rotating machine averaged 2.218 ft. per minute, the wet, hand-rotating machine averaged 2.52 ft. per minute, and the dry, hand-rotated machine averaged .723 ft. per minute. In other words, the wet machines drilled from 50 per cent more to almost four times as much ground as the dry machine.

It should be noted in these tests that the wet machines were both using  $\frac{3}{4}$ -in. hexagonal steel, whereas the dry machine was using  $1\frac{1}{4}$ -in. cruciform steel, but other tests indicated that the wet machines will drill just as satisfactorily when the larger steel is used. The wet machines were also newer, but the dry machine nevertheless was in excellent repair.

The next tests were made using the Sullivan DT-44 wet, hand-rotated machine, and an Ingersoll-Rand CC-11, dry, hand-rotated machine. It was found that in fairly soft limestone the wet machine drilled an average of 1.888 ft. per minute and the dry machine drilled an average of .625 ft. per minute. In very hard siliceous porphyry the wet machine drilled an average of .31 ft. per minute as against the dry machine's .079 ft. per minute. In soft sulphide ore the wet machine drilled an average of 5.08 ft. per minute and the dry machine an average of .524 ft. per minute. It will be noted from these results that the wet machine had an average drilling speed of from three times to ten times that of the dry machine. In this case the wet machine was using  $\frac{3}{4}$ -in. hexagonal steel, with a starter gage of  $1\frac{1}{4}$ -in., while the dry machine was using 1-in. cruciform steel, with a starter gage of 2 in.

It is probably that the wet machines will cost more to keep in repair than the dry machines.

The Anaconda Copper Mining Co., after a thorough test, has completely eliminated dry stoppers and is now making comparative tests of the different makes of wet machines. Also, at the Hecla mine at Burke, Idaho, the Ingersoll-Rand CC-11 dry stoppers have been converted into what are known as CCW-11 wet stoppers, and are giving excellent satisfaction.

One of the vital features of the wet machines, especially the heavier, self-rotating types, seems to be the brake which is provided for the feed. By means of this brake, the forward feed of the machine can be stopped, while the bit continues to rotate, which in a large measure prevents the bits from sticking, and the miners soon learn to take full advantage of it.

From talking with the superintendents and foremen in Utah, and also

with a number of miners who have used the wet machines, it has been found that after the miners become accustomed to them they much prefer them to the dry stoppers. In Butte, the experience at first with the miners was reported to be unsatisfactory, and a number of men had to be discharged before the machines were given a fair trial.

In the Coeur d'Alenes, the Hecla mine reports that their best miners will not work in raises unless they are furnished wet machines, and in the stopes some prefer them and some do not. When men first start to use the wet drills they usually use too much water, and get themselves wet, but they soon learn to use only enough water to clear the hole. It will probably be necessary, for at least the new men, to wear slicker pants and change their clothes after the shift.

It should also be mentioned that the heavier, self-rotating machines are more difficult for the miner to handle properly, and it will be necessary for good staging to be used.

## MEN YOU SHOULD KNOW ABOUT

Ira L. Wright has returned to Silver City from an examination trip in Mexico.

F. W. Bradley is in Alaska and is expected back in San Francisco early in November.

Arthur W. Jenks is examining mining properties in several districts of northern Ontario.

W. D. Arnett, formerly of Goldfields has moved his headquarters from San Jose, Cal., to El Paso, Tex.

Sydney J. Kidder, general manager of the Mogollon Mines Co. has returned to the mines from a visit to Kansas City.

Capt. M. D. Murray has returned to Los Angeles from a visit to his silver-lead properties at Tarazas, Chihuahua, Mexico.

John M. Sully, general manager of the Chino Copper Co., is on an inspection trip to the company coal properties at Gallup, N. M.

Kirby Thomas has completed an examination of gold properties in the Caribou Mountain District north of Soda Springs, Idaho.

Glenn L. Allen is in Guadalupe, Zacatecas, Mexico, conducting some metallurgical investigations for the Cia. Internacional Minera, S. A.

Edmund Norris Hobert, mining engineer with the American Smelting and Refining Co. at Parral, Mexico, is at his headquarters in El Paso, Tex.

Louis Padison, an engineer of long experience in Montana and Mexico, has become chief mining engineer for the Magma Copper Co., at Superior, Ariz.

A. R. Chambers, of New Glasgow, N. S., has been appointed superintendent of the mainland ore mines and quarries of the British Empire Steel Corporation.

Walter G. Scott, of the Southwest Station, U. S. Bureau of Mines, is returning to the Inspiration Consolidated Copper Co. to assume his former duties.

Warren R. Sholes, of the School of

Mines, University of Utah, has been appointed mineral examiner in the Utah field division of the United States Land Office.

C. O. Stillman, president of the Imperial Oil Co., has returned to Toronto from a tour of inspection of the company's operations in the Western part of Canada.

D. F. Haley, manager of the Chanute Spelter Co., local subsidiary of the American Metal Co., returned to Joplin on Oct. 26 from a brief business trip to New York.

Stanley Williamson has resigned as secretary of the New Mexico State Corporation Commission, to accept a position in the executive offices of the Central Copper Co. in New York.

E. H. B. Avery, formerly purchasing agent and traffic manager for the United Verde Extension Mining Co., has become connected, at Los Angeles, with the traffic department of one of the Pacific Coast steamship companies.

Dr. Charles H. Herty has resigned as editor of the *Journal of Industrial and Engineering Chemistry* to accept the presidency of a new organization, which will be known as the Synthetic, Organic, Chemical Manufacturers' Association of the United States.

J. R. Reigart, assistant superintendent of mines in the Gwinn district, Mich., for the Cleveland-Cliffs Iron Co., has resigned his position and left on Nov. 1 for Gold Hill, Nev., to assume the management of a gold property for the United Metals Selling Co.

Mining and Metallurgical engineers visiting New York City last week included: S. G. Blaylock, Trail, B. C.; R. A. Rank, Tampico, Mexico; J. K. Walsh, St. Louis, Mo.; A. S. Walker, East Aurora, Ill.; W. G. McBride, Globe, Ariz.; Dwight Garrison, Philadelphia, Pa.; Oscar Lachmund, Spokane, Wash.; E. S. Moore, State College, Pa., and Alexander Leggat, Butte, Mont.

## SOCIETY MEETINGS ANNOUNCED

American Iron and Steel Institute will hold its twentieth general meeting in New York at the Hotel Commodore on Nov. 18.

The annual meeting of the American Society of Mechanical Engineers will be held in the Engineering Societies Building, New York, Dec. 5-9.

## OBITUARY

Dwight W. Bisbee, of Los Angeles, was accidentally killed on Oct. 18 in the Yellow Aster mine, near Randsburg, Cal.

Franklin Leonard, president and superintendent of the Comstock Tunnel Co., Nev., died recently at Sutro, at the age of 78.

James B. Lewis died at Walpole, Mass., on Oct. 20. He was connected with the Calumet and Arizona Mining Co. for a number of years.

# THE MINING NEWS

The Mining News of ENGINEERING AND MINING JOURNAL is obtained exclusively from its own staff and correspondents, both in the United States and in foreign fields. If, under exceptional conditions, material emanating from other sources is published, due acknowledgment and credit will be accorded.

## Leading Events

Attention is called to the review of the situation at the mines in October, published on p. 751.

The mining town of Britannia Beach on Vancouver Island, B. C., was partly destroyed by a cloudburst and flood on Oct. 28. Thirty-five were reported killed or injured.

The Ayan Corporation, managed by C. W. Purington, has undertaken gold mining and trading operations in Siberia on the north shore of the Okhotsk Sea.

Our London correspondent states that the interesting plan of the Roodepoort United company in South Africa to operate its mines on a co-partnership basis has been turned down by the men.

Another hydroelectric power project in the Southwest is being talked of. El Paso business men are investigating the possibilities of erecting a power plant at Elephant Butte dam to supply western New Mexico and eastern Arizona.

An amendment to the tax bill in the interest of gold producers has been made by Senator Walsh and accepted by the Senate.

Director Bain, of the U. S. Bureau of Mines, believes that the western states are generally in favor of revising the mining law, though many individuals are opposed through a misunderstanding of the provisions of the so-called Arentz bill.

### Cloudburst at Britannia Beach Does Much Damage

Part of British Columbia Town Destroyed — Mining Company's Plant Reported Safe

A cloudburst and flood on the night of Oct. 28 swept away part of the town of Britannia Beach, on Vancouver Island, B. C., and late reports had it that thirty-five of the 1,500 inhabitants were either dead or missing. Fifty houses were carried away. The plant of the Britannia Mining & Smelting Co. was unharmed. Flood waters of the Coquitlam River were also reported to have inundated a section of Port Coquitlam, fourteen miles away.

### Suit Over Premier Mine Settled By Paying Daly \$15,000

Cash Payment Unexpectedly Ends Contest for Share in Property

Litigation over an interest in the Premier mine near Stewart, B. C., in which Patrick Daly sought to recover \$1,960,000 from Reginald K. Neill and others, has been terminated by a \$15,000 cash settlement in favor of Daly. The litigation was started last winter after M. W. Bacon, a mining engineer, had sued Mr. Neill to recover a quarter interest in the mine. Judge Rudkin ruled that Bacon could not recover the interest which he valued at \$2,500,000.

Mr. Daly, who had formerly been superintendent of the Premier, immediately filed suit against Mr. Neill and associates. Daly in his complaint alleged that as superintendent of what was known as the Bush properties he discovered the great possibilities of the mine and decided to come to Spokane to get capital. He took Mr. Neill to the property and soon convinced him that the mine was rich. He declares that Mr. Neill then organized the Premier company and arranged for him to act as superintendent and confidential agent, with the understanding that he was to have a share in the mine. Some time ago Mr. Neill and his associates sold a fraction of the mine to the American Smelting & Refining Co.

### Attempted Deal With Soviet Government Fails

Employees of Russo-Asiatic Consolidated, Ltd., Eager for Resumption of Work—Conditions Proposed by Officials Too Onerous for Acceptance by Mining Company

NEGOTIATIONS begun in Moscow on Aug. 20 last by Leslie Urquhart, chairman of the Russo-Asiatic Consolidated, Ltd., with the Soviet government, for the return to the company of its properties, have failed, according to information placed before the stockholders recently by Mr. Urquhart, as told by our London correspondent in the issue of Oct. 29. The chairman says that up to the evening of his departure from Moscow on Sept. 12 he was continuously engaged with the concessions commission, called the Technical Economic Commission, appointed by the Soviet government for the purpose. This commission was a large one, including men with business experience in important affairs in the old days. The direction and decision, however, rested with three ministers of the government, who in turn had to submit the draft contract to the final decision of the Council of People's Commissaries under the presidency of Lenin.

In the course of these negotiations a concession agreement was drafted and discussed. The intention of this was to return to the company its properties as they were at the time of nationalization, together with the stocks of materials, working capital, and other assets. Eighteen of the twenty-seven clauses of the agreement were agreed upon, and in certain other clauses there was only slight disagreement. There were, however, vital questions at issue which could not be decided.

Information obtained at Moscow from employees of the company who had come from the properties was reassuring as to their condition as well as to the attitude of the workmen there, according to Mr. Urquhart. Given fair opportunity, the time needed to rehabilitate the company's business would not

be so great as might be expected. At all of the properties at Kyshtim, Rider, Ekibastus, and Tanalyk the employees are pathetically anxious to resume work, according to Mr. Urquhart.

The nine clauses in the concession agreement which could not be agreed upon embodied the following points:

Referring to the return of the company's properties under the form of a concession, the Soviet government proposed to exclude lands that had been assigned or were to be assigned to the local population in accordance with the land settlement scheme of the government. The company could not agree to this until the lands to be demarcated, and the new regulations under which the land, mineral and timber rights were to be assigned, were clearly defined.

No agreement was reached as to return of the company's losses and working capital. It was held necessary also by Mr. Urquhart that state control with reference to new forest and timber regulations and other points be clearly defined; likewise the substitute for the old mining code.

The amount of royalty payable on sales, in place of taxation, could not have been paid, in the amount demanded, without loss. The company refused to consider an excess profits tax.

Mr. Urquhart insisted that all employees, whether Russian or foreign subjects, be regarded as engaged on work of state importance and should not be liable to forced labor; that their property be free from special local taxes, requisitions and confiscations; their homes free from regulations limiting living space, emigration and other similar measures of force; that all searches, arrests and similar acts be

carried out against the company's employees by decision and in the presence of judiciary organs; also that qualified employees be free from military service and mobilization and on an equality with persons employed in the most important state enterprises. The commission refused to agree to this.

The company insisted on a ninety-nine-year concession: The commission offered only a seventy-two-year lease.

Certain conditions proposed by the Soviet government, involving, among other things, the right of purchase of properties by the government after a term of years, were unacceptable.

Clause 27, referring to arbitration, provides that all disputes as to the meaning or fulfillment of the concessions agreement were to be referred to a permanent arbitration commission of three; one member to represent each side, the third, or president, to be mutually agreed on. Failing agreement as to the third member, the commission proposed that the president, who must be a Russian, would be nominated by the Russian Academy of Science. The company insisted that, failing agreement, the president, who must be a neutral, that is, neither a Russian nor British subject, be nominated by a foreign scientific society, preferably the A. I. M. E. This latter, Mr. Urquhart said, "is the only safeguard (and at that only a moral safeguard so long as present conditions of lawlessness exist in Russia) that the terms of the contract would be interpreted in all fairness and justice for both sides by an unprejudiced umpire."

Mr. Urquhart refers to some of the clauses of a proposed supplemental agreement with the All-Russian Council of Professional Unions, which was to form part of the concessions contract, this council being a department and organ of the Soviet government. "To call this union a professional union," says Mr. Urquhart, "seems to me a misnomer, for whether he desires it or not it is obligatory for every man or woman worker in Russia, be he a brain worker, lawyer, mining, civil or mechanical engineer, a skilled craftsman or unskilled laborer, to be a member of this union.

In one of the clauses of this agreement, skilled workmen are divided into thirty-nine categories, whose rates of pay are based on wages paid in England and Germany. "But it is beyond the skill of mortal man today to fix the rate of exchange," comments Mr. Urquhart, "and further the conditions are not the same."

The concessionaire is obliged to inform the Professional Unions of every engagement and every discharge of workmen. The transfer of persons employed in state enterprises to the enterprises of the concessionaire is permitted only on the same conditions as the transfer from one state enterprise or department to another. The restriction on the personal liberty of the workman and the freedom of the concessionaire in developing and operating his enterprise is evident.

Another clause insisted that the concessionaire be obliged to buy from abroad for a period of not less than seven years, for the personal needs of the workmen and their families, all food, provisions, clothes, and other supplies, and to sell these at cost. Mr. Urquhart says that he pointed out that it was illogical that a seven-year period

should be fixed in advance, and that it was unreasonable to force the concessionaire to bring flour and provisions from America for seven years, when there is today wheat in Akmolinsk Province which cannot be moved by the Soviet government. Mr. Urquhart says he suggested that the interests of the workmen would be safeguarded better if the concessionaire were obliged to buy in the cheapest market and sell at the cheapest price. The Professional Unions, however, insisted on their conditions.

### New Power Project Would Use Elephant Butte Dam

Proposed To Supply Companies in Western New Mexico and Eastern Arizona—El Paso Business Men Studying Problems Involved

Another hydro-electric development project, that at the Elephant Butte dam, is being seriously considered in the Southwest. On account of the fact that the development of the supply of water power is already completed at Government expense there remains but the erection of a power house, and building of transmission lines, if it is decided to undertake the project. Fuel for power purposes in this section is one of the greatest expenses of mining and the introduction of cheap electric power would be welcome by many mining companies in west Texas, New Mexico and eastern Arizona.

A committee to look into the matter has been selected from the personnel of the government research and city planning departments of the El Paso Chamber of Commerce and it will work in connection with Charles G. Wilfong, who has been carrying on investigations in this connection for four years, with particular relation to the mining industry in New Mexico. The present peak load demand in this territory has been estimated at 58,900 hp. by the engineering firm of Henry & Conkling.

The transmission line considered would extend west to the Clifton district in Greenlee County, Ariz., a distance of about 150 miles. The largest consumers would be the Chino Copper Co. at Santa Rita and Hurley, using from 12,000 to 17,000 hp.; the Hanover-Fierro district, 3,000 hp.; Silver City, 1,000 hp.; Phelps-Dodge Corporation at Tyrone, 4,000 hp.; and the Lordsburg district, 2,000 hp., these points all being in New Mexico. The Phelps-Dodge Corporation, recently consolidated with the Arizona Copper Co. and operating at Clifton-Morenci-Metcalf, Ariz., would demand from 8,000 to 10,000 hp., while the requirements of the City of El Paso and Juarez, Mexico, would be about 10,000 hp.

### To Mine Gold Along Okhotsk Sea

A company known as the Ayan Corporation, Ltd., with its home office at 428 Salisbury House, London, is conducting the development of an extensive gold mining area in Siberia on the north shore of the Okhotsk Sea, as well as trading activities in the same district. J. A. Agnew is chairman of the board and C. W. Purington managing director.

Silver purchases by the Bureau of the Mint during the week ended Oct. 29 totaled 320,997 fine ounces, bringing the total purchased under the Pittman Act to 79,698,863 fine ounces.

### The Attempt To Block the Deal To Operate the Star Mine

An Account of the Efforts of Day-Smith Interests To Prevent Joint Operation by Hecla and B. H. & S.

BY A. J. DUNN

The injunction proceedings brought by Eugene R. Day, manager of the Hercules Mining Co. and a stockholder in the Hecla Mining Co., and Mrs. Sarah E. Smith, director of the Hecla and the largest individual stockholder in the company, to restrain the officers and directors of the Hecla Mining Co. from submitting to the stockholders of the company for ratification an agreement entered into with the Bunker Hill & Sullivan Mining & Concentrating Co. for the purchase and operation of the Star mine, was the preliminary step in a legal controversy that promises to become a veritable fued between the contending parties and which even now has widened the breach that has long existed between the adherents of the respective litigants. For the real animus that prompted the litigation, one must go back of the issue presented to the court. Mrs. Smith is the widow of the late James R. Smith, who was president of the Hecla Mining Co. at the time of his death. Upon the death of Mr. Smith, James F. McCarthy, manager of the company, was elevated to the presidency and he has since retained the dual position, and the steady dividend record of the Hecla, together with the vast ore reserves blocked out and the mine's modern equipment, are the best evidence of his successful management. For several years Mrs. Smith, who owns 94,000 shares of stock and for that reason alone has been retained on the board of directors, has manifested dissatisfaction with the management, but in view of the highly successful operations of the company, she has been unable to gain support from other directors or stockholders. However, at the annual meeting of stockholders of the company last April, an alliance was formed between Mrs. Smith and Eugene R. Day for the purpose of electing the latter to a place on the board of directors. The combination failed, and therein was born the attempt to gain control of the Hecla company, which appears to be the real motive back of the attempt to block the Hecla in the purchase of the Star.

In July a circular letter from the secretary advised Hecla stockholders that a special meeting had been called to meet in Spokane on Aug. 18 to take action, among other things, upon an agreement between the directors of the Hecla company and the Bunker Hill & Sullivan company for the purchase and operation of the Star mine, the letter giving full information regarding the terms of payment and the reasonable certainty that ore shipments from the Star would meet the deferred payments. On the eve of this meeting a restraining order was issued by the superior court of Spokane upon complaint of Mr. Day and Mrs. Smith forbidding the officers and directors of Hecla from submitting the ratification of the agreement to the stockholders and setting a date for a hearing on the question of making the temporary order permanent. After several postponements the case came on for hearing when, on motion of defendant, the case was dismissed upon the ground that since the Bunker Hill & Sullivan was

a party to the agreement in question, that company should be made a party to the suit, but as the Bunker Hill was a foreign corporation, the court had no jurisdiction.

The restraining order was continued five days in order to allow plaintiffs time to bring an action in a court having jurisdiction over both companies. Thereupon action was started in the district court at Wallace, Idaho. At the same time service was obtained on Frank M. Smith, director of the Bunker Hill smelter, who maintains an office in Spokane, and the court was asked to accept that as legal service on the Bunker Hill & Sullivan company. The hearing in Wallace occupied two days and upon its conclusion the court took the matter under advisement.

While the Wallace judge was still pondering over his decision, the superior court of Spokane heard the question of service on Frank M. Smith and decided that he was the legal representative of the Bunker Hill company in the state of Washington and that the court therefore had juris-

diction to hear the case with the Bunker Hill company as one of the defendants. The application for an injunction was therefore renewed in the Spokane court directed at both the Hecla and Bunker Hill companies for the purpose of preventing the stockholders of Hecla from ratifying the agreement entered into by the directors for the purchase of the Star. The turn of affairs in Spokane made it easy for the Wallace court, who immediately handed down a decision denying the injunction, but declining to discuss the merits of the case for the reason that the injunction had been continued and the questions involved were still pending in the Spokane court.

It was alleged in the complaints filed both in Wallace and Spokane that the agreement to purchase the Star had been accomplished through conspiracy, misrepresentation and fraud on the part of Manager McCarthy and the Bunker Hill company and that the Star mine is without ore of commercial value. While these proceedings were in progress, a lengthy letter was

mailed by Mr. Day and Mrs. Smith to all Hecla stockholders attacking Mr. McCarthy and his management of the company with the promise that others of the same import will follow. Stockholders in person or by proxy representing 800,000 shares out of the total of 1,000,000 are waiting to ratify the agreement. The legal proceedings and the letter to stockholders has given rise to suspicion on the part of some that the attempt to block the Star deal is not in good faith, but rather with the view to discrediting the Hecla management with the stockholders in the hope of gaining control of the company.

### Broken Hill To Pass November Dividend

*By Cable from Reuters to "Engineering and Mining Journal"*

London, Oct. 24—Cables received from Melbourne today report that Broken Hill Proprietary Ltd. will not declare a dividend for the November quarter.

## NEWS FROM WASHINGTON

By PAUL WOOTON  
Special Correspondent

### Purpose in Revising Mining Law Misunderstood, Says Bain But Believes Western States in Favor of Proposal—Every Man Should Read Bill for Himself

H. Foster Bain, the director of the U. S. Bureau of Mines, has returned to Washington after an extended western trip firmly convinced that the western states are overwhelmingly in favor of a revision of the mining laws. He found, however, that there is widespread misunderstanding of the exact purport of the bill now before Congress. An impression has been formed in some districts that an effort is being made to put something over on the West. Mr. Bain had frequent opportunity to reassure western miners that this is simply an effort to comply with their long years of demand that the mining laws be improved and made to conform with the existing situation.

"This bill," said Mr. Bain, "is simply a preliminary draft to form a basis of discussion. It is an attempt on the part of a committee to put in concrete form a demand which has been widespread and continuous through many years for a revision of the mining law. It probably is too much to think that any committee would succeed in getting everything right the first time. It is to be hoped that those concerned will use it as a basis for criticism and comment.

"One phase of the bill has given rise to much unfavorable comment. I refer to the provision that where land has been surveyed the new location must be in accordance with the land survey. In view of the inaccuracies of the surveys in the West, there is a general feeling that this provision would make disproportionate difficulties and expense, by making it neces-

sary for the miner to tie in his claims. The intent of the committee was to harmonize the way of taking up land. The committee only suggested that lode claimants hereafter should meet the same conditions which have to be met by everyone else, including the placer miner, who takes up land. The whole matter is one of small importance and I doubt if anyone would care to argue for it, if there is any substantial objection to it. I suggest that the law be framed so that if a miner did locate his claims according to the public land survey, he should be relieved from the expense of the survey for patent, but if he prefers to locate in any other fashion, he be permitted to do so. In that event, he would be expected to pay for the patent survey, as now is the case.

"It is my impression that the square claim and the vertical boundary lines meet general approval and are likely to be adopted. The provision for staking ground in advance of discovery but requiring discovery prior to patent meets little opposition. There is some disposition to question the advisability of procedure to patent within a definite number of years. That has the effect of converting land to private ownership, and in that way makes it possible for any state, by means of its taxing power, to force the land into development. The state, of course, has no power to do that so long as the land is public property. The decision as to whether or not that should be done is one best made by individual states, representing the people most concerned.

"In general the draft, as submitted, is merely a codification of existing law. Some of the criticism has been leveled at existing law and not at any change proposed. The draft is before the

House Committee on Mines and Mining. The committee does not propose to take up the consideration of the bill until after Jan. 1. This will give an opportunity for the committee to hear from every one interested.

"An opportunity now is afforded to the miners of the country to get some of the things that they have been asking for. It is important that every mining man read the bill for himself."

### Tax Bill Amended To Help Gold Producers

Based on Principle That Excess Profits Tax Should Not Apply to Them

The Senate has accepted an amendment by Senator Walsh, of Montana, to the tax bill which makes paragraph (c) of Sec. 304 read as follows:

"(c) In the case of any corporation engaged in the mining of gold, the portion of the net income derived from the mining of gold shall be exempt from the tax imposed by this title, or any tax imposed by Title II of the revenue act of 1917 and assessed but remaining unpaid, and the tax on the remaining portion of the net income shall be the same proportion of a tax computed without the benefit of this subdivision which such remaining portion of the net income bears to the entire net income."

In explaining his amendment to the Senate, Senator Walsh said: "The principle of the clause under consideration and recognized in this bill was recognized in the act of 1918, but appears to have been overlooked in the act of 1917, namely, that gold mining corporations which could not take advantage of the general rise in prices, the price being fixed absolutely at \$20 per oz., were not of that class against which the excess-profits tax was intended to apply."

## NEWS BY MINING DISTRICTS

### London Letter

**Cam & Motor Opening Good Ore—Recent Development at Globe & Phoenix Unprofitable—Naraguta Tin Mines Developing Gold Find—Roodepoort United Plan Rejected**

BY W. A. DOMAN

London, Oct. 18—Whether the fortunes of the Cam & Motor have turned remains to be seen; it is nevertheless a fact that a good run of ore is being opened up on in the No. 11 level drive south. Previous to intersecting this shoot, a distance of no less than 435 ft. was traversed. At the point of contact the average gold content per ton was 30/— taken over the full width of the drive, which was 5 ft. At 440 ft. sampling showed 36/— per ton over the same width, the actual width of the lode not being exposed. During the second half of August the total driven from the point of intersection was 20 ft., and the average value was 161/— per ton over 56 in. High values were then reduced to 59/— per ton. When the level had attained a length of 85 ft. the average gold content was 86/— over 57 in., reduced to 40/—, the last 35 ft. being 160/— over 54 in., reduced to 61/—. During September a further 50 ft. were driven, averaging 34/— over 43 in., reduced to 68/—.

From the cabled reports it is not easy to determine the footage on the ore shoot, but the last 135 ft. average unreduced 210/— over 55 in., the reduced value being 50/—. In none of these operations was the lode fully exposed. At 540 ft., however, a crosscut was put in, and gave an average of 602/— over 164 in.; reduced value 68/—.

For the Cam & Motor the unreduced values are phenomenally high, and the reduced values, which are regarded as conservative, are highly satisfactory. Although no specific mention is made of the fact, it may be presumed that these developments are in the Motor mine. The average is considerably above that of the ore reserves.

As in the case of almost every other South African gold mine nowadays, the gold premium saved the position. Last month 13,900 tons of ore was treated, yielding 4,771 oz. of fine gold of a value at standard price of £20,233. Costs were £19,241, including £2,085 for development and redemption; and capital expenditure, including development, was £3,519. "Premium" brought in £5,500, and presumably met the capital outlays.

Development work at the Globe & Phoenix last month was of an unprofitable character at all points. The position at this mine is now becoming interesting, as, so far as can be seen, the ore reserves are being drawn upon every month. Apparently about 50 per cent of the reserves is in the form of pillars, and the question is being asked how long returns at the present rate can be maintained.

At the end of May last a report was issued by the Naraguta (Nigeria) Tin Mines concerning the gold deposit

which had been discovered on the Birnin Gwari Areas. A few samples had been taken showing from a few pennyweights up to 10 oz. to the ton. The report left a good deal to be desired in the way of detail, though the results were sufficiently encouraging to warrant the directors in ordering machinery. Pumping and crushing plants have been acquired, and Mr. Clyde Allan, the company's engineer, will proceed to Nigeria in about a month to organize a comprehensive campaign of exploration and development.

A private cable dispatch from Johannesburg just received states that the scheme proposed by the directors of the Roodepoort United Main Reef to the owners for working the property (*Engineering and Mining Journal*, Oct. 1, 1921, p. 551) has fallen through, and that the mine will be gradually closed down.

### Johannesburg Letter

**South African Asbestos Properties Visited—Rand Gold Refinery To Start Soon—Dust Prevention Reported Upon**

BY JOHN WATSON

Johannesburg, Sept. 27—The South African Asbestos Mines, Ltd., was floated in September, 1920. On Sept. 17 last a party composed of the directors of this company, with the mayors of Johannesburg, Pretoria and Pietersburg, and Tudor Trevor, inspector of mines, visited the property, which lies 65 miles by road southeast of Pietersburg.

Traveling by motor-cars, the party went through the pass known as Chunes Poort. The chairman of the company is A. B. Sumner, the managing director Hugh J. Orr, and the consulting engineer H. Rose Martin. Mining operations are being confined to the McPie valley, where a treatment plant has been erected. The lode is mined to a width of 5 ft. and over that stoping width contains about 11 per cent of asbestos, varying in length from 2 in. downwards. The asbestos belt is said to extend in the direction of strike of the country rock on either side of the property and in all is over 100 miles long. At present, the only means of transport is by ox-wagon to Pietersburg, a distance of 65 miles, the cost of transport being 50s. per short ton. Asbestos of two varieties is found in the belt, namely, blue asbestos (crocidolite) and the white (amosite) variety.

It is officially announced by the Chamber of Mines that it is expected that operations on a small scale will start at the new refinery of Rand Refinery, Ltd., near Germiston, during October. Early in next year it is expected that the whole of the production of the Witwatersrand gold mine will be refined here. A staff of about seventy employees will be engaged.

An interim report has been issued by the joint committee appointed by the Government Mining Engineer and the president of the Chamber of Mines to inquire into dust prevention in mine development. The report states: "We have, apart from preliminary tests by

the individual members, conducted a series of tests in development drives in the Crown and Spring Mines to ascertain the effect of water-blast and of auxiliary ventilation after blasting. We have come to the conclusion (1) that observance of the water-blast regulations will not necessarily give such a satisfactory condition in development ends; (2a) that the useful purpose of a water-blast is to damp the face and broken rock; (b) that the present water-blast is ineffective in allaying the fine dust which has been projected by the blast; (c) that if the water used is not clear of solid particles the water-blast is likely to increase the dust contents of the development ends; (d) that one water-blast at the face is sufficient to damp the face of broken rock if it is of a type to project the necessary water; (3) that the exact amount of air required to clear development ends has not been definitely determined. From tests conducted it would appear to be less than a volume of air equal to that of the development end. The exact amount may be dependent upon the rate and method of supply of the air; (4) that the most practicable way of dealing with the fine dust in development is by ventilation. The tests are being conducted to ascertain the volume of air necessary under different conditions for ventilation of development ends both during the working shift and after the blast.

H. C. Fletcher, of Messrs. Johnson & Fletcher, Bulawayo, has been visiting the Rand on his way back from East Africa and the Congo. Mr. Fletcher is quoted as being much impressed with the vastness of the great Kilo fields, and is one of the few British subjects who has visited them.

### CANADA

#### Ontario

**McKinley Not To Be Opened Before Spring—Davidson Resumes Work—Gold Discovery Near Lightning Lake**

Cobalt—It is understood that there is no immediate possibility of the McKinley being reopened, and that the matter will not be further considered until next spring. The last annual report showed a loss of \$40,574 for the year. The bullion produced, however, was not sold, and the increased price has raised its value to the extent of \$60,000, or more than enough to wipe out last year's deficit.

Coniagas is now handling a daily tonnage composed of 325 tons of mine ore, 150 tons of sand tailings and 150 tons of slime tailings. A dividend of 2½ per cent, payable Nov. 1, has been declared.

Mining Corporation is treating 320 tons a day of 20-oz. ore, and on account of the reduction in costs, a good profit is being made.

The directors of the Beaver have announced that there is no prospect of the property being reopened before spring.

For the week ended Oct. 74 the Coniagas and O'Brien were the only

two companies to ship ore out of the camp.

A find of high-grade ore has been made on the Frontier property in South Lorraine.

**Kirkland Lake**—Developments on the 300 level of the Bidgood mine are said to be satisfactory. The shaft has been deepened, and if corresponding results are met with at 400 ft., the company will consider the installation of a mill.

The King Kirkland has taken a ninety-day option on the Boston-McRae property, at a price of \$15,000. The latter property has some fair surface showings.

The September report of the Lake Shore shows the mill treated 1,622 tons of ore and recovered \$40,928, or an average of \$25.23 a ton.

**Porcupine**—Work has been resumed at the Davidson mine, and drifting has been started on the 600 level. The company has recently been financed by English capital.

A shareholders' meeting of the Thompson-Krist company was held in Toronto on Oct. 25, to consider the relationship of the company with Porcupine Crown Mines, and to determine what action should be taken in view of the fact that the latter company was threatening to take legal proceedings for the defaulting of the interest on the bond mortgage given by the North Crown Mines to the Porcupine Crown Mines, and to which the Thompson-Krist was a party.

A new company, with a capital of \$3,000,000, has been formed to take over the old St. Anthony mine in north-western Ontario.

An important find has been made on the property of the Lightning River gold mine, near Abitibi Lake. The vein has been stripped on the surface for 300 ft. in length, and an average width of from 5 to 6 ft. and shows some spectacular gold values.

## MEXICO

### Jalisco

#### El Favor Smelter Resumes

**Guadalajara**—The smelting plant of El Favor Mining Co. has resumed operations after being inactive for some time.

#### Cave-in at El Oro Company's Mines

**El Oro**—A cave-in occurred between the 11th and 12th levels of the north shaft of the Mexico mines of El Oro Mining Co. on Oct. 19. Four miners were entombed.

### Coahuila

#### Alternations at Torreon Smelter Progressing

**Torreon**—Work of enlarging the Torreon smelter, owned by the Cia. Minera de Peñoles, is progressing rapidly and it is expected that the plant will be ready for operation by Jan. 1. The old furnaces are being torn out and others of larger capacity substituted. The number will be the same as before, namely, eight lead and one copper.

## SPAIN

*By Cable from Reuters to "Engineering and Mining Journal"*

**Madrid, Oct. 15**—The Customs Commission on Oct. 14 considered the question of the taxes on iron and other ores and decided to recommend a slight reduction of the duties originally proposed, among others that on lead.

## ALASKA

### Culross Island Company To Equip Mine and Mill

**Valdez**—Development work at the property of the Culross Island Mining & Milling Co. on Culross Island has been so encouraging that plans are now being made to equip the property fully for extensive operations. It is planned to utilize a nearby stream for water power and install a 200-hp. plant to operate a 500-cu.ft. compressor and a 50-ton mill. The power installation will give an effective head of 300 ft. with a pipe line 1,000 ft. long. The company already owns some milling equipment. The mill flow sheet calls for a 12-foot Lane slow-speed Chilean mill, hydraulic classification, and table and flotation concentration.

**Juneau**—Alaska Juneau has reached its goal of 200,000 tons per month. This has resulted in the month of September in an operating profit of \$24,000 as against an estimated operating profit of \$17,000 made earlier. This is the highest operating profit that has been made in one month since operations began. Owing to the overtaxing of the coarse-crushing plant and the excessive repairs required under these severe conditions a return has been made to two shifts operation. Under this arrangement a greater operating profit is expected.

## ARIZONA

### Laborers Transferred from Mining Districts to Cotton Growing Section

BY JAMES H. McCLINTOCK

**Phoenix**—Magma Copper Co., at Superior, has awarded a contract to Paul Michaelson, of Globe, for concreting its main 3-compartment shaft, No. 2, from its collar to the 600 level. The company also will granite and reinforce the timbering of some of the more important underground stations. The last report shows 827,000 tons of reserve ore.

Steam shovel work in the Sacramento Hill section of the Copper Queen at Bisbee suspended Oct. 31, after four years of activity, in which time 6,500,000 cu.yd. of material has been removed. The main sulphide orebodies have been well exposed and are ready for shoveling. W. H. Webster, assistant manager reports that operations during the last few months have given a stock pile of 175,000 tons of ore, available for the new mill, and that 375,000 tons of lower-grade ore has been placed in the leaching dump pile south of the millsite.

New Cornelia is shipping east via Galveston, about 2,000,000 lb. a month of cathode copper.

Transfer from mining to agriculture has practically been forced upon several thousand Mexican employees in Arizona mining camps such as Jerome, Ray, Miami and Douglas. From these points, almost daily, truckloads of Mexican laborers, with their families, are being dispatched to Phoenix, for service in the long-staple cotton fields. It is said that the men are not at all enthusiastic over the chance to work, but that the Salvation Army captains, in charge of local relief hard-heartedly have stopped issuance of rations after providing the opportunity for employment. Pickers get 2c. per lb. for seed cotton and make about \$2 a day, but this applies also to women and

children, who are even better pickers than the men, and thus the family income may be large. The season lasts till February, when, it is hoped, the mines again may be working.

Legal notice of resumption of operation has been given the Arizona State Mining Inspector by the following companies: White Hills Mining Co., Mohave County; Yavapai Gold-Silver Mining Co., Morristown; Hickey Copper Co., Canon; Davis & Dunkirk, Senator district, Prescott; Davis tunnel, A. K. McDaniel, Prescott; Rowley Copper Mines Co., Gila Bend.

## NEW MEXICO

### High Freight Rates Retarding Development of Properties—Tax Rate May Increase

BY JAMES P. PORTEUS

**Lordsburg**—The fact that there is no market for copper ores at present has concentrated attention on lead-silver properties but the high freight charges and equally high smelter charges and penalties have been drawbacks. It is unfortunate that there is but one lead-silver smelter in the Southwest for, as in any territory where there is no competition, there is always the feeling that the lack of it has its effect upon the treatment rates and penalties exacted. That the I. C. C. has seen the necessity of making a 16 per cent reduction in freight rates in favor of the farmer on his hay, grain and grain products is a hopeful indication to the miner that a general reduction in freight rates may be effected on smelter products and coal. Though ocean competition via the Panama Canal on smelter product shipments to the eastern refineries has forced a reduction in rail rates and some few reductions have been made on concentrates favoring the big companies, rates that would benefit the ordinary operator on ore shipments and reduced rates on mining supplies and fuel generally have not been made.

A decision was rendered by the Supreme Court at Santa Fe, N. M., on Oct. 22 affecting the right of the land commissioner to reserve mineral rights in state lands sold under contract with long time payments. It also has a bearing upon possible oil and gas deposits found upon state lands, many of which have been sold to oil speculators in recent years. This case was the State of New Mexico *ex rel* A. J. Evans' appellee, versus Nelson A. Field, commissioner of public lands and J. S. Read, appellants, appealed from Santa Fe County. Judgement of the court below was reversed. The action originated in a proceeding in a mandamus to compel the land commissioner to execute and deliver a deed or patent to the lands that had been previously sold to Evans on the deferred payment plan, the contract containing the clause reserving to the state all mineral rights.

Upon hearing in the district court the commissioner's demurrer was overruled and a peremptory writ of mandamus awarded, commanding the commissioner to execute a deed to Evans without reservation of mineral rights. The opinion of the supreme court was unanimous and held that "mandamus will not lie against the commissioner of public lands to compel him to issue a deed covering the public lands free from the reservation of the minerals therein, which reservation was con-

tained in the contract of sale, because it is in effect an action against the state."

It is intimated from Santa Fe that an increase in the tax rates to provide necessary state revenues may be looked for, due to the heavy falling off in tax valuations on account of the idleness of the big copper properties and the low production at the coal mines.

#### NEVADA

##### Spearhead Gold Mining Co. Announces Suspension of All Work on Company Account

**Tonopah**—The Belmont mine continues to produce a larger tonnage than any other mine in this district. Development work is being accomplished on all levels from the 700 to the 1,300, with satisfactory results. The main shaft is over 1,600 ft. deep and there are levels below the 1,300 on which considerable work has been done, but showings at depth are not considered sufficiently encouraging to justify work below the 1,300 at present. The Belmont mine contains many veins, some only a few inches wide which are exceptionally rich at times, and others up to 60 ft. in width. The better portion of the wide veins has, of course, been mined. At present most of the ore mined is coming from enrichments in the hanging and foot wall which were passed over in previous years, low-grade ore which was left in the hanging or foot wall at a time when the price of silver was too low to make it profitable, and from the numerous narrow veins. The Halifax crosscut on the 900, which is the highest level of the mine, is making good progress toward the orebody which was discovered by leasers about six months ago and which was traced above the 900 level. The West End continues development in Tonopah "76" ground in favorable formation. Both raising and crosscutting are in progress at the present time.

**Goldfield**—The management of the Spearhead Gold Mining Co. has announced a suspension of all work on company account and the intention to turn any part of the mine over to leasers. This decision was reached on account of water difficulties on the lower levels which made cost of operations prohibitive. The mine has been opened to a depth of 1,100 ft., the lower workings being from winzes, and work has been continuous for twelve years. Small high-grade orebodies have been encountered and considerable low-grade ore but results as a whole have been disappointing.

**Hornsilver**—The main shaft of the Orleans Hornsilver has about reached the 700-foot point and a crosscut will soon be started to intersect in the vein on this level. Much interest is manifested in this piece of work, as upon the proving of the continuity of the ore shoot developed on the 600 level to the 700 depends the starting of considerable other work in the district.

**Argentite**—On the Sanger property, or original discovery, the shaft has reached a depth of 90 ft., and crosscutting to pick up the vein, which was faulted near the bottom of the shaft, has been started. The Shirley and Edgar property has been taken over on lease and bond and the option holders are purchasing hoist and compressor in preparation for active work. The shaft is 50 ft. deep and the vein is said to be as much as 25 ft. wide in places and to average 9 to 25 oz. silver ore per ton.

#### CALIFORNIA

##### 1,500 Men Working in Grass Valley District

**Redding**—L. Gardella is operating two gold dredges on Clear Creek near Redding. The Shasta Dredging Co. is operating one dredge near Gas Point. The American Dredging Co. has shut down the Holton No. 5. The Valdor Dredging Co. is operating its dredge in Trinity County and L. Gardella is building a dredge at Lewiston.

At Winthrop the Shasta Zinc & Copper Co. is delaying its operations pending changes in its plant. Harry Thompson of the Shasta Hills Mining Co. is working the Sybial and Niagara mines near French Gulch. The Hornet of the Mountain Copper Co., is in steady operation.

Fred Searles, Jr., is examining the Gladstone mine at French Gulch. At the Milkmaid mine, the mine dump is being worked and some leasers are at work at the Summit mine at French Gulch.

**Grass Valley**—The North Star mine has a payroll of 460 men, according to local reports. It is estimated that 1,500 men are at work in the district.

**Downieville**—The Brandy City Mining Co. is preparing to operate several giants. Recently a 200-ft. gravel bank was blasted, preliminary to hydraulicking. A restraining dam has been constructed on the Yuba River.

**Weaverville**—The Lorenz mine is making ready for operation as soon as the water supply warrants. The Enterprise mine near Helena is also being prepared for operation.

#### UTAH

##### Newly Organized South Hecla Mines Files Articles of Incorporation

**Alta**—Articles of incorporation have been filed by the South Hecla Mines which is a consolidation of several properties on the south side of Little Cottonwood Canyon at Alta. The capitalization is \$500,000 and there are 5,000,000 shares of which 300,000 shares remain in the treasury for financing and development. The properties involved are the South Hecla Mining Co., which receives four shares of new stock for one share of old; Albion Consolidated Mining Co., share for share; Alta Tunnel Mines Co., one of new for two and one-half of old; South Hecla Extension Mining Co., one of new for eight of old. The combined mining territory amounts to 1,300 acres. Active development is being done in three places from the Quincy tunnel level of the former South Hecla Mining Co. The new officers and directors are: George H. Watson, president and general manager; George F. Wasson, vice-president; Robert F. Marvin, secretary-treasurer and J. Will Knight and A. B. Watson, directors.

The Cardiff is shipping daily up to a car of silver-lead ore of a gross value of \$45 to \$55 a ton. Repairs are being made to the large storage bin at the mouth of the South Fork, where ore is accumulated during the winter when the road down the main canyon is blocked.

Drifting is being done by the Tar Baby at 2,000 ft. in the main tunnel. A foot of gouge mineralized with pyrite and a little galena is being followed along the contact of quartzite and limestone. The property is north of the Cardiff in the South fork of Big Cottonwood.

The Alta Tunnel & Transportation Co. has arranged with teamsters to move not less than 10 tons of ore daily from Silver Fork of Big Cottonwood. Three carloads have been marketed, the ore netting about \$40 at ton.

**Eureka**—Ore has recently been opened on the 400 level of the Iron Blossom in a heretofore undeveloped part of the property. The work is under the direction of H. R. Trenholm.

**American Fork**—Milling ore has been developed by the Pacific Gold M. & M. Co. on a strong fissure 1,100 ft. from the portal of the main tunnel and 400 ft. from the surface during the summer months. The vein is 4 ft. wide and has been opened for 300 ft. on its strike and raises have been driven for 75 ft. in ore. The value is in silver and lead. This property has produced something over \$200,000 in the past and has paid dividends of about \$16,000. J. L. Craig is general manager.

Active development will be carried on through the winter by the newly organized Midwest Development Co. which has taken over control of the Old Miller and other American Fork properties. The officers of the Midwest company are: George S. Silsby, president; A. W. Larson, R. V. Smith and Albert W. Hahn.

#### MONTANA

##### Paul A. Gow Gets Injunction To Prevent Cascade Mines & Mills Co. From Carrying Out Deal

**Butte**—Interest was aroused during the week by reports that the Anaconda Copper Mining Company was purchasing shares of the American Brass Co., supposedly with the idea of acquiring control of the latter corporation, and thus affording the company another outlet for its zinc and copper. In this connection there was also a report to the effect that the Anaconda for some time has enjoyed an agreement with the National Brass Company of Ohio whereby its zinc and copper requirements will be filled by the mining company. The reports are unverified. The Anaconda is continuing to employ several hundred men at the Washoe Reduction Works on repair work and general cleaning-up operations. The company has started driving on the 1,900 level for what is believed to be the Hornet vein, from the West Gagnon workings.

Official word has been had that logging operations on the Anaconda's western timber tracts in this state will start about Nov. 15 together with operations at its Bonner lumber plants, where some 600 men are ordinarily afforded employment.

Rumors continue in East Butte-Davis Daly circles that the purported negotiations between the two companies are being conducted to the end that control of the Davis-Daly may be acquired by the former. Cyanide tanks at the Elkhorn gold mill of the East Butte have been filled with solution and active operations are expected within a day or two, with the initial tonnage at 150 daily. Crude values are said to be around \$8 per ton in gold. East Butte has a substantial tonnage indicated.

Tuolumne Copper has resumed drifting easterly on the 1,600-foot level of the Main Range mine in conjunction with the drift which is being pushed westerly. Little change is reported in either face, although the further softening of the vein matter is commented upon as favorable.

Butte & Superior's copper ore showing on the 2,200 level of the Black Rock continues to impress the management with its possibilities when it shall have been opened on the 2,600 level, where a crosscut is being driven for the copper fissure.

North Butte is continuing the drifting on the 3,600 level of the Edith May on a branch of the fissure with very encouraging results. Development work on this level is the principal labor under way at the Granite Mountain property.

Barnes-King Development Company reports gross bullion output for September at \$27,867.42 as compared with \$28,605.04 the preceding month, a decrease of \$737.62. Only the Shannon mine is operated by the company and its tonnage and assay values for September show little change as compared with August, crude values ranging from \$11.38 to \$11.78 per ton. Announcement of discontinuance of further development at the Betsy Baker claim in Madison county was made together with the abandonment of work below the 500 level of the North Moccasin mine, which is under the operation of leasers and from which in September the Barnes-King received \$645.15 in royalties. Apparently no development of the prospect near Waterloo, Madison County, will be undertaken until a road has been constructed to the property, which is situated in an accessible section of a rugged mountain range.

**Elkhorn**—Both ends of the power line over which the Elkhorn mill of the Boston & Montana will receive its power are being connected, the Montana Power Co. being only a mile or two out of Butte stringing wires and the Boston & Montana's own crew practically finishing up at the Elkhorn camp. The end of the month should see the tuning up of the mill begun. Cost of the construction of the Elkhorn mill to Sept. 30 was \$1,086,265, according to official figures and since 1914 there has been actually expended on the Boston & Montana properties \$4,347,732. Expenditures thus far this year have been approximately at the rate of \$75,000 monthly, it is reported.

## MICHIGAN

### The Copper Country

**Copper Shipments Heavy in October—C. & H. To Aid Former Employees This Winter—La Salle Holds Little Promise—Mohawk Making Money**

By M. W. YOUNGS

**Houghton**—October will probably prove the banner month of the year for copper sales in the Lake district. Metal shipments have been unusually heavy, both by boat and rail. There has been an increase of activity at all smelters and the outlook is better than for some time. Calumet & Hecla is now working eight furnaces instead of six, two more having just gone into commission. Two are being employed on cupola blocks, turning out anodes, while six are making special shapes, presumably for Germany. The company has just shipped out 600,000 lb. by boat to Detroit and Buffalo. It also has engaged in shipping by rail 560,000 lb. ordered by Middle West consumers.

The Calumet & Hecla has announced that it is planning to aid former employees needing assistance the coming winter. The co-operation of Calumet

business men in the work of relief has been asked, the aim being to have the business men look after the needs of residents who are not former employees of the company. Committees have been appointed to make adequate plans to handle the situation.

The announcement is taken to indicate that there will be no resumption of operations at the Calumet & Hecla mines until spring. The majority of the former employees still reside in the district and many of them will be in need of help this winter. Practically all of them have been enabled to get along during the summer, either having found other work or having lived on their savings. They are paying no rent for their homes and with the organized relief that will be provided it is believed there will be no particular suffering in the district during the cold months.

In addition to the Superior mine, which has been abandoned, LaSalle is another Calumet & Hecla subsidiary that holds out little promise and it is unlikely this property ever will be worked again except through the Osceola workings. Exploratory work in LaSalle, up to the time of its shutdown in November, 1920, revealed no ground that warranted either stopping or a continuation of development. Only a total of 3,430 tons of rock was treated, although Osceola mined 24,419 tons under a royalty arrangement. Where penetrated by the Osceola openings LaSalle ground is the best yet encountered. The 59,713 lb. of copper obtained from the rock milled by LaSalle in 1920 was produced at a cost of \$1.12 a lb., including mining costs and mine taxes, but exclusive of other costs and depreciation, which brought the total up to \$1.30.

Mohawk has temporarily ceased sinking in No. 1 shaft to give the timbermen a chance to catch up on their work. Sinking continues in Nos. 4 and 6 shafts. With coal and other costs down, Mohawk is now better than breaking even on the present price of copper. Wolverine is still on the losing side but with a reduction in freight rates would turn its loss into a profit. Wolverine is producing at the rate of 350,000 lb. of refined metal monthly, or 4,200,000 lb. a year. This compares with 3,640,000 lb. produced last year.

### Menominee Range

**Penn Iron Mining Co. Closes Two Out of Three Mines—New Hydro-electric Plant To Be Running Jan. 15**

**Norway**—The Penn Iron Mining Co. has closed its East Vulcan and Central Vulcan mines, leaving the West Vulcan the only mine working at Vulcan. The pumps have been pulled and the mines will be permitted to fill to the sixth level. Most of the old hands employed at the two mines closed have been given places at the West Vulcan.

**Iron Mountain**—It is expected that the Peninsula Power Co.'s new hydro-electric plant on Pine River will be generating current by Jan. 15, 1922. The construction work is fully up to schedule. The dam, 32 ft. high, is expected to impound a 28-ft. head of water, leaving 4 ft. of freeboard. It is 500 ft. long. A 10-ft. canal, 1,500 ft. long, runs to the power house. Two 9-ft. penstocks carry the water down to the turbines. The water drops 93 ft. from the canal to the turbines, of which there are two. These are S. Morgan

Smith machines and are directly connected to two 2,000-kw. generators, giving the plant about 5,300 electrical hp. The current will be generated to a pressure of 2,300 v., which is stepped up through transformers to 66,000 v. for transmission to the Commonwealth station, where it will be turned into the main lines. The Peninsula Power Co. now has two plants in operation and furnishes power to most of the mines on the Menominee range.

## JOPLIN-MIAMI DISTRICT

**Search for Lead Ore Stimulated—Taxation of Ore in Bins Troubles Operators—Rumors of Merger Circulating**

By P. R. COLDREN

**Joplin**—Production of the Tri-State field is proceeding with only slight increase being reported. Most of the mining companies are concentrating their efforts on lead production, trusting that metal to pay their operating expenses the while they hold their zinc ore for future profits. This special search for lead is naturally being rewarded. Recently the Kanok Company at its Premier mine in Picher, Okla., opened up an unusually rich face of lead ore, being a vein approximately 4 ft. in thickness made up of almost solid lead ore. It is one of the finest lead showings reported in the field for many months.

The Federal Mining & Smelting Co. recently started up its Brewster mine, near Hockerville, Okla., and is producing dirt that shows a recovery of about 6 per cent lead ore and 3 per cent zinc. The Underwriters' Land Co., which started its No. 4 mine several weeks ago after a prolonged shutdown, is also making exceptional lead recoveries and up to last week had held all the zinc ore it has been making, amounting to about 25 tons weekly.

The matter of taxation of ore in the bin for school purposes in the Oklahoma section of the field is bothering mining companies greatly. The law has been so doubtful in this regard that some of the attorneys of some of the largest companies had advised that the assessment for last year be held back. Recently, however, the county authorities have threatened seizure and tax sale and in most cases the taxes will be paid forthwith. The tax rate on ore in bin has been raised once more this year in some of the school districts, and amounts to so much that producers already are making plans to sell at least some of their ore before Jan. 1. Others may go to the trouble and expense of having the concentrates hauled over into Kansas where there is no tax on stored but unsold ore.

Within the past week there has been a recurrence of the rumors concerning reported options taken on local mining companies, and it is reliably reported that options have been taken by a St. Louis concern of magnitude on two of the largest producing companies in the Picher field. An investigation of the properties is understood to be under way, looking toward the ultimate closing of these options.

It is commonly believed here that before the slump that has recently been experienced has completely disappeared there will be a definite tendency in this field to place more mines under the ownership or control of one large company.



## The Situation at the Mines in October

**C**ONDITIONS in the metal-mining districts of the country showed improvement in October. Copper camps remained generally shut down or running on the same basis as in recent months. Zinc-lead mining improved, however, notably in the Joplin-Miami districts and in Wisconsin. The Pittman Act continued to stimulate the production of silver and the search for new deposits of silver ore, while gold producers also continued to regain very gradually their long lost ground. As for iron, the Birmingham district is apparently recovering more quickly than the Lake Superior ranges and gave unmistakable signs of improvement during the month. Conditions of unemployment were nowhere noticeably bad except in the Butte district, though the situation in this respect may be expected to worsen.

In the Birmingham district at the end of the month the schedules for resumption of iron and steel making operations announced for October were found to have been more than realized. Five furnaces were blown in during the month, bringing the number in blast to eleven with the probability strong of others coming in at short notice. The October output of pig is estimated at over 100,000 tons. The production of coal, iron ore and limestone reflected a more favorable general condition.

Shipments of iron ore from the Lake Superior district were practically completed for the season by Oct. 31, very little ore then remaining to be transported to lower lake ports. The October movement was less than one-third of normal. The open-pit mines were closed with few exceptions and only a small part of the underground mines were in operation and few working on a full-time basis. Two Michigan mines resumed production in October. There were many unemployed but various relief measures were tried.

In the Lake Superior copper country, the number of furnaces worked during October was 16 per cent of normal and the number of men employed 25 per cent. Eight furnaces were in blast at the Calumet & Hecla smelter, compared with six in September, two at the Michigan smelter and one at the Quincy. Copper production in October was estimated at 6,225,000 lb., including the Calumet & Hecla refinery output, against a normal monthly production of 22,800,000 lb. The total number employed during October in Houghton and Keweenaw counties was 4,793. The district was remarkably free of cases of absolute destitution. Relief measures were being organized and sawmills and camps to furnish employment were being started.

There was no curtailment in the Wisconsin zinc-lead district in October. Production is estimated at 2,500 tons crude blende concentrates; 1,500 tons roasted blende; and 200 tons lead ore. Five producing mines were active, one roaster, one acid plant, and one oxide plant. One new mine was opened. About fifty individual miners were reported to be prospecting independently. October witnessed the first sale and shipment of high-grade blende since May. There was a large tonnage of ore in storage.

Fifty-five mines were operated in the Joplin-Miami zinc-lead district in October compared with 130 two years ago and less than thirty a few months ago at the depth of the slump. Some of the companies worked but a few days per week. The October output is estimated at 5,600 to 5,800 tons of zinc concentrates. The amount of unemployment was small. Until recently there was a slight labor shortage.

In the southeast Missouri lead belt conditions were generally satisfactory. The St. Joseph Lead Co. operated at about 60 per cent of normal with its force of men in the same proportion. This is believed to correspond to other operations in the district. Unemployment was not apparent.

In the Ducktown district in Tennessee, the Tennessee Copper & Chemical Corp. ran its smelter and acid plant at about 50 per cent of normal capacity. The Ducktown Sulphur Copper & Iron Co. ran at 25 per cent above normal.

Passing to the Western States, but two companies, the Homestake and the Trojan, were producing gold in the Black Hills during October, both of which ran at capacity. The Homestake continued its work of equipping its new stamp mill that is to increase its output.

Gold mining in California showed steady improvement in October. Increasing interest was taken in operations on the Mother Lode. With the resumption of the North Star, the Grass Valley district reached practically the pre-war scale of operations. Except in Plumas County, where the Engels company ran as usual, the copper camps were dead. The serious strike in the oil fields continued throughout the month and there was some talk that it might spread.

The situation at Nevada mines was generally good. The labor supply was ample, there being more jobs than men, though wages were above the pre-war basis. There was marked activity in development work on the Comstock. Pioche was very quiet as was the Ely district. Unemployment in most camps was not serious.

In Utah, things were rather quiet as in September, though with some improvement. Labor was plentiful. The Tintic district employed more miners than any other camp, most properties having relatively full forces and the production of lead and dry silver ores being good. Bingham was quiet with the United States mines the only property working. Park City was active, its output of silver-lead ores being not far below normal. Alta and the Cottonwoods shipped a moderate tonnage of silver-lead ores. The valley smelters were still short of ores: Midvale worked three furnaces, two on lead and one on matte; Murray worked three lead furnaces; Garfield ran three reverberatories treating an increased tonnage of siliceous silver ores.

October showed general improvement in mining conditions throughout Colorado. Much exploration and development work was under way and production continued to increase, especially in Cripple Creek and in districts where gold and silver predominate. Conditions at Leadville were not so good as a year ago but better than in the earlier months of 1921. Production at Telluride increased, due principally to the completion of the Smuggler Union mill. In Park County several new enterprises got under way; the Yuba Dredging Co. started its new dredge near Fairplay. The Aspen output was restricted on account of the smelter limiting tonnage of lime-silver ores. Operations were slowing up in the carnotite fields.

Greater optimism based on the prices of lead and silver prevailed in the Coeur d'Alene district but conditions were little changed in October from September. The Hecla, Morning, and Bunker Hill & Sullivan maintained their normal output. The Bunker Hill smelter continued to operate one furnace. Custom ore accumulated at this plant owing to the expansion of the smelter's field through more favorable freight rates. The company had about 1,600 tons of pig lead on hand. It announced that it planned to erect a lead products plant in or near Spokane. The three companies employed about 2,000 men and others 500 more.

The Tacoma and Trail smelters maintained curtailed production in October. The Northport smelter remained closed, with little indication of early resumption. Labor was plentiful.

In Montana, operators made an effort to relieve the unemployment situation by increasing operations where possible. Anaconda kept more men on the payroll than market conditions warranted, having 400 on repairs at the Washoe works and over 4,500 on split shifts in the Butte mines on repair and development work. East Butte and Davis Daly produced to a limited extent. There was some suffering but little destitution was reported. Anaconda kept about 200 men on development at its Soda Springs phosphate properties. Gold and silver-lead mining improved a little.

Throughout the Southwest the copper camps were shut down, except New Cornelia, which produced to a limited extent, and Miami Copper, which produced at the rate of 4,500,000 lb. per month. Silver mining was active, particularly at Tombstone, Ariz., which shipped to El Paso. Gold mining also showed continued recovery, especially in Mohave County, Ariz. There was little distress from unemployment. One method of relieving it adopted was the transfer of Mexican laborers from mining camps to the cotton fields of the Salt River Valley.

# THE MARKET REPORT

## Daily Prices of Metals

Oct.	Copper, N. Y., net refinery*	Tin		Lead		Zinc
		99 Per Cent	Straits	N. Y.	St. L.	St. L.
27	12.625@12.75	27.75	28.125	4.65@4.70	4.40	4.55
28	12.625@12.75	27.625	28.00	4.65@4.70	4.40	4.55
29	12.625@12.75	27.625	28.00	4.65@4.70	4.40	4.55
31	12.625@12.75	27.75	28.25	4.65@4.70	4.375	4.55
Nov. 1	12.75	27.375	27.875	4.65@4.70	4.375	4.55@4.60
2	12.75	27.375	27.875	4.65@4.70	4.375	4.60

\*These prices correspond to the following quotations for copper delivered: Oct. 27 to 31 inc., 12.875@13c.; Nov. 1 and 2, 1 3c.

The above quotations 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 deliveries constituting the major markets, reduced to the basis of New York, cash, except where St. Louis is the normal basing point, or as otherwise noted. All prices are in cents per pound. Copper is commonly sold "delivered," which means that the seller pays the freight from the refinery to the buyer's destination.

Quotations for copper are for ordinary forms of wire bars, ingot bars and cakes. For ingots an extra of 0.05c. per lb. is charged and there are other extras for other shapes. Cathodes are sold at a discount of 0.125c. per lb.

Quotations for zinc are for ordinary Prime Western brands. Tin is quoted on the basis of spot American tin, 99 per cent grade, and spot Straits tin.

## Monthly Average Prices for October

Copper:	
New York Electrolytic.....	12.673
London Standard.....	67.327
London Electrolytic.....	73.476
Lead:	
New York.....	4.690
St. Louis.....	4.439
London.....	23.679
Silver:	
New York, foreign.....	70.970
New York, domestic.....	99.250
London.....	41.442
Sterling Exchange.....	386.315
Zinc:	
St. Louis.....	4.605
London.....	26.315
Tin:	
99 per cent.....	27.278
Straits.....	27.655
London.....	156.380
Antimony.....	5.085
Quicksilver.....	39.840
Platinum.....	81.800

## London

Oct.	Copper			Tin		Lead		Zinc	
	Standard		Electro-lytic	Spot	3 M	Spot	3 M	Spot	3 M
	Spot	3 M							
27	65½	66½	72	156½	158½	24	23½	25½	26½
28	65¾	66¾	72	156	158¼	24	23¾	25½	26½
29	...	...	...	...	...	...	...	...	...
31	66½	67	72½	156½	158¾	24	23½	26	26½
Nov. 1	66½	67½	73	155½	157¾	23½	23¾	26½	26½
2	67	67½	73½	155	157½	23½	23¾	26	26½

The above table gives the closing quotations on the London Metal Exchange. All prices in pounds sterling per ton of 2,240 lb.

## Silver and Sterling Exchange

Oct.	Sterling Exchange "Checks"	Silver			Oct.	Sterling Exchange "Checks"	Silver		
		New York Domestic Origin	New York Foreign Origin	London			New York Domestic Origin	New York Foreign Origin	London
27	392½	99½	69¾	40	31	392¾	99½	70¾	40¾
28	390¾	99½	70¾	40¾	Nv.1	392	99½	69¾	40¾
29	392	99½	71	41½	2	391	99½	70¾	40¾

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. Sterling quotations represent the demand market in the forenoon.

## Metal Markets

New York, Nov. 2, 1921

The metal markets have been generally quiet, with practically unchanged prices, during the last week. The October average prices, published in another column on this page, show uniform advances over the figures for September, with the exception of quicksilver, which is the lowest for seven or eight years. Unlike some of the other metals, however, quicksilver has not so far dropped much below pre-war levels. Lead, zinc, tin, and antimony averages for October were the highest since May or June. The average quotation for platinum is the highest since last November, and silver exhibits a new high monthly price for the year.

## Copper

Copper was somewhat firmer yesterday and today, although sales have not been large, either domestic or foreign. The slightly increased firmness among the producers is no doubt due to the unexpectedly high figure for October sales—approximately 140,000,000 lb. This is the best month's business of the year, exceeding by about 30,000,000 lb. the very satisfactory figure for May. A large proportion of this business was for domestic account. The brass, wire, and sheet-metal businesses all seem gradually improving. The improved demand for copper is particularly noticeable from brass manufacturers, who are running out of the supplies of scrap, of which they had such large quantities.

We understand that the world's stock

of scrap is now largely made up of the 150,000 tons which was recently taken over by a British metal company. This will be in large part divided among American, German, and British refineries, and deliveries are to extend over the greater part of the coming year. The balance will no doubt go to brass manufacturers, who will be able from time to time to take reasonable quantities of the higher grades. In view of the manner in which the American copper surplus is being handled, and of the character of the people now holding this foreign scrap, it is reasonable to assume that it will be marketed carefully and that it will not interfere with a gradually rising copper market. The scrap bogey is now a thing of the past, and by May the surplus American copper stocks are likely to have faded away also.

Small lots of spot copper are still available at 12.875c. cash, delivered to near-by points, but producers generally are quoting 13c. for November, and 13@13.125c. delivered for December.

## Lead

The official contract price of the American Smelting & Refining Co. continues at 4.70c. The market has been quiet but firm, especially in New York. In St. Louis there has been more of a disposition to shade prices, and since Monday lead has been freely offered for prompt delivery in lots of several hundred tons at 4.375c. The Chicago business has been done at 4.50c., as a rule, though some sales at 4.475c. are reported. Corroders expect to work at capacity all winter, and the lead-cable, pipe, and cartridge businesses continue satisfactory.

## Zinc

The zinc market has been fairly quiet. Trading early in the week was almost entirely on a 4.55c. basis, the steady advance in the metal being held up partly by the psychology of the threatened railroad strike and partly

by the disposal of some speculative lots of metal. The market is firmer since Monday, and it would be difficult to obtain zinc below 4.60c. today. Inquiries are reported in fair volume. High-grade zinc still commands 6c., with freight allowed.

#### Tin

Tin has been irregular. There has been a little buying every day, but nothing like the business of early October. Consumers are expecting somewhat lower prices. The American deliveries for October—2,280 tons—were somewhat lower than expected. Tin for forward delivery was quoted as follows: Oct. 27th, 28.375c.; 28th, 28.375c.; 29th, 28.375c.; 31st, 28.625c.; Nov. 1st, 28.375c.; 2d, 28.375c.

Arrivals of tin, in long tons: Oct. 25th, Australia, 15; 28th, London, 25; 31st, Rotterdam, 25; Straits, 600. Total for October, 2,565.

#### Gold

Gold in London: Oct. 27th, 104s. 5d.; 28th, 104s. 10d.; 31st, 104s. 9d.; Nov. 1st, 104s. 9d.; 2d, 104s. 10d.

#### Foreign Exchange

Exchange markets have generally been narrow, with minor fluctuations. Italian lire have moved above 4c. Sterling cables continue to be quoted at one-half cent premium over the price of demand as given in the table on page 752. On Tuesday, Nov. 1, francs were 7.335c.; lire, 4.02c.; and marks, 0.52c. New York funds in Montreal, 8½ per cent premium.

#### Silver

Although the immediate tendency is uncertain, owing to the influence which the speculative transactions in Shanghai are having on the London market, the impression is that the undertone is firm, as our information from various sources is that the requirements of China for the actual metal will continue for some time. The monsoon now completed, we understand, has been considered good, so that the prospects for the Indian crop are more favorable, and there is no reason to suppose that India will not also continue to want at least moderate quantities of silver.

Mexican Dollars—Oct. 27th, 53½; 28th, 54½; 29th, 54½; 31st, 54½; Nov. 1st, 53½; 2d, 54½.

#### Other Metals

Quotations cover large wholesale lots unless otherwise specified.

Aluminum—List prices of 24.5@25c. are nominal. Outside market, 17@18c., with practically no sales.

Antimony—Chinese and Japanese brands, 4.90@5.25c.; market firm. W.C.C. brand, 5½@5¾c. per lb. Cookson's "C" grade, spot, 9c. Chinese needle antimony, lump, nominal at 4c. per lb. Standard powdered needle antimony (200 mesh), nominal at 5.25c. per lb.

White antimony oxide, Chinese, guaranteed 99 per cent Sb<sub>2</sub>O<sub>3</sub>, wholesale lots, 6½@7c.

Bismuth—\$1.50@1.55 per lb.

Cadmium—Range \$1@1.10 per lb., in 1,000-lb. lots. Smaller quantities, \$1.10@1.25 per lb.

Cobalt—Metal, \$3@3.25 per lb., black oxide, \$2@2.10 per lb. in bbls.

Iridium—Nominal, \$150@170 per oz.

Molybdenum Metal—In rod or wire form, 99.9 per cent pure, \$32@40 per lb., according to gage.

Nickel—Standard market, ingot, 41c.; shot, 41c.; electrolytic, 44c. Small ton-nages, spot, 35@38c. Market dead.

Monel Metal—Shot, 35c.; blocks, 35c., and ingots, 38c. per lb., f.o.b. Bayonne.

Osmium—\$70 per troy oz. Nominal. \$70, Los Angeles, Cal.

Palladium—Nominal, \$60 per oz.

Platinum—\$85 per oz. Market firm.

Quicksilver—Market weaker at \$38@40 per 75-lb. flask. Heavy imports reported. San Francisco wires \$42.25.

Rhodium—\$150 per troy oz.

Selenium—Black powdered, amorphous, 99.5 per cent pure, \$2@2.25 per lb.

Thallium Metal—Ingot, 99 per cent pure, \$20 per lb.

Tungsten Metal—Wire, \$35@60 per kilogram, according to purity and gage.

#### Metallic Ores

Chrome Ore—Ore analyzing 40@45 per cent Cr<sub>2</sub>O<sub>3</sub>, crude, \$20@25 per net ton; ground, \$30; analyzing 45@50 per cent Cr<sub>2</sub>O<sub>3</sub>, \$24@26; ground, \$28; f.o.b. Atlantic ports. Quotations are nominal.

Iron Ore—Lake Superior ores, per ton, Lower Lake ports: Old Range bessemer, 55 per cent iron, \$6.45; Mesabi bessemer, 55 per cent iron, \$6.20; Old Range non-bessemer, 51½ per cent iron, \$5.70; Mesabi non-bessemer, 51½ per cent iron, \$5.55.

Magnetite Ore—F.o.b. Port Henry, N. Y.: Old bed 21 furnace, \$4.85; old bed concentrates, 63 per cent, \$5.75; Harmony, cobbed, 63 per cent, \$5.75; new bed low phosphorus, 65 per cent, \$8.50.

Manganese Ore—22@23c. per unit, seaport; chemical ore (MnO<sub>2</sub>) \$50@55 per gross ton, lump; \$70@75 per net ton, powdered. Nominal.

Molybdenum Ore—85 per cent MoS<sub>2</sub>, 45@50c. per lb. of contained sulphide, New York. Quotation purely nominal.

Tantalum Ore—Guaranteed minimum 60 per cent tantalic acid, 50c. per lb. in ton lots.

Titanium Ores—Ilmenite, 52 per cent TiO<sub>2</sub>, 1½@2c. per lb. for ore. Rutile, 95 per cent TiO<sub>2</sub>, 12c. per lb. for ore, with concessions on large lots or contracts.

Tungsten Ore—Scheelite or wolframite, 60 per cent WO<sub>3</sub> and over, per unit of WO<sub>3</sub>, \$3, f.o.b. Atlantic ports. Chinese, as low as \$2.50.

Uranium Ore (Carnotite)—Ore containing 1½ per cent U<sub>3</sub>O<sub>8</sub> and 5 per cent V<sub>2</sub>O<sub>5</sub>, sells for \$1.50 per lb. of U<sub>3</sub>O<sub>8</sub> and 75c. per lb. of V<sub>2</sub>O<sub>5</sub>; ore containing 2 per cent U<sub>3</sub>O<sub>8</sub> and 5 per cent V<sub>2</sub>O<sub>5</sub>, sells for \$2.25 and 75c. per lb., respectively; higher U<sub>3</sub>O<sub>8</sub> and V<sub>2</sub>O<sub>5</sub> content commands proportionately higher prices.

Vanadium Ore—\$1 per lb. of V<sub>2</sub>O<sub>5</sub> (guaranteed minimum of 18 per cent V<sub>2</sub>O<sub>5</sub>), New York. Nominal.

<sup>1</sup>Furnished by Foote Mineral Co., Philadelphia, Pa.

Zircon—Zirconium silicate, f.o.b. Pablo, Fla., 4½@13c. per lb.

Zirkite—According to conditions, \$70 @ \$90 per ton, carload lots. Pure white oxide, 99 per cent, is quoted at \$1.15 per lb. in ton lots.

#### Zinc and Lead Ore Markets

Joplin, Mo., Oct. 29—Zinc blende, per ton, high, \$26.40; basis 60 per cent zinc, premium, \$24; Prime Western \$23; fines and slimes, \$23@22; average settling price, all grades of blende, \$23.38.

Lead, high, \$64.65; basis 80 per cent lead, \$60@55; average settling price, all grades of lead, \$62.95 per ton.

Shipments for the week: Blende, 7,007; lead, 2,001 tons. Value, all ores the week, \$289,840. Shipments for ten months: Blende, 231,470; calamine, 102; lead, 51,370 tons. Value, all ores ten months, \$8,111,830.

Offerings of \$22.50 basis this week brought no ore on the market, and offerings were advanced to \$23 and at the very close \$24 basis, with light purchases, as many buyers remained on \$22.50 basis and secured no ore. Lead prices were lowered on purchases for next week's delivery to \$55 basis.

Compared with last year the shipments for ten months are lower by 259,803 tons of blende, 8,734 tons of calamine, and 25,488 tons of lead.

Platteville, Wis., Oct. 29—Blende, basis 60 per cent zinc, \$30. Lead ore, basis 80 per cent lead, \$60 per ton. Shipments for the week: Blende, 602; lead ore, 40 tons. Shipments for the year: Blende, 9,310; lead ore, 1,605 tons. Shipped during the week to separating plants, 676 tons blende.

#### Non-Metallic Minerals

Asbestos—Crude, No. 1, \$1,500@2,000; No. 2, \$700@1,250; spinning fibers, \$250@850; magnesia and compressed sheet fibers, \$225@350; shingle stock, \$90@150; paper stock, \$55@70; cement stock, \$16@27.50; floats, \$8.50@15, all per short ton, f.o.b. Thetford, Broughton, and Black Lake mines, Quebec, Canada.

Barytes—Crude, 88 to 94 per cent barium sulphate, \$10@12 per net ton; ground (white) \$23@24 in bags, carload lots; (off-color) \$21@22 in bags, carload lots; all f.o.b. South Carolina points. Foreign barytes, prime white material, \$25 per net ton, f.o.b. Atlantic seaports. Western grades are \$24.50. Crude quoted \$7@10 per long ton, f.o.b. Cartersville, Ga.

Bauxite—French bauxite, \$8@10 per metric ton, c.i.f. Atlantic ports. American bauxite, crushed and dried, \$8@10 per gross ton, f.o.b. shipping points; pulverized and dried, \$12@15 per gross ton, depending upon grade; calcined so as to remove most of the combined water, \$20 per gross ton, f.o.b. shipping point.

Borax—Granulated, crystals, or powdered in bags, carloads, 5½c. per lb.; in bbls. 5¾c.

Chalk—English, extra light, 5c. Domestic light, 4½c.; heavy, 4c. per lb., all f.o.b. New York.

**China Clay (Kaolin)**—Crude, \$6.50@ \$8.50; washed, \$9@ \$10; powdered, \$12 @ \$20; bags extra, per net ton, f.o.b. mines, Georgia; powdered clay, \$13@ \$20, f.o.b. Virginia points. Imported lump, \$12@ \$20, f.o.b. American ports; powdered, \$25@ \$40, f.o.b., quoted at New York.

**Emery**—Turkish emery, 6c. per lb., depending upon fineness. Inferior grades, 3½c., f.o.b., from New England points.

**Feldspar**—No. 1 soap grade, \$7@ \$7.50 per ton, f.o.b. North Carolina points; No. 1 pottery, \$6@ \$6.50; No. 2, \$5@ \$5.50. Market dull. For No. 1, Canadian, ground, \$23, f.o.b. Ohio points.

Transactions are reported on a \$5 basis for crude No. 1; prices are still nominal.

**Fluorspar**—Gravel, guaranteed 85 per cent calcium fluoride and not over 6 per cent silica, \$20@ \$22.50 per ton, f.o.b. Illinois and Kentucky mines; acid, glass, and enamel grades, \$40@ \$55; gravel, \$15; lump, \$12.50, f.o.b. Lordsburg, N. M. Ground, acid grade, 97 per cent CaF<sub>2</sub>, \$30, New Mexico.

**Fuller's Earth**—16 to 30 mesh, \$21; 30 to 60 mesh, \$23; 60 to 100 mesh, \$19; 100 plus mesh, \$15, f.o.b. plants, Pennsylvania. California grades, \$15@ \$25, f.o.b. mines. Imported, English, \$24@ \$27, f.o.b. Atlantic ports.

**Graphite**—Ceylon lump, first quality, 6@ 7c. per lb.; chip, 4½@ 5c.; dust, 3 @ 4c. No. 1 flake, 5@ 6c.; amorphous crude, ¾@ 2¾c.

**Gypsum**—Plaster of paris in carload lots sells for \$4.25 per 250-lb. bbl., alongside dock, New York. Raw crushed rock, \$3.50@ \$4.50; calcined stucco, \$9; f.o.b. works, Illinois.

**Kaolin**—See China Clay.

**Limestone**—Crushed, New York State shipping points, ¾ in. size, \$1.40@ \$1.75 per net ton; 1½ in., \$1.35@ \$1.70. Prices for other sizes practically the same. Agricultural limestone, \$2.50@ \$4.50 per net ton, f.o.b. eastern shipping points, depending upon analysis.

**Magnesite, Calcined**—Crude, \$12@ \$15 per ton. High-grade caustic calcined, lump form, \$30@ \$40 per ton. Plastic calcined, \$45@ \$50 in barrels, carload lots, f.o.b. California points. Atlantic seaboard, \$60.

**Dead-Burned**—\$33 per net ton, Chewelah, Wash.; \$58@ \$64, Chester, Pa. Austrian grade, \$53.80 per ton, f.o.b., Chester, Pa. (Magnesite brick—See Refractories.)

**Mica**—India block mica, slightly stained, per lb.: No. 6, 35c.; No. 5, \$1.20; No. 4, \$2.50@ \$3; No. 3, \$3.50@ \$4; No. 2, \$4.50@ \$6; No. 1, \$5.50@ \$6.50. Clear block: No. 6, 50c.; No. 5, \$1.75; No. 4, \$3.25; No. 3, \$5; No. 2, \$6.50; No. 1, \$8; A1, \$6.50@ \$8.50; extra large, \$25; ground, wallpaper grade, \$90@ \$160 per ton (depending upon quantity); ground roofing mica, \$25@ \$70, all f.o.b. New York.

**Monazite**—Minimum of 6 per cent thorium oxide, \$30 per unit, duty paid.

Wootte Mineral Co., Philadelphia, Pa.

**Phosphate Rock**—Per long ton, Florida ports: 77 per cent tricalcium phosphate, \$11; 75 per cent, \$9.50; 75@ 74 per cent, \$9; 70 per cent, \$6.25; 68 per cent, \$5.75; 68@ 66 per cent, \$5.50.

**Pumice Stone**—Imported, lump, 3@ 40c. per lb.; domestic lump, 5c.; ground, 5@ 6c., all f.o.b. New York.

**Pyrites**—Spanish fines, per unit, 12c., c.i.f. Atlantic seaport; furnace size, 13c.; Spanish lump, 13@ 14c.; domestic fines, f.o.b. mines, Georgia, 11@ 12c.

**Silica**—Glass sand, \$2.25 per ton; sand-blast material, \$2.25, both f.o.b. Indiana points. Amorphous or decomposed variety, soft silica, 250 to 500 mesh, \$16@ \$30 per ton. Ganister, crude, \$2.50 per ton, f.o.b. Illinois points. Molding sand, building sand, glass sand, \$2.25@ \$3, f.o.b. Pennsylvania points. Market reported dull.

**Sulphur**—\$16@ \$18 per ton for domestic, f.o.b. Texas and Louisiana mines; \$18@ \$20 for export, f.a.s. New York.

**Talc**—Paper making, \$11@ \$20 per ton; roofing grades, \$8.50@ \$13; rubber grades, \$11@ \$18; all f.o.b. Vermont. California talc, \$16@ \$35, talcum powder grade. Southern talc, powdered, carload lots, \$7.50@ \$11 per ton; less than carload, \$25, f.o.b. cars. Imported, \$30@ \$40; Canadian, \$18@ \$40 per ton.

#### Mineral Products

**Arsenic**—5¼@ 6c. per lb.

**Copper Sulphate**—Large crystals, 5.35c.; small crystals, 5.25c. per lb. f.o.b. New York.

**Sodium Nitrate**—\$2.35@ \$2.45 per cwt. ex vessel, Atlantic ports.

**Sodium Sulphate**—For 95 per cent material, \$12.50 per ton, f.o.b. in bulk, Western mines, spot and six months' contract; \$20@ \$22 per ton, New York.

**Potassium Sulphate**—Powder, domestic, \$1.15@ \$1.20 per unit, basis 90 per cent, f.o.b. New York.

#### Ferro-Alloys

**Ferrotitanium**—For 15 to 18 per cent material, \$200@ \$225 per ton, f.o.b. Niagara Falls, N. Y.

**Ferrocromium**—Per lb., \$12@ \$15.

**Ferrochrome**—Carload lots, spot and contract, 60 to 70 per cent chromium, 6 to 8 per cent carbon, 11c. per lb. of chromium contained; 4 to 6 per cent carbon, 11@ 12c., f.o.b. works.

**Ferromanganese**—Domestic 76 to 80 per cent, \$58@ \$60, f.o.b. furnace; resale, \$90, delivered; English and German, \$60@ \$63, c.i.f. Atlantic seaports. Spiegeleisen, 18@ 20 per cent, \$25@ \$27 per gross ton, f.o.b. furnace.

**Ferromolybdenum**—Standard grades, carrying from 50 to 60 per cent molybdenum metal, with low sulphur, phosphorus, and arsenic, \$2.25 per lb. of contained metal, f.o.b. works. Imported material, \$1.70@ \$2.

**Ferrosilicon**—For 10 to 15 per cent, per gross ton, f.o.b. works, \$38@ \$40; 50 per cent, \$57@ \$59; 75 per cent, \$120@ \$125.

**Ferrotungsten**—Domestic, 70 to 80 per cent W, 40@ 45c. per lb. of contained tungsten, f.o.b. works. Foreign, 50c., duty paid, f.o.b. Atlantic ports.

**Ferro-uranium**—35 to 50 per cent U, \$6 per lb. of U contained, f.o.b. works.

**Ferrovanadium**—\$4.25@ \$4.50 per lb. of V contained, according to analyses and quantity.

#### Metal Products

**Copper Sheets**—Current New York list price, 20.50c. per lb.; wire, 14.50c.

**Lead Sheets**—Full lead sheets, 7½c.; cut lead sheets, 8c. in quantity, mill lots.

**Nickel Silver**—29.50c. per lb. for 18 per cent nickel. Grade "A" sheets.

**Yellow Metal**—Dimension sheets, 17.25c.; sheathing, 16.25c.; rods, ¾ to 3 in., 14.25c.

**Zinc Sheets**—\$10 per 100 lb., less 8 per cent on carload lots, f.o.b. smelter.

#### Refractories

**Bauxite Brick**—56 per cent alumina, \$50 per ton; 76 per cent, \$90@ \$95 f.o.b. works.

**Chrome Cement**—40@ 45 per cent Cr<sub>2</sub>O<sub>3</sub>, \$30@ \$32 per net ton, and \$31 in sacks, carload lots, f.o.b. eastern shipping points.

**Chrome Brick**—\$52@ \$55 per net ton.

**Fire Brick**—First quality, 9-in. shapes, \$35@ \$40 per 1,000, Pennsylvania, Ohio and Kentucky. Second quality, \$30@ \$35.

**Magnesite Brick**—9-in. straights, \$65 @ \$70 per net ton; 9-in. arches, wedges and keys, \$77; soaps and splits, \$98, f.o.b. works.

**Silica Brick**—9-in., per 1,000; \$35@ \$45 in carload lots, f.o.b. shipping points.

#### The Iron Trade

Pittsburgh, Nov. 1, 1921.

Buying of finished-steel products in general has clearly been receding in the last fortnight.

The Steel Corporation's reported earnings for the September quarter, \$18,918,058, are of interest in the steel market, in that they fell a trifle short of covering the preferred dividend, but were about \$15 per ton shipped, a better rate than in many pre-war years. The Steel Corporation wrote off many items in 1920 that the independents that now show losses probably deferred considering.

Not only has the attempted \$5 a ton advance in sheet failed, but the old prices are now being shaded, the market being quotable at 2.25c. to 2.50c. for blue annealed, 2.90c. to 3c. for black, and 3.90c. to 4c. for galvanized. Plates are still easier, with shapes and bars unchanged.

**Pig Iron**—There is no important buying of pig iron, the market remaining very dull. Basic is easier. Bessemer, \$20; basic, \$19 to \$19.50; foundry, \$21, f.o.b. Valley furnaces.

#### Coke

**Connellsville**—Furnace, \$3.25@ \$3.50; foundry, \$4.25@ \$4.50.

## Review of Several Industries Indicates Upward Trend

**Iron and Steel, Railroad, Construction, Electrical, Automobile, Marine, Textile, Agricultural, and Leather Industries Report Various Stages of Revival—Steady Prices, Stabilization of Wages, and Increased Production Among Influencing Factors**

AT THE NATIONAL CONFERENCE of the Business Papers Editors in Chicago on Oct. 24, summaries<sup>1</sup> were presented by the editors of leading industrial publications dealing with existing conditions, and forecasting the future. These summaries and forecasts are of interest to mining men, since their own industries will follow the general business trend.

### THE IRON AND STEEL INDUSTRY

A. I. Findley of *Iron Age* in speaking of conditions in iron and steel stated that production reached its lowest point in July and is now on the upward trend, although an uninterrupted advance need not necessarily be looked for immediately.

The country's capacity is between 52,000,000 and 53,000,000 tons of steel ingots annually, and during July operation was about 20 per cent of capacity. Today steel works are operating at about 42 per cent. Ordinarily the "wear and tear" of the country requires about a 60-per cent operation and rarely has this fallen below 50 per cent.

Compared with other commodities, finished steel prices are the lowest in the list given by the Department of Labor, in relation to the level of 1913. Steel works wages today are 40 per cent below the war peak, whereas few other industries show reductions exceeding 25 per cent. Generally speaking, price liquidation in steel is well advanced.

The railroads and building trades will determine largely to what extent the steel industry is to see revival in 1922.

A prediction of a gradual advance to a 60 per cent operation in 1922 would represent a fair allowance for favorable developments that are not yet in sight.

### RAILROADS HANDICAPPED WITH HIGH WAGES

Samuel O. Dunn, editor of *Railroad Age*, stated that in the railroad business the rates are fixed by Government bodies, chiefly the Interstate Commerce Commission, and wages, rules, and working conditions are set by the Railroad Labor Board. In July, 1920, an increase in railway employees' wages was made, in addition to those increases already made under Government control. In August, 1920, an advance in rates was granted, but subsequent operating expenses were so excessive that the returns expected were not realized. Then the decline in traffic in the latter part of 1920 and early in 1921 made matters worse than ever. Retrench-

ments were then made both in supplies and labor and in July, 1921, a reduction in wages was allowed. The railways are doing better financially at present than they have been at any time during the year; they will ask for further reductions in wages; if these are not obtained they will resist further substantial reductions of rates; if they do get reductions in wages there will be voluntary reductions.

### CONSTRUCTION INDUSTRY WAITS FOR STEADY PRICE

Improvement in the construction industry, stated W. W. DeBerard, Western editor of *Engineering News-Record*, is looked for in 1922. Prices have fallen steadily since the peak in July, 1920, and construction costs are now about 30 per cent cheaper than a year ago, or 34 per cent under the peak. For the whole country common labor has dropped from 64c. per hour to an average of 50c. per hour, the average for the country in 1913 being about 22c. per hour. It is, therefore, probable that labor cost will continue to decline in 1922, and this will work to draw certain materials below the present levels. The volume of construction of an urgent nature is steadily swelling and a certain proportion of this must be released, irrespective of market conditions. It seems safe to predict that 1922 will be a considerably better construction year than the present.

### ELECTRICAL INDUSTRY OPTIMISTIC

Frank E. Watts, of *Electrical Record*, in presenting a resumé of conditions in the electrical industry, indicated a rapid recovery in the manufacture and sales of electric appliances. Export business for the 12 months ending June 30, 1921, shows an increase of 37 per cent over 1920. Surveys of the entire industry indicate that the production of manufacturers today is between 55 and 60 per cent of capacity.

### REVIVAL IN AUTOMOBILE INDUSTRY DUE TO PRICE REDUCTIONS

Concerning the automotive industries David Beecroft, editor of the *Class Journal*, stated that all branches of the automobile industry should produce this year approximately 1,200,000 vehicles, as compared with 1,880,000 in the 1920 calendar year. Ford will produce from 55 to 65 per cent of this total. During this year automobile sales have been to the urban population, the farmers buying only in a small way. After a complete cessation of the automobile industry in the fall of 1920 there was an unexpectedly heavy revival in the spring of 1921, which continued well through the summer, this being largely due to price reductions. The motor truck industry has passed through the

quietest year in its history. There has been a gradual revival in the last six or eight weeks. The farm tractor industry has had the slowest year in its history. The airplane industry has been in a state of coma during the past year. Ford prices are lower than ever before. The prices of many other makes are 10 to 35 per cent higher than the 1916 level. Throughout the world it is estimated 10,000,000 automobiles have been in use.

### MARINE INDUSTRY PESSIMISTIC AND OPTIMISTIC

An analysis of the marine industry, according to R. V. Sawhill, editor of the *Marine Review*, shows somewhat of a paradox. Many of the war-boom shipyards have permanently closed down and many others have changed over to other lines of industry. On the other hand ship construction now under way is about 25 per cent more than the banner production for an entire year prior to the war. The U. S. Shipping Board has more vessels tied up in idleness than it has in service. Export trade is slack and private ship owners have found difficulty in obtaining profitable freight for the decreased number of ships in service. The present shipping board, however, is showing an intelligent concept of its functions.

### UNDUE OPTIMISM NOT WARRANTED IN TEXTILE INDUSTRY

The textile industry, as reviewed by V. E. Carroll, editor of the *Textile World*, has been passing through a period of drastic deflation and readjustment and it would appear that this has been completed as far as manufacturing and the wholesale distribution of merchandise are concerned. The textile industry may be said to have passed through its slough of despond and to be on the up trend, although conditions as indicated by economic tendencies do not appear to warrant any undue optimism on the part of producers.

### THE FARMER TENDS TO HIS KNITTING

The farmer, according to Clifford V. Gregory, editor of the *Prairie Farmer*, is setting the business man a good example in attacking the present depression. He is hard at work and operating his "plant" at normal capacity. Agriculture is on the soundest financial basis of any basic industry. Reduced production costs, readjustment of prices, more liberal credits, lower railroad rates, and hard work will put the farmer at the head of the procession in 1922.

### SHOE, LEATHER, AND HIDES INDUSTRY

The shoe, leather, and hides trades, according to James H. Stone, editor of the *Shoe Retailer*, were among the first to suffer deflation, the beginning commencing in August, 1919 when hide prices had reached the peak prices. At that time high wholesale prices for finished goods necessitated high prices in retail wares, but public sentiment created a "buying strike," causing raw material prices to tumble. Tanners are now operating about 50 per cent on the average and the normal production of leather exceeds the domestic demand.

<sup>1</sup>A review, covering conditions in the mining industries and also presented at this meeting, appeared in *Engineering and Mining Journal* of Oct. 22, p. 678.

## COMPANY REPORTS

### Temiskaming Mining Co. Shows Deficit

Silver; Ontario

A report of operations of the Temiskaming Mining Co. for the eighteen months ended June 30, 1921, states that 243,029.2 oz. of silver was produced during the first eleven months of this period, the mill being shut down in November, 1920. Profit and loss account follows:

Production			
Ore sales.....	\$271,330.05		
Less ore on hand Dec. 31, 1919.....	92,035.38		
		\$179,294.67	
Costs			
Development and exploration.....	\$31,828.80		
Mining.....	162,137.77		
Milling.....	84,166.42		
Shipping and marketing.....	8,380.94		
	\$286,513.93		
Administrative and General			
General expense, mine office.....	44,442.98		
Taxes, insurance and general expense.....	35,582.56		
	80,025.54		
		366,539.47	
		\$187,244.80	
Miscellaneous Earnings			
Interest, discount and exchange.....	49,049.76		
Miscellaneous.....	2,429.54		
		51,479.30	
Deficit, transferred to surplus.....		\$135,765.50	

Surplus Dec. 31, 1919, was \$864,018.70. Subtracting a deficit of \$135,765.50 gives a surplus June 30, 1921, of \$728,253.20. The company is capitalized at \$2,500,000.

### McIntyre Porcupine Surplus Increases

Gold; Ontario

A report of operation of the McIntyre Porcupine Mines, Ltd., for the fiscal year ending June 30, 1921, states that 171,916 tons of ore was treated, having a gross value of \$11.67 per ton and containing 91,330.3 oz. of recoverable gold and 19,806.4 oz. of silver.

Profit and loss account follows:

Earnings			
Bullion recovery.....	\$1,904,326.36		
Operating costs:			
Mining, development, and exploration.....	\$615,310.65		
Transportation of ore.....	39,841.14		
Milling.....	207,190.04		
Heating and maintenance of buildings and camps.....	28,929.21		
Employees' insurance and welfare.....	44,169.68		
	935,440.72		
Administrative and general expenses:			
Management and general expense, mine office.....	\$61,732.17		
Administrative and general expense, head office.....	76,712.29		
Insurance, general.....	14,878.65		
	153,323.11		
Total operating costs, before providing for taxes and depreciation.....	1,088,763.83		
Net operating earnings, before providing for taxes and depreciation.....	815,562.53		
Non-operating revenue:			
Interest and exchange earned.....	\$269,570.59		
Miscellaneous earnings.....	3,380.79		
	272,951.38		
	\$1,088,513.91		
Appropriations			
Provision for municipal, provincial and dominion taxes for current year.....	\$64,525.54		
Reserve for plant depreciation.....	207,326.50		
Holdings in adjoining mining properties written down.....	1,131.75		
Total appropriations.....	272,983.79		
Net profit for the year, transferred to surplus.....	\$815,530.12		

Surplus on July 1, 1920, was \$1,381,683.98; adding net profit of \$815,530.12, a rebate of \$480.40, and deducting three dividends paid of \$182,014.15 each, and a tax deduction of \$5,444.29, gives a surplus of \$1,646,207.76 on June 30, 1921.

The company has \$3,640,283 in capital stock outstanding.

### Kerr Lake Mines Shows Profit

Silver; Ontario

A report of operations of Kerr Lake Mines, Ltd., for the year ended Aug. 31, 1921, states that 194,351.7 oz. of silver and 17,096 lb. of cobalt were produced. Profit-and-loss account of the Kerr Lake Mining Co., Ltd., the operating company, follows:

Debit:			
Expenses in connection with operation of mine, production, development, shipment and treatment of ore, general expense and adjustment of Canadian taxes.....	\$143,355.42		
Expenses in connection with lake draining.....	2,200.04		
Balance, being profit.....	50,264.80		
		\$195,820.26	
Credit:			
Proceeds of ore sales.....	\$175,957.07		
Less			
Ore on hand at smelters and in transit, Aug. 31, 1920 (estimated).....	82,174.65		
	\$93,782.42		
Plus			
Ore on hand Aug. 31, 1921 (estimated).....	523.08		
	\$94,305.50		
Interest.....	76,633.79		
Exchange.....	17,530.97		
Dividends received.....	7,350.00		
	\$195,820.26		

The surplus of Kerr Lake Mining Co. on Aug. 3, 1920, was \$1,962,966.40. Adding a profit of \$50,264.80 and subtracting a loss on sale of bonds amounting to \$20,590 and dividends totaling \$590,000, gave a surplus on Aug. 31, 1921, of \$1,402,641.20.

Kerr Lake Mines, Ltd., the holding company, paid four dividends of \$75,000 each. Surplus balance on Aug. 31, 1920, was \$941,142.84. Plus income and expenditure account balance of \$178,979.51, and less loss on bond sales of \$5,907.93, gave a balance on Aug. 31, 1921, of \$1,114,214.42.

During the early part of 1921 an opportunity presented itself to acquire the Hargrave property, consisting of eighty acres (adjoining the Kerr Lake mine) at a favorable price. The ore taken from this property has already returned the purchase price.

The Tahoe silver mine, in Utah, in which this company has a majority interest, has been in continuous operation, but many difficulties have been encountered.

### Mining Dividends for October, 1921

The following dividends were paid by mining and metallurgical companies during October, 1921:

Companies in the United States	Situation	Per Share	Totals
American Smelters Sec. pfd. "A".....	U. S.	\$1.50 Q	\$146,071
American Smelters Sec. pfd. "B".....	U. S.	1.25 Q	39,855
Eagle-Picher Lead, pfd.....	Mo., Okla.	1.50 Q	15,000
Homestake Mining, g.....	S. D.	.25 M	62,790
Phelps Dodge Corporation, c.....	U. S. and Mex.	1.00 Q	450,000
Tonopah Extension, g.s.....	Nev.	.50 Q	64,636
Tonopah Mining, g.s.....	Nev.	.05 SA	50,000
United Eastern, g.....	Ariz.	.15 Q	204,455
U. S. Smelting, Ref. and Mng. pfd.....	U. S. and Mex.	.875 Q	425,556
Companies in Canada:			
Asbestos Corporation.....	Que.	\$1.50 Q	\$45,000
Asbestos Corporation pfd.....	Que.	1.75 Q	70,000
Dome Mines, g.....	Ont.	.25 Q	119,167
Hollinger Consol, g.....	Ont.	.05 4 wks.	246,000
Kerr Lake, s.....	Ont.	.125 Q	75,000
Nipissing, s.....	Ont.	.15 Q	180,000

M, monthly; Q, quarterly; SA, semi-annual; c, copper; g, gold; s, silver.

Tintic Standard, which paid 5c. per share in July, passed its dividend. This was also the case a year ago, but a double dividend was paid the following quarter. It is unknown whether this is again the intention of the directors. The other companies reporting exhibit unchanged disbursements.

# METAL STATISTICS

## Monthly Average Prices of Metals

	Silver					
	New York		London		Sterling Exchange	
	1920	1921	1920	1921	1920	1921
January.....	132.827	65.950	79.846	39.985	367.082	372.650
February.....	131.295	59.233	85.005	34.745	337.466	385.932
March.....	125.551	56.023	74.194	32.479	370.870	389.806
April.....	119.779	59.337	68.848	34.250	392.438	391.784
May.....	102.585	59.810	60.010	34.165	383.360	396.580
June.....	90.957	58.510	51.096	34.971	393.663	377.236
July.....	91.371	60.260	53.736	37.481	385.538	362.565
August.....	96.168	61.597	59.875	38.096	360.404	364.505
September.....	93.675	66.160	59.476	40.082	350.370	371.725
October.....	83.480	70.970	54.197	41.442	346.460	386.315
November.....	77.734	.....	50.952	.....	342.333	.....
December.....	64.774	.....	41.845	.....	348.101	.....
Year.....	100.900	.....	61.590	.....	364.840	.....

New York quotations cents per ounce troy, 999 fine. London, pence per ounce, sterling silver, 925 fine.

### Copper

	New York		London	
	Electrolytic		Standard	Electrolytic
	1920	1921	1920	1921
January.....	18.918	12.597	118.095	70.964
February.....	18.569	12.556	120.188	70.925
March.....	18.331	11.976	109.533	67.565
April.....	18.660	12.438	103.025	69.381
May.....	18.484	12.742	96.750	73.196
June.....	18.065	12.697	87.864	71.852
July.....	18.576	12.170	90.148	71.155
August.....	18.346	11.634	93.935	68.614
September.....	18.144	11.948	96.381	67.977
October.....	15.934	12.673	93.327	67.327
November.....	14.257	.....	84.807	.....
December.....	13.188	.....	75.702	.....
Year.....	17.456	.....	97.480	.....

New York quotations, cents per lb. London, pounds sterling per long ton.

### Lead

	New York		St. Louis		London	
	1920	1921	1920	1921	1920	1921
	January.....	8.561	4.821	8.300	4.747	47.095
February.....	8.814	4.373	8.601	4.228	50.256	20.650
March.....	9.145	4.084	8.894	4.000	46.054	18.911
April.....	8.902	4.356	8.618	4.272	39.225	20.589
May.....	8.576	4.952	8.352	4.784	38.488	23.399
June.....	8.323	4.485	8.169	4.293	34.330	22.563
July.....	8.338	4.410	8.283	4.260	34.960	23.399
August.....	8.687	4.382	8.725	4.217	36.304	23.489
September.....	8.177	4.600	8.160	4.392	35.452	23.148
October.....	7.070	4.690	7.018	4.439	35.238	23.679
November.....	6.159	.....	6.127	.....	32.489	.....
December.....	4.727	.....	4.717	.....	24.089	.....
Year.....	7.957	.....	7.830	.....	37.832	.....

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

### Tin

	New York		Straits		London	
	1920	1921	1920	1921	1920	1921
	January.....	61.596	36.000	.....	36.000	376.512
February.....	58.466	28.534	59.932	32.142	395.750	166.250
March.....	61.037	27.296	61.926	28.806	369.489	156.024
April.....	61.120	28.990	62.115	30.494	345.450	163.905
May.....	53.230	31.431	55.100	32.500	294.813	177.411
June.....	46.125	28.514	48.327	29.423	250.614	167.506
July.....	45.798	26.755	49.154	27.655	261.886	164.530
August.....	43.856	25.662	47.620	26.301	274.048	155.318
September.....	41.940	26.280	44.465	26.680	270.120	156.750
October.....	39.310	27.278	40.555	27.655	258.190	156.380
November.....	35.667	.....	36.854	.....	241.080	.....
December.....	31.135	.....	34.058	.....	212.440	.....
Year.....	48.273	.....	49.101	.....	295.866	.....

New York quotations, cents per lb. London, pounds sterling per long ton.

### Zinc

	New York		St. Louis		London	
	1920	1921	1920	1921	1920	1921
	January.....	9.133	5.413	58.643	25.262	.....
February.....	8.708	4.928	61.338	24.850	.....	.....
March.....	8.531	4.737	53.467	25.977	.....	.....
April.....	8.184	4.747	47.388	25.530	.....	.....
May.....	7.588	4.848	45.088	26.923	.....	.....
June.....	7.465	4.421	41.193	26.750	.....	.....
July.....	7.720	4.239	41.886	26.262	.....	.....
August.....	7.835	4.186	41.220	25.068	.....	.....
September.....	7.661	4.235	39.690	25.256	.....	.....
October.....	7.150	4.605	39.756	26.315	.....	.....
November.....	6.247	.....	35.028	.....	.....	.....
December.....	5.824	.....	27.762	.....	.....	.....
Year.....	7.671	.....	44.372	.....	.....	.....

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

## Antimony, Quicksilver and Platinum

	Antimony (a)		Quicksilver (b)		Platinum (c)	
	New York		New York		New York	
	1920	1921	1920	1921	1920	1921
January.....	10.577	5.258	90.192	48.440	154.23	73.400
February.....	11.588	5.250	84.432	49.545	151.59	70.227
March.....	11.056	5.282	92.611	46.796	138.56	72.463
April.....	10.500	5.137	102.192	45.423	127.04	73.404
May.....	9.655	5.250	89.560	47.000	97.50	73.740
June.....	8.289	5.087	90.154	46.846	85.19	74.942
July.....	7.500	4.735	90.333	44.950	83.94	70.440
August.....	7.177	4.597	83.806	45.028	111.44	73.222
September.....	7.113	4.564	75.000	42.660	115.20	75.960
October.....	6.723	5.085	67.200	39.840	101.70	81.800
November.....	6.109	.....	58.417	.....	84.75	.....
December.....	5.534	.....	49.577	.....	79.62	.....
Year.....	8.485	.....	81.123	.....	110.90	.....

(a) Antimony quotations in cents per lb. for ordinary brands. (b) Quicksilver in dollars per flask. (c) Platinum in dollars per ounce.

## Pig Iron, Pittsburgh

	Bessemer		Basic		No. 2 Foundry	
	1920	1921	1920	1921	1920	1921
	January.....	\$40.47	33.96	\$39.88	31.96	\$39.86
February.....	42.95	28.96	42.61	26.96	43.40	30.25
March.....	43.40	28.16	42.90	26.46	43.40	27.85
April.....	43.72	26.96	44.22	24.46	43.90	26.77
May.....	44.00	26.21	44.88	23.84	45.36	25.56
June.....	44.89	24.96	45.41	22.66	46.40	24.38
July.....	47.21	22.84	47.42	20.76	46.56	22.36
August.....	48.90	21.96	49.88	20.29	49.35	21.53
September.....	50.46	21.96	50.46	21.21	51.96	22.82
October.....	49.21	21.96	44.38	20.96	48.58	22.96
November.....	41.26	.....	39.20	.....	42.61	.....
December.....	36.96	.....	34.90	.....	37.73	.....
Year.....	44.45	.....	43.85	.....	44.93	.....

In dollars per long ton.

## Monthly Crude Copper Production

	1921			
	June	July	August	September
Alaska shipments.....	3,234,693	3,019,812	4,407,434	3,709,844
Arizona Copper.....	(a)	(a)	(a)	(a)
Calumet & Arizona.....	(a)	(a)	(a)	(a)
Con. Ariz. Smelting.....	(a)	(a)	(a)	(a)
Inspiration.....	(a)	(a)	(a)	(a)
Magma.....	(a)	(a)	(a)	(a)
Miami.....	3,939,000	4,112,000	4,281,000	4,268,000
Old Dominion.....	1,300,000	1,502,927	1,511,964	1,527,493
Phelps Dodge.....	(a)	(a)	(a)	(a)
Shattuck Arizona.....	(a)	(a)	(a)	(a)
Ray.....	(a)	(a)	(a)	(a)
United Verde.....	(a)	(a)	(a)	(a)
United Verde Extension.....	(a)	(a)	(a)	(a)
Calumet & Hecla.....	(a)	(a)	(a)	(a)
Other Lake Superior.....	4,500,000	4,250,000	4,250,000	4,250,000
Anaconda.....	(a)	(a)	(a)	(a)
East Butte.....	1,350,000	1,000,000	1,278,000	949,980
Nevada Cons.....	(a)	(a)	(a)	(a)
Chino.....	(a)	(a)	(a)	(a)
Utah Copper.....	(a)	(a)	(a)	(a)
Others, estimated.....	10,300,000	8,150,000	7,520,000	9,150,000
Total United States.....	24,623,693	22,033,739	23,248,398	23,855,317
Imports: Ore and concen- trates, matte, etc.....	5,129,065	10,924,973	10,888,426	6,268,635
Imports of blister, unrefined	12,531,637	20,749,969	12,574,740	8,614,851
Imports of refined, etc.....	3,306,349	595,835	662,885	10,533,792
Grand total.....	45,600,744	54,304,516	47,374,449	49,292,595
Granby Cons.....	2,254,639	2,255,425	2,485,704	2,720,761
Boleo.....	1,433,804	943,740	770,096	771,305
Cananea.....	(a)	(a)	(a)	(a)
Phelps Dodge Mexican.....	(a)	(a)	(a)	(a)
Cerro de Pasco.....	4,012,000	4,346,000	4,630,000	4,594,000
Chile.....	4,008,000	4,000,000	4,000,000	4,000,000
Katanga.....	6,032,880	7,031,745	.....	.....
Rackus & Johnston.....	1,506,000	1,310,000	720,000	350,000
Hampden Cloncurry.....	(a)	(a)	(a)	(a)
Mount Lyell.....	902,000	892,000	940,000	.....
Mount Morgan.....	(a)	(a)	(a)	(a)
Cons. M. & S. of Canada.....	152,000	284,000	209,090	261,855
Falcon Mines.....	486,000	486,800	540,880	511,280
Furukawa.....	2,766,230	2,641,780	.....	.....
Sunimoto.....	.....	.....	1,673,601	.....

(a) No copper produced during this month.

## Comparative Annual Copper Production

	1919	1920	1921
	January.....	135,733,511	121,903,744
February.....	111,649,512	117,450,000	86,632,941
March.....	102,040,460	120,309,316	91,046,345
April.....	98,808,998	116,078,871	46,946,523
May.....	92,652,975	114,964,207	25,310,511
June.....	95,856,5		

MINING STOCKS

Week Ended October 29, 1921

Table listing mining stocks under the 'COPPER' section. Columns include Stock, Exch., High, Low, Last, and Last Div. with various price points and dates.

Table listing mining stocks under the 'GOLD' section. Columns include Stock, Exch., High, Low, Last, and Last Div. with various price points and dates.

\*Cents per share. †Bid or asked. ‡Quotations missing. Q, Quarterly SA, Semi-annually. M, Monthly. K, Irregular. I, Initial. X, Includes extra

Toronto quotations courtesy Hamilton B. Wills; Spokane, Pohlman Investment Co.; Salt Lake, Stock and Mining Exchange; Los Angeles, Chamber of Commerce and Oil; Colorado Springs, The Financial Press, N. Y.

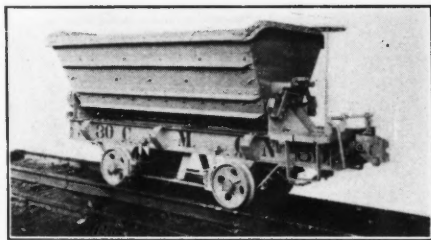


## NEW MACHINERY AND INVENTIONS

### The Krom Sintering System

The Krom sintering system is said to remove the difficulty in the sintering of those ores, flue dust and concentrates which are in a finely divided form, and which stick tenaciously to the sinter grate, the former condition requiring special mechanical construction for securing a uniform sintering draft through the charge, and the latter condition requiring means for economically removing the same from the grate. The Krom system of sintering is based on the unit-oven principle, so successfully developed by the modern byproduct coke ovens.

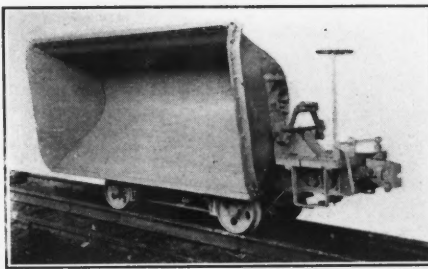
To produce either coke or sinter most satisfactorily the period of heat treatment must be under control independently of all other steps in the process, such as charging, igniting, and discharging. In both coking and sintering operations the treatment is perfectly controlled by unit charges; namely, separate ovens or pans independently charged and discharged.



permanently connected with the traveling igniter. In a unit of this size the charging distributor and the igniter travel over the pan by motor power on circular tracks. In the case of three or more pans the tracks are laid in a straight line over the extent of the battery, and the igniter receives its gas supply from an automatic valve at each pan location. This is accomplished by a new method, namely, the retaining walls of the pan holding the charge on the grate also form a motor-driven ram for pushing off the finished sinter. The rim, or the retaining wall of the pan, is mounted on wheels and is provided with a cast-steel plow. This plow travels clear of the grate section, ripping the sinter cleanly from the grate and at the same time breaking it into desirable sizes. The discharging operation is said to be automatic, fast, and positive in its results.

### Mine Dump Cars Shipped to Mediterranean

Recently the Koppel Industrial Car & Equipment Co., Koppel, Pa., shipped to the Island of Cyprus, in the Mediterranean, a consignment of thirty specially designed, heavy duty, two-



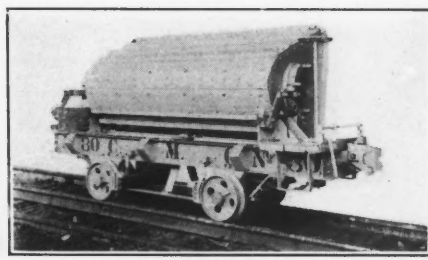
knuckle and a powerful spring draft gear.

The running gear is made of 16-in. cast steel plate, which is mounted on 3½-in., high-carbon steel axles with a single spring suspended inside the bearing boxes and brass bearings.

### Time Studies on a "Shoveloder"

Results of a detailed time study upon the "Shoveloder" mucking machine used at the Kern Canyon tunnel of the San Joaquin Light & Power Corporation, of Edison, Cal., are given in the accompanying table, which is a summary of the observations made.

The cross-section of the tunnel varied, the unlined section being 14 ft. wide by 13.5 ft. high; the lined section 10.5 ft. wide and 11.25 ft. high, the roof being arched. On the 14-ft. wide sections the "shoveloder" did not quite reach the extreme sides, the track being in the center, but this did not entail much difficulty, as two muckers worked the rock over to the loader by hand. The ground consisted of blocky granite and in places there were loose slides consisting of a mixture of granite blocks and sand. The work consisted of enlarging a 6.5 ft. square heading already driven. The muck as



TYPE OF 3-CU.YD. DUMP CAR TO BE USED IN MINING PYRITE ORE ON ISLAND OF CYPRUS

The Krom sintering system consists of a battery of circular cast-iron pans. The circular form of the pan has the following features:

1. *Suction Draft.* The bottom or grate portion of the pan is adapted to a cone-shaped sheet-iron extension, from the apex of which the suction draft is drawn. This construction insures an even draft of air through all portions of the sinter charge resting on the pan grate above. On account of this construction the pans can be made of any size desired. The usual dimensions are from 12 to 25 ft. in diameter, the former size having a capacity of from 250 to 500 tons per day, and the latter from 1,000 to 2,000 tons. The greatest capacity is reached when the ore is to be simply sintered; but when high sulphur is to be eliminated a longer heat treatment is generally necessary.

2. *Charging the Pan.* The circular form of the pan allows the charge to be quickly and evenly distributed without compression or packing. This is accomplished by a rotary distributor.

A motor-driven traveling igniter equipped with burners for gas or oil which cover the entire surface of the pan is used. A two-pan battery is provided with a pivoted gas pipe which is

way, all steel rocker dump cars of 3 cu.yd. capacity. These cars, which are of 30-in. gage, are to be used to handle iron pyrite ore weighing 170 lb. to 175 lb. per cu.ft. that will be loaded from underground chutes. The height of the car is limited to 5 ft. 6 in., and the width over all to 5 ft.

Because of special loading conditions, the car body of the V-shape type required extremely heavy reinforcement and this type is made of heavy steel plates, the mould or side plate is provided with a wood false bottom, and in addition a steel lining plate gives further protection against the heavy shocks caused by the impact of run-of-mine lumps in sizes up to 18 in.

The ends of the body are slanted so that the bodies can be telescoped or nested for export shipping purpose. The so-called cradles or rockers attached to the end plates are made of cast steel. The car body is held in an upright position by means of a patented automatic locking device. The underframe is made of extra heavy channels and well reinforced, one end being provided with a brakeman's platform. A powerful chain brake acts on all four wheels and is employed on all cars. The coupling device consists of ¾-in. MCB couplers, with a slotted

a consequence contained comparatively large masses of rock, some pieces being as heavy as 2,000 lb. These were handled by the dipper by having the crew assist the dipper by lifting. During May, six machines were on the job, five at work and one always as a spare. Working from several headings about 2,700 ft. of tunnel were enlarged.

The machines were worked twenty-four hours per day. When one heading was mucked out, a machine would be moved to another. In one instance 27 ft. of tunnel was mucked in twenty-four hours. It was common to muck out a foot per hour. This would equal 7.56 cu.yd. per ft. The maximum distance trammed was 1,500 ft., but the average distance was approximately 600 ft. The tunnel was worked three shifts per day. A shift consisted of one shifter, four drillers, four chuck tenders, one mucking machine operator, two muckers in the pit, two muckers to pull back material in the car, and two muckers behind the car, cleaning up the bottom to the lower surface of the ties which were on grade. One motorman, a brakeman, and a dumpman completed the shift crew.

As the work upon the shovels was unusually heavy, one repair man was kept on call at all times. Forgings

were substituted for castings, and as these were made in the shop the cost was high. Solid rollers were substituted for the roller bearings, forged clamps for the cast iron; the gear segments were reinforced and extra metal was welded into the frames.

semi-steel with moulded teeth. The motor pinion is of forged steel, and the gear which engages with it is of semi-steel. Both have machine-cut teeth.

The drum is 8 in. in diameter, 13½ in. long between flanges, and the ratio of gearing and sizes of shafts are well

#### TIME STUDIES OF A "SHUVELODER"

	Hours		
Time operated (actual).....	4.92		
Time idle due to changing cars and miscellaneous delays.....	4.00		
<b>Total.....</b>	<b>8.92</b>		
Changing cars required.....	2.33		
Miscellaneous delays are accounted for by:			
Waiting for motor.....	0.64		
Moving up mucking machine.....	0.06		
Unloading steel and powder.....	0.14		
Changing shift — oiling machine.....	0.16		
Engineers marking face.....	0.17		
Lunch.....	0.50		
<b>Miscellaneous delays — total.....</b>	<b>1.67</b>		
<b>Performance</b>	<b>Cars</b>	<b>Cu.Yd.</b>	<b>Tons</b>
Total muck loaded.....	52.0	104.0	156.0
Per hour actual loading time.....	10.6	21.2	31.8
Per hour total loading time.....	5.8	11.7	17.5
Per man-hour actual loading time.....	1.8	3.5	5.3
Per man-hour total time.....	0.97	1.94	2.91
	<b>Per Car</b>	<b>Per Cu.Yd.</b>	<b>Per Ton</b>
	<b>Minutes</b>	<b>Minutes</b>	<b>Minutes</b>
Average loading time.....	5.7	2.85	1.88
Average total time.....	10.3	5.15	3.43
Average time switching.....	2.7	....	....

Size car—L.72, W.52, D.30, in.; 43 cu.ft.; loaded 6 to 12 in. above top or 2 cu.yd. per car.

Material—Blocky granite; each car contained in addition to other material at least five pieces weighing over 5,000 lb. and in the muck from every round there were at least ten pieces weighing from 1,000 to 2,000 lb.; weight per cubic yard estimated at 1.5 tons.

Air pressure was 100 lb. at the compressors, but the machine pressure was about 80 lb. Though the machine will operate under 60-lb. pressure, it lacks "punch" at this pressure. Track gage was 36 in., and a 25-lb. rail used. At first a section of track was taken up before blasting and short lengths were used, but considerable trouble was caused by the machine tipping up, and in some cases completely tipping over, when an attempt was made to handle large blocks. Finally the rock was blasted down on the rails, and this did away with the tipping trouble, although hard on the rails. Storage battery six-ton locomotives were used. The speed of the mucking machine was dependent upon the operator. All of the operators were broken in. Scale of wages paid was as follows: Shifter, \$6.50; mucking machine operator, \$6.50; miners, \$5.50; muckers, \$4.50.

#### Small-Type Hoist for Underground Use

An electrically driven stope hoist or small car-haulage winch for use in and around mines has been developed by the S. Flory Manufacturing Co., Bangor, Pa. The hoist is single drum, with the drum cast integral with the main gear. The drum and gear are keyed to the drum shaft. The intermediate shaft is equipped with a sliding pinion, which is thrown in and out of gear with the main gear and the drum shaft as desired, thus actuating from stopping the rotative movement of the drums. This sliding pinion is operated by a lever in a quadrant. The motor may be alternating or direct current and of a size to meet operating conditions, generally 3 or 5 hp. The bed plate is a single casting and heavily ribbed, with the bearing housings cast integral. The main drum gear and pinion are of

proportioned for the duty imposed. Over-all dimensions are width, 2 ft. 9 in.; length, 3 ft. 6 in., and height, 2 ft. 1 in. Approximate total weight is 900 lb., complete. The base may be bolted to wooden skids for convenience in moving.

#### INDUSTRIAL NOTES

C. H. Hobbs has recently been appointed assistant general manager of sales for the Detroit Seamless Steel Tube Co., Detroit, Mich.

J. E. Kennedy has joined the Celtic Products Co. as sales engineer for the northern California district, making his headquarters at the Monadnock Building, San Francisco.

Chain Belt Co., Milwaukee, Wis., has opened offices at 735 Ellicott Square, Buffalo, N. Y., and has announced the appointment of T. E. Cocker as district manager of that territory.

Byron B. Oberst is president of the newly formed Powdered Coal Development Corporation, with headquarters at Omaha, Neb. This company controls the Pruden patents for the burning of pulverized coal in the western half of the United States, and is actively engaged in financing and erecting central pulverizing plants and installation of equipment used in the burning of pulverized coal.

J. C. Townley, formerly district manager of the Pittsburgh office of the Cement-Gun Co., Inc., sailed for Holland-Oct. 15, where he will take up his duties as general manager of the International Cement-Gun Co. which has been recently organized to handle the foreign business for the Cement-Gun Co., Inc., with the exception of Canada, Mexico and Cuba. The address of the company will be at 50 Maria Plaats, Utrecht, Holland.

#### TRADE CATALOGS

**Material Handling Machinery**—The Jeffrey Manufacturing Co., Columbus, Ohio, have announced catalog No. 350, on Jeffrey Material Handling Machinery. This book contains price lists and dimensions of Jeffrey chains, sprockets, conveyor and elevator details, transmission and gears; illustrations and descriptions of elevating and conveying machinery for every industry; complete coal handling equipments for boiler house and tipples; mining machinery, ventilating fans; crushers; pulverizers; shredders; portable loaders, and related devices.

**Wood Pipe**—Pacific Tank & Pipe Co., San Francisco, Cal., has issued its catalog, "Pacific Woodstave Pipe." In addition to descriptions and illustrations of its various products, a number of views of different installations are shown and tables are given.

**Nordberg**—Mine equipment and Nordberg are generally agreed to be synonymous, and it is difficult to find a mining district in the world where this famous line of machinery is unknown. "Nordberg and the Mining Industry" is the title of a new booklet issued by the Nordberg Manufacturing Co., Milwaukee, Wis. The booklet illustrates the plants of fifteen mining companies, gives data concerning their production of copper, gold and silver, mentions the capitalization, assets and dividends of each plant and briefly describes the important equipment, including the Nordberg apparatus in use.

**Flotation Oils**—American Turpentine & Tar Co., New Orleans, La., in a small booklet, "Destructively Distilled Flotation Oils," announce its active participation in the marketing of flotation oils. General descriptions and specifications of seven different oils produced by this company are given.

**Transits and Levels**—Warren-Knight Co., 136 N. 12th St., Philadelphia, Pa., have included illustrations and specifications of several types of surveying instruments and appurtenances in their recently issued booklet, "Sterling Transits and Levels."

**Dry Vacuum Pumps**—Chicago Pneumatic Tool Co., New York, has issued Bulletin 710, "Chicago Pneumatic Dry Vacuum Pumps—Steam, Belt and Motor Driven," which outlines several new features of design.

**Excavating Machinery**—The Marion Steam Shovel Co., Marion, Ohio, has recently issued Catalog 190, "Marion Excavating Machinery," which contains descriptions, specifications, and working ranges of the various types of steam and electric shovels and dragline, orangepeel, and clamshell excavators. The bulletin is well illustrated and gives an excellent idea of the diversity of uses that may be made of Marion machines.

**Gas Masks**—Bulletin 72 of the Mine Safety Appliances Co., Pittsburgh, Pa., details the design and operation of Burrell gas masks for mine fire fighting and other purposes where dangerous gases are encountered. This company also carries a complete line of safety materials and devices that are utilized in safety practice.

