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# ENGINEERING AND MINING JOURNAL-PRESS

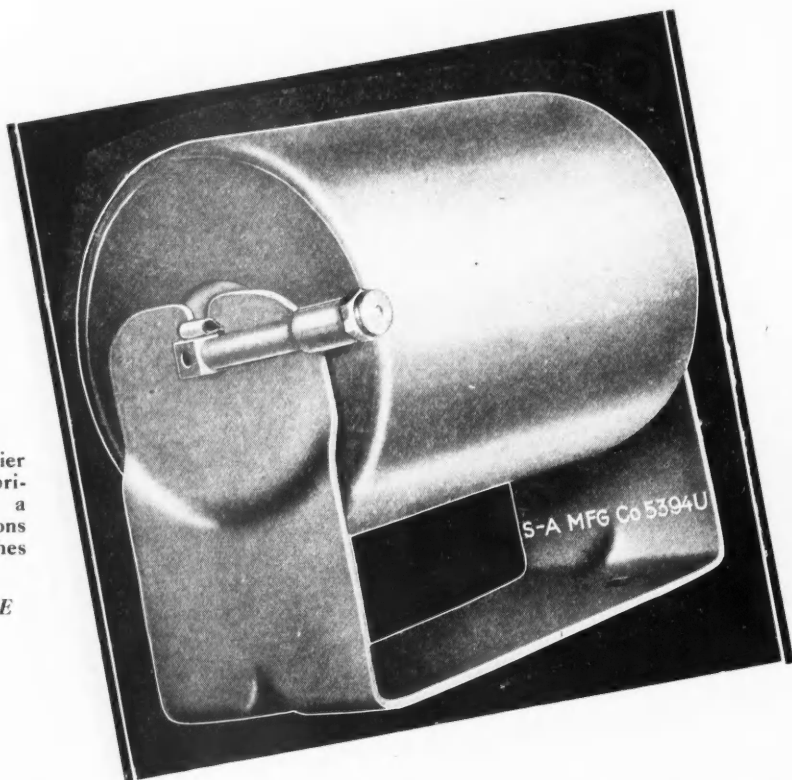
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A pipe line in southern Oregon that supplies water for  
hydraulic mining gold-bearing gravels

Producing Gold and Arsenic at Jardine, Mont., by Edward Hodges Robie—Mine Taxation in  
Arizona, by George J. Young—Largest Diesel Engines for Panama—Biography of Scott Turner  
Newly Appointed Director of the U.S. Bureau of Mines

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# ENGINEERING AND MINING JOURNAL-PRESS

JOSIAH EDWARD SPURR, Editor

Volume 120

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Number 20

## Mining Journal-Press Editorial Service

**M**INING JOURNAL-PRESS editorial service covers the world. Mr. T. A. Rickard, contributing editor, has recently returned from a trip to Africa, where he inspected the gold, platinum, and copper fields; and is contributing a series of articles covering them. Mr. Edward H. Robie, assistant editor, has just returned from a field trip to Colorado, Missouri, Utah, and Montana, and the result of his work will appear in a number of important articles on mining and milling developments and other outstanding features. Mr. George J. Young, Western editor, has recently made an extended trip through Nevada, and is preparing a series of analytical articles upon mining in that region. Mr. A. H. Hubbell, managing editor, has just returned from a pilgrimage through the Lake Superior iron fields and has brought back data which will develop into descriptive articles by himself and others, of great interest. Mr. Arthur B. Parsons, assistant editor, has just started for a trip through Mexico. He has been given the greatest facilities for observing general conditions and mining in that country; and the results of his trip will appear in a series of articles to appear in forthcoming issues. The other editors are planning field trips which will trend along the same lines of keeping constantly in actual physical touch with the industry.

Correspondents of *Mining Journal-Press* are chosen for their standing and representative qualifications; in England, Canada, Australia, Germany, Japan, and elsewhere we have been fortunate in securing the co-operation, as correspondents, of men who stand high in the professional world.

No pains, in short, have been spared, or will be spared in the future, to make the editorial service of *Mining Journal-Press* represent the mining industry of the United States and of the world in the broadest, liveliest, and most constructive spirit. We invite your co-operation.

## French Economic Conditions Disappointing To Metal Producers

**E**CONOMIC CONDITIONS in France are getting worse instead of better, and the value of the franc recently fell below 4c., though still considerably above the low level of about 3½c. reached a year and a half ago, just before American credits were arranged. Caillaux, whose ability as a financial genius was generally recognized, failed in his efforts to straighten out the country's affairs, and little can be expected of Painleve, who commands no great measure of respect from either the radical or conservative elements, his policies apparently following a middle course.

The French people, considered as individuals, seem pretty well off; money is freely spent even for luxuries, but there is a well-developed aversion to expenditures such as government taxes, which bring no visible

return. With the decline in the franc, there seems to be a scramble among the French people to exchange their own currency for sterling and dollars; they evidently fear that the franc will go the way of the mark, and well it may unless some major operation is decided on quickly. Capital levies, heavy taxation, curtailment of governmental expenditures, especially for military purposes—one or all of these—would appear to be the only solution of the French troubles, but there is in evidence no more general acceptance of these measures now than there has been in the last few years.

Certainly, present economic conditions in France are not encouraging for the investment of capital, and it would appear that the vast programs of railway electrification, hydro-electric development, and other improvements that would require large tonnages of metal will not advance very far.

That currency stabilization is of the greatest importance to the American mining industry is indicated by some very illuminating and easily comprehended statistics, it being only necessary to keep in mind that it was just about a year ago that the mark was stabilized in Germany:

Average Monthly Imports of Copper, in Metric Tons

	1923	1924	Eight Months 1925
Germany .....	5,926	8,059	19,718
France .....	9,005	11,281	9,467

The Italian consumption of copper has shown little variation in the last three years, but if the Italian debt-funding commission is successful, and some measure of stabilization of the lira is obtained, improvement should result.

## Millions to Spend

**M**ORE THAN A FEW MILLIONS today are needed to make an impression. Billion has succeeded to million's halo and in turn may have to give way to trillion. Magnificence characterizes the age—magnificent public and private works, magnificent accumulation, magnificent spending, a magnificent way of thinking that is much too magnificent at times. Nothing is too good for Murphy when he has the money in his jeans. The workman in his sedan, the shop girl clothed in silk, all are evidence of a general prosperity hitherto unknown. Some have earned their prosperity, others fallen into it. From the latter as a rule come the most magnificent spenders.

Evidence of magnificent spending for municipal purposes impresses the visitor on the Mesabi range. Mining there has been done on a magnificent scale. Large tonnages of iron ore moved quickly are the order of the day. Local landscapes include the great expanse of the Hull Rust pit and other magnificent holes. So it is that the inhabitants, finding taxes for local improvements desirable, decided to levy them in a magnificent way. The levying accomplished, the spending follows as a matter of course and on the same magnificent scale.

To a politician it doubtless seems foolish to save when next year's revenue will be as great as that of the current year. It matters nothing that the iron ore won't last forever, nor that the heavy taxation burdens the operators and indirectly has caused many a resident at times to lose his employment.

Thus it is that Hibbing, "the iron-ore capital of the world," of some 10,000 inhabitants, has a \$4,000,000 high school which is probably unequaled among educational institutions elsewhere in the United States. Locally it is said that, unnecessarily sumptuous as it is, it could have been built for considerably less. A new memorial building, less costly than the school, but a splendid edifice at that, has just been completed at municipal expense. Other cases could be cited. Nothing is too good for the people, so long as the mining companies pay the bill, the political leaders apparently reason. Better ways of spending the taxes have been suggested that would tend to insure the community's prosperity after the iron-ore resources are depleted. But money burns a hole in the municipal pocket. This is a fact that, here in New York, the people, having just voted a \$100,000,000 bond issue for maintaining the institutional and educational plant of the state, but without specifying how the money is to be spent, will have many an opportunity to prove during the time of its spending.

### Metallurgical Patents

MILD AMUSEMENT was aroused, in looking over the *Patent Office Gazette* last week, to see that members of the staff of the United Verde Extension Mining Co. had taken out four patents on methods of charging reverberatory furnaces: one covers charging in a line along the longitudinal center of the furnace; the second, similarly charging along two or more lines; the third, charging in one line but having the mound of material higher near the firing end of the furnace than toward the front; and the fourth, similarly charging, in two lines. Apparently not much has been overlooked, and metallurgists have evidently learned the lesson of the Carson patents well. Perhaps they had become too careless about patenting new developments. If a new idea were found of value there was too much a tendency to share it with every one else, without receiving any special credit and without recourse to the Patent Office. Ideas of others were freely offered and received, so why should they not be as freely released?

The modern history of American metallurgy has been remarkably free from patent litigation. How about flotation? some one may ask. But we said American metallurgy; the flotation patents were exploited by an English company, at least originally. A few improvements have been patented, and a royalty has been charged for their use, among those coming to mind being the Peirce-Smith converter, the Garr gun, the pneumatic flotation cell, and the manufacture and use of sponge iron, which has not yet emerged from the shadow; but, generally speaking, either patents have not been applied for or use of patented machinery or processes has been granted without royalty or for only a moderate charge. It is most unusual for an attempt to be made to hold up anybody.

To go back to the first statement, it is unlikely that the U. V. X. is going to be a hog in the manger, or rather sty, and prevent any one else from using the

method of charging reverberatories that it has patented, or even charge a big royalty. It has secured these patents for protection, as companies so commonly do. It has not been the only company that has developed similar methods in the last year.

Sometimes this freedom of use of new ideas goes too far. If a clever operator devises something new and valuable, he is entitled to a little extra compensation for his resourcefulness from his employer, and possibly the company employing his services, and to whom his patent is usually assigned, according to contract, is entitled to a moderate royalty if the idea proves advantageous to others. Application for a patent is the only way that one can really protect one's rights.

### More Heard About Selective Flotation

MUCH MORE FREEDOM in the release of information concerning the methods of selective flotation and the results secured by the use of various operative methods, and by different reagents, is noticeable. In the last two years greater advances have probably been made in the separation of lead and zinc sulphides, and in the dropping of iron in the flotation of copper sulphides, than were registered in all the history of the flotation process up to that time, so it is perhaps natural that operators are taking more pride in their work and are more anxious to tell about what they are doing. Improved prices for copper, lead, and zinc have aided this development; the introduction of xanthate as a flotation reagent has been an important contributing factor; and the free interchange of information among the various companies that have been working on the problem is not to be underestimated, for the experience of others is almost as good a teacher as one's own experience. It is to be regretted that mistakes are not so freely published as records of successes, for they are often exceedingly informative, but it is against human nature to say much about these.

Readers of *Mining Journal-Press* may have noticed that rather more has been published on selective flotation recently than in the past, both by ourselves and by various state and federal bureaus. During the winter, several additional articles are in prospect, describing the practice at representative American plants. Such co-operation in the furtherance of technical knowledge is the principal reason why metallurgical practice on this continent has advanced to its present high state of development.

### Control of the World's Nickel Further Narrowed

THE SECRET of who bought the world's third largest nickel-producing plant is at last out, and, as was surmised, it was absorbed by the premier producer of that metal, the International Nickel Co. It is no secret that the British America Nickel Corporation was a war baby, nurtured at the cost of some twenty millions of dollars by its financial parents, the British Government and a group of Norwegian investors, or maybe they should now be called speculators. After the war, competition with the International company was too hot, and it was forced to close down—metallurgically a success and economically a failure—though if there had been no big controlling influence in the nickel industry it might have survived. Put up at auction recently, no one could be induced to pay more

than \$5,000,000 for it, and it was afterward sold by the bondholders. A year or so ago, the Guggenheims were reported to be interested, but they apparently did not find things attractive.

It will be interesting to see what the International does with this property, which consists of a large low-grade copper-nickel ore deposit; a modern and well-equipped surface plant and smelter, all within two or three miles of the International's smelter at Copper Cliff; and an up-to-date electrolytic refinery near Ottawa. It might conceivably be used as a smelter for custom ores, though only a small tonnage would be available, unless brought from the Rouyn district, a rail haul of over 300 miles on a track not yet completed. More likely it will be retained as a spare unit for expansion. The present price of International Nickel's stock—\$40 a share, to yield 5 per cent—would indicate that stockholders are not worrying.

Thus is the International's grip on the world nickel industry firmer than ever, the much smaller Mond company being its only competitor of any importance, and one which behaves itself very well indeed. It has not seen fit to abuse its monopoly, however; it is well managed by a fine group of men, and its accession of the British America properties is rather a good omen for nickel users than otherwise.

### Improving Zinc Metallurgy

THE RETORT PROCESS for the distillation of zinc from its ores has had to stand a lot of criticism in the last few years, without any one having done much about it. Its defects seem to be more evident than methods to improve it, and some metallurgists seem inclined to give it up as a bad job and turn to electrothermic or electrolytic processes. Gilbert Rigg, the well-known Australian engineer, however, offers some constructive suggestions in a paper recently published by the Institution of Mining and Metallurgy. The principal cost items in zinc smelting today are, as he points out, raw material, labor, and fuel, and the greatest of these is labor. The best chance to save labor, in Mr. Rigg's opinion, is in the process of drawing residues from the retorts, which, in present practice, is a tedious and slow job, done entirely by hand.

One solution of the problem, mentioned by Mr. Rigg, certainly has the merit of novelty and of having been successfully used at one plant where willemite was being treated and lead was absent. A jet of water was projected into the butt end of the retort, with a steel screen for protection to the wielder of the water pipe, and the suddenly generated steam blew out the residue, presumably with the utmost promptness and dispatch. This might be a fine idea where there was no lead or silver to lose, or fumes to be detrimental to health. At that, it might be developed to apply to the more mixed ores commonly treated.

There is certainly no dearth of ideas for the development of the zinc distillation process, as may be observed by a study of the literature and of the patents. Mechanical charging of retorts has achieved success, but much of the ancient process survives in substantially unchanged form.

Mr. Rigg thinks that more will be accomplished in improving the distillation process in the next few years than in furthering the electrolytic process. That may very well be, but it will be necessary for the zinc-

smelting companies to be more liberal in their support of research departments, divorced from operating worries, and to show more co-operation with one another than they have evidenced in the past, if much is likely to be accomplished.

### Adirondack Iron Ores

THE NON-TITANIFEROUS MAGNETITE iron ores of the Adirondacks of New York have always been of great interest, but there has been much disagreement as to their nature. For this reason a summary of the situation by Mr. H. L. Alling in a recent issue of *Economic Geology* is of interest.

These ores occur in country rocks that grade from soda syenites to soda granites, which contain much magnetite as a rock mineral: in the high soda content these rocks are comparable to those which in Sweden constitute the country rock of magnetite deposits. Besides the syenites and granites in the Adirondacks, there are sedimentary rocks of the Grenville (Pre-Cambrian) series: and there are rocks as to whose origin, whether igneous or sedimentary, it is difficult to decide, on account of the extensive replacement of Grenville sedimentary rocks by the intrusive magma. Mr. Alling uses the term "magmatic replacement," which many geologists would do well to note and inwardly digest. He says:

"I have a growing tendency to distinguish between magmatic assimilation, an actual melting in, of roof fragments and xenoliths on one hand and magmatic replacement of such foreign bodies by aqueo-igneous solutions derived from a differentiating magma on the other. Bowen urges caution in postulating wholesale assimilation by thermal action. If, however, chemical activity, reaction between solid crystals and the liquids of the magma, is possible, replacement of roof fragments may take place. This would remove the objection that the magma does not possess sufficient heat (calories) to fuse pieces of the country rock. The conception I am developing is apparently a departure from Daly's rather violent stopping to a more gradual infiltration, soaking and penetration of highly foliated rock cover and by chemical, as opposed to thermal, reaction replacing the country rock by igneous minerals."

The orebodies (pods, lenses, shoots, zones, or bands) are roughly parallel with the foliation of the inclosing rock. They are, Mr. Alling believes, in part replacement of fragments of highly folded Grenville sediments; and for this reason, as Mr. F. L. Nason has found, the structure of the sediments offers a guide to exploration for ores: from which circumstance Mr. Nason has suggested that the magnetite may be sedimentary. Mr. Alling, however, in common with many geologists who have previously written, believes the ore to be of igneous origin: the result of a "magnetite-rich differentiate of the syenite-granite intrusives," which is essentially the view of a number of earlier writers. He further agrees with Professor Colony, in picturing the further differentiation of this original ore magma into pegmatite-rich and magnetite-rich portions. He finds the magnetite to be of three distinct ages: the third stage produced veindikes of magnetite which cut the wall rock and the main magnetite orebodies.

These conclusions harmonize in a general way with those of Bayley for the iron ores of New Jersey. There is indeed a great zone of magnetite iron ores, reaching from Canada to the South Atlantic states, which suggests in a broad way a common origin and a general metallographic province: and which will bear further study from this broader standpoint.



## Scott Turner

### New Director of the U. S. Bureau of Mines

superintendent of a small property at Manhattan, Nev., but quickly left this to join F. W. Bradley's staff of engineers. He was smelter representative at Tacoma for the Bunker Hill & Sullivan Mining & Concentrating Co., and also for the Alaska Treadwell companies. In 1908, he accompanied T. A. Rickard to Dawson, Fairbanks, and Nome. He remained at Nome for a few weeks as engineer for the Wild Goose Mining & Trading Co. and then returned to Tacoma as F. W. Bradley's representative. After this experience he joined the geological staff of the U. S. Smelting, Refining & Mining Co. He was mining geologist for the Mammoth Copper Co. at Kennett, Calif., for two years or so, and then transferred his activities to Europe, where he investigated tin mines in Cornwall and coal deposits in Spitzbergen. The latter work was for J. M. Longyear and Frederick Ayer,

**S**COTT TURNER, the newly appointed Director of the U. S. Bureau of Mines, is a product of Michigan. On his father's side were pioneers and early settlers of this state and on his mother's were old-time residents of Saratoga County, N. Y. He was graduated from the University of Michigan and then added to his scholastic training by work at the Michigan College of Mines, graduating from that school with the customary degrees in 1904. While in college he had the advantage of being field assistant in the U. S. Geological Survey. On graduation he became assistant engineer with the Development Company of America, concentrating his attention upon the Tombstone district of Arizona. Following this period he obtained a variety of experience—examination work in Montana, Idaho, California, and Nevada; millman at the Rowe mill, Leadville, Colo.; millman at Tin Cup, Colo.; superintendent of two mining companies in the Province of Veraguas, Panama; engineer in Nevada for a syndicate; miner at the Standard mine, Mace, Idaho, and millman at the Hecla and also at the Hercules properties. In 1907, he served for a time as assistant editor on the *Mining and Scientific Press*. Next he accepted the position of

of Boston. As a result of his field work, he was appointed general manager of the Arctic Coal Co., of Boston, having direction of the company's activities in Norway, Spitzbergen, and on the Continent. The operation of these mines was complicated by the war, and great tact and patience were necessary on Turner's part to make headway; he continued at this work for five years, and finally negotiated a sale of all these mining and shipping interests to Scandinavian capitalists.

Following this experience in the Arctic, Turner was placed in charge of mine examination work in Peru, Bolivia, and Chile, for two years. In January, 1919, he became chief assistant to the consulting engineer to the Mining Corporation of Canada and in June of that year was appointed consulting engineer to the corporation, which position he still holds, with headquarters at Toronto. His work takes him pretty well over the United States and Canada. He was one of the consulting engineers of the U. S. Bureau of Mines.

Mr. Turner is an American of the forthright energetic type, with the O. Henry sense of humor and the ability to discern the essentials of any technical problem that may be placed before him.

# Producing Gold and Arsenic at Jardine, Mont.

*How an Old Mine, After Fattening the Legal Profession for a Score of Years,  
Is at Last Making Money for the Stockholders—The Mine,  
Concentrator, and Sublimation Plant*

By Edward Hodges Robie

Assistant Editor



Earl B. Young, general superintendent

THE history of the Jardine mining camp, at the southern border of Montana, near Yellowstone Park, dates back to 1866, when placer gold was discovered at the mouth of Bear Gulch by Joe Brown, the gulch being named from a hairless cub that was found there. Part of the present ditch used for power purposes was built about that time for sluicing the gravel, and in 1884 Major Eaton put in operation a powerful hydraulic giant served by 1,200 ft. of 12-in. pipe with a vertical fall of 400 ft. A 6-in. nozzle was

used. Eaton also constructed a combined five-stamp mill and a sawmill, so the present milling operations had their start forty years ago. Difficult transportation, however, caused an early shutdown, as has happened so often. Edgerton and Jewell, of Helena, added five more stamps in 1890, and operations were resumed until the crisis of 1893, when the mine was again shut down for five years. Harry Bush came to Jardine from Africa in 1898, following a long period of litigation. He incorporated the Bear Gulch Mining Co., bought up many claims, and laid out the present townsite, named Jardine, after A. C. Jardine, superintendent, who represented Canadian interests.

Bush converted the old sawmill into a 20-stamp mill and made good profits out of its operation. About this time one Ryan, whose sobriquet was "Cabbage Ryan," appeared on the scene and became interested in a small way in the enterprise. He and Bush soon disagreed, and Ryan, appearing to have been smarter than Bush, after a period of litigation, finally forced him out, and secured control of the property about 1901. Bush purchased adjoining mining claims, organized the Revenue Mining Co., and built a good 40-stamp mill, which he started with a dance and a buffalo supper said to have "set him back" \$3,000. Bush's extravagance soon got him into financial troubles, and Ryan, securing the assistance of the late Peter L. Kimberly, of Sharon, Pa., and later of Kimberly, Nev., acquired the Revenue company's property.

Kimberly was, according to all accounts, a picturesque character, doubtless known to many of my readers. His father is reputed to have had around \$3,000,000, much of which seems to have been at his son's disposal. P. L. Kimberly's judgment of mines was excellent, but his market operations were not so good, and he is said to have gone broke and made millions a score of times.

He developed the famous Chandler iron mine, on the Vermilion range in Minnesota; conceived and organized the Northern Coal & Coke Co. in Kentucky and Tennessee, and developed the Honerine silver-lead mine, in Utah; the Annie Laurie gold mine, at Kimberly; and, according to my source of information, the Ballacallah, in California — probably the Balaklala is meant. Soon after the World War started, Peter Kimberly died, at the age of fifty-nine, leaving an estate which was valued at \$20,000,000.

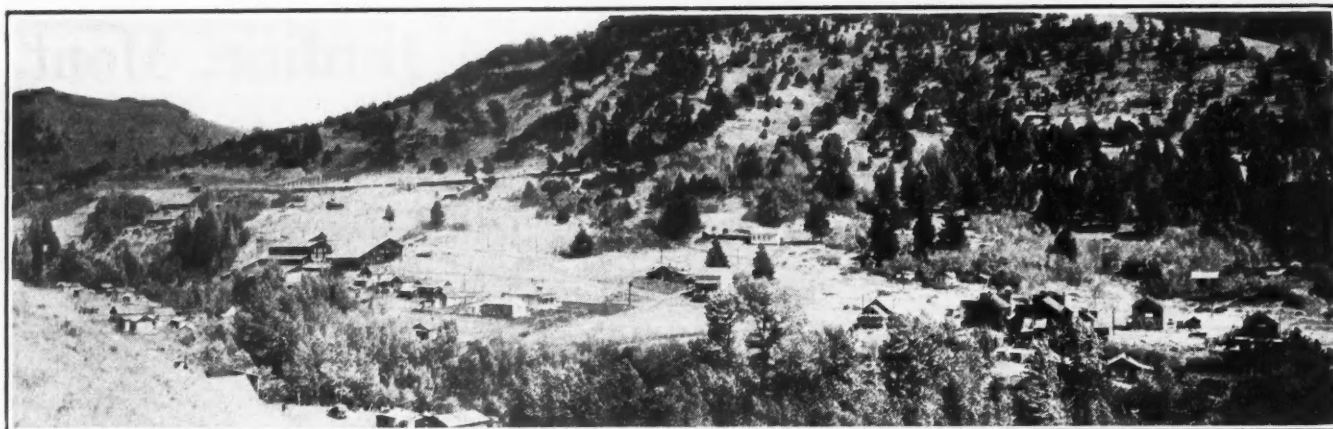
Ryan and Kimberly consolidated these properties, acquired others, and organized the Kimberly-Montana Gold Mining & Milling Co. This company, under Ryan's guiding hand, built a large cyanide plant, purchased the machinery, and began the erection of another 40-stamp mill, and planned for 500 stamps; harnessed the waters of Bear Creek for electrical power; installed the present air compressor; and made large expenditures underground. His revenues did not keep up with his expenditures and he organized the Montana Consolidated Co. to take over the debts and properties. Its operations proved to be mainly stock selling and paying dividends from the proceeds. During these various changes in ownership and organizations, the lawyers of many states waxed fat.

The Jardine Gold Mining & Milling Co. took over the properties in 1914 through bondholders' foreclosure sale, but a mass of litigation prevented work until several years later. Harry C. Bacorn, of Butte, now vice-president and general manager, took charge in 1916, and later was joined by his brother, F. W. Bacorn, now treasurer of the company. Litigation was not ended and clear title secured until 1917, when operations were begun. In 1921 the property was purchased by the Jardine Mining Co. and refinanced. West Virginia capital is represented by Henry G. Stifel, president of the company. Since a shutdown of eight months in 1921 the mine has been in continuous operation.

Money has been available to bring the mine to a self-supporting basis; the management has been good; and the stock of the company has been retained by the large holders. As a result, the mine is making money and modest dividends are being paid this year. Though dividends were paid in the early days, they were paid either out of receipts from stock sales or by extracting only the limited amount of high-grade ore available.



Harry C. Bacorn, general manager



*Panoramic view of the properties of the Jardine Mining Co. and the town of Jardine. The mountain in the background is 1,150 ft. above Bear Gulch, in the foreground, and is a steep climb, though it does not look so*

When the present management took charge, about ten years ago, both the mine and the surface plants were in a grievous condition and totally unfit for profitable operation. Since that time, over \$300,000 of outside capital has been put into the property, together with practically all the profits from recent operations. This emphasizes the amount of work and capital necessary to bring even a partly developed mine to a modest producing stage.

Ample ore seems to be available, judging from the present development of the mine and from the numerous prospect holes that have been sunk on the mountain side. It is comparatively low grade, however; possibly \$6 per ton is a conservative estimate of what might

be milled on a large scale. To realize the full possibilities of the property, high-grade ore must be developed in quantity or the production gradually increased to 1,000 tons or more per day. Any such expansion would, of course, require a proper amount of development work first.

The property is situated 5 miles northeast of Gardiner, Mont., the northern entrance to Yellowstone Park; in fact, the white limestone deposits of Mammoth Hot Springs can easily be recognized as one looks across from the mine. The town is in Bear Gulch, at an elevation of 6,450 ft., and the company's mill and mines are on the mountain side to the east. The horse tunnels and tramway, the lowest mine openings, are at 6,700 ft., the upper mine workings at 7,000 ft., and the top of the mountain, where several partly developed claims are located, is 7,600 ft. above sea level.

#### COMPLEX FOLDING OF THE VEINS

The metallic minerals, in the order of their economic importance, are gold, arsenopyrite, and scheelite. The ore occurs as lenses in mineralized shear zones in folded Pre-Cambrian schist. Six of these zones have been developed, from 50 to 150 ft. apart. They are reached by adits driven into the mountain side, the zones being roughly parallel to the schistosity, to the original bedding, and to the slope of the mountain side. Each zone has a width of from 20 to 50 ft., and consists of from one to six individual veins or strands, each of which may be mined separately or with the adjoining ones. The general strike of the zones is north and south and the dip is rather flat, from 20 to 35 deg. west, though the folding is exceedingly complex in irregular anticlines and synclines whose axes pitch in general down to the southwest at varying angles. The veins sometimes double back on themselves and range in dip all the way from horizontal to vertical in extreme instances; in fact, in one or two places they dip east instead of west.

No definite conclusions have been reached as to the origin of the minerals. The indications are that mineralizing solutions have ascended along certain permeable planes of schistosity and that the deposits are largely replacements of the soft folded schist by the mineral-bearing solutions. Large quartz veins also occur, their origin possibly being explainable by the quartz-dike theory developed by J. E. Spurr.

Parallel to the orebodies and including some of them is a fine-grained hard, dense rock which Alexander



*Meant to be a drilling scene underground, this flashlight is rather a photograph of one of the square sets so generally used in the mine*



Winchell has characterized as quartz-biotite schist. Minor faults are numerous, and a very large fault, known as the Bear Gulch fault, has been identified in several places in the workings and is believed to have determined the course of the valley. The present workings of the mine are entirely in the hanging-wall side of this fault.

Three types of orebodies occur: (1) Large masses of decomposed iron-stained schist carrying small particles of arsenopyrite and gold. This is characteristic of the north end of the property. (2) High-grade arsenical ore, with large crystals of arsenopyrite imbedded in the hard quartz-biotite schist. This also carries gold and is characteristic of Zone 1 in the south end. (3) Siliceous ore, largely quartz, containing payable quantities of gold, especially where fractured and stained, and also containing small amounts of arsenopyrite. This is characteristic of Zones 2, 3, and 4 further in the mountain. Individual lenses of ore range from 300 to 800 ft. long, and from 50 to 200 ft. high, with stoping widths of from 3 to 20 ft.

Enough has been said to indicate the difficulty of forming any definite conclusions as to the history or present situation of the orebodies. If the saying were ever expressive, that "ore is where you find it," it reflects conditions here, and so far the mining has determined the geology rather than the geology the mining. However, as the ore faces are followed further, many puzzling situations will no doubt be cleared up, and in a year or two the geologist in charge, Earl B. Young, may have some interesting data for our readers.

A word here as to the mineral occurrences. The vast amount of arsenopyrite in the deposit is unusual, and is an important source of revenue; should arsenic become more valuable, perhaps its value would eclipse that of the gold. The arsenical gold deposit at Keystone, S. D., is the only one known in this country at all comparable with this at Jardine. The occurrence of scheelite is also interesting. This mineral is found throughout the mine in small quantity. It is not at present recovered, but will be if the plans for a cyanide plant are carried out, as will be related later. In certain sections of the mine almost pure chunks of scheelite are found, and several tons of this mineral, assaying over 60 per cent tungsten, are now stored at the mine. After concentration, grade is raised by roasting and magnetic separation.

#### NO HOISTING OR PUMPING REQUIRED

The orebodies have been developed through twenty-five adits, extending into the mountain at varying levels, and over a length of half a mile along the mountain side. There are also several open pits and surface workings, the surface dirt to a depth of 4 or 5 ft. being of milling grade at one point, where it is removed by a scraper. The adits, or tunnels as they are locally called, lead to over 5 miles of crosscuts and drifts. Not a ton of ore is hoisted, nor is any pumping necessary; in fact, the mine yields but little water. Some glory-hole work has been done, but all of the mining now is in underground stopes following the veins, the walls being supported by square sets, stulls, posts with head boards, or timber cribbing. Stope sets, light sets with long caps, used mostly to support lagging, are used to hold the roof where badly broken while taking out the ore. If the cap takes too much weight, an extra post is used at the center of the cap. In the old days the entire orebody was not extracted, only sills and a few floors

being taken out, as the miners were looking for high-grade gold ore. This condition, together with the caving that has occurred in many of the old workings, adds considerably to the difficulty of mining old ground.

Mining is by overhand stoping. At present no shrinkage stopes are being worked, but two are now being opened and in future more of this kind of work may be done where conditions are right. Waugh drills are used almost exclusively. These include dry stopers (called "buzzies" by the miners), turbros, dreadnaughts, and mounted jackhammers, all made by the Denver Rock Drill Mfg. Co. The jackhammers are used almost entirely mounted, with excellent results.

The ventilation in the mine is so good that dry stopers may be used, though a wet stoper is now being tried out. The wet stoper is not liked by the men, however, because of the attendant muss, and no particular advantage seems to be gained by its use. A light Ingersoll-Rand Leyner drifting machine weighing 85 lb. mounted is also on trial, with excellent results so far; it was the first to be used in Montana. If the ground is hard, or drilling is otherwise difficult, two men are used on a Leyner, but where the ground is soft only one man is used, or possibly two men, with timbering and accessory duties in addition to the drilling. The following steel is used: 1½-in. cruciform on the dry stopers; 1-in. quarter octagon on the wet stoper; ¾-in. hollow hexagon on the mounted jackhammers; and 1¼-in. round hollow on the larger water Leyners. The ground varies so greatly that nothing approaching a "blueprint round" is possible.

When all the ore has been removed, the bottoms of all stopes are cleaned out with compressed air, the floor dirt being sufficiently moist not to dust, and of a grade approaching that of concentrates.

Chutes are placed about every 25 ft. along the vein,



*The higher adits are not conveniently reached by horse-drawn carts carrying the mine timbers, so this skidway has been built, up which the timbers are pulled by a compressed-air hoist*

so that muckers do not have far to shovel. Chutes, or untimbered raises, are often bottomed with 16-gage sheet iron, with a slightly concave face upward, resting on supporting timbers laid along each side of the raise. This allows the ore to slide freely and obviates much manual labor, even where the slope is as little as 20 deg. This practice is, of course, not original with this mine.

from the ore chutes to the mill, a round trip that will average 4,500 ft., is 10½c. per ton.

Compressed air is furnished by an Ingersoll-Rand Imperial type 10, 11x18x16-in. compressor. This machine is about twenty-five years old and is still giving good service. Its capacity is 700 cu.ft., and it is driven by two 75-hp., 440-volt, General Electric motors. The



*The concentrating mill and arsenic plant of the Jardine Mining Co. A wooden flue leads up the mountain side to the steel stack*

Some slushing into chutes has been tried and in some instances represents quite a saving.

Thirty-five per cent machine powder is used, in sticks 1½ in. x 6 in. Although recognizing the value of stemming, this is not done here. In the first nine months of 1925, 0.713 lb. of powder was used per ton of rock broken (ore and waste). Waste rock broken was 7.5 per cent of the total.

#### PLENTY OF TIMBER ABOUT THE PROPERTY

Timber is abundant in the neighborhood, and is purchased from the United States Forest Service. It is mainly lodge-pole pine, fir, and spruce; as far as possible fir is used for caps, spruce for girts, and pine for posts. Stulls cost about 5c. per running foot, lagging costs 2c., and saw-logs cost \$10 per thousand board feet. A sawmill is maintained on the property, and the timbers are drawn by horse carts to the lower tunnels. To some of the upper levels, the hoist shown in the photograph is used. Owing to the fractured country, everything has to be timbered. Although the ground is loose, it is not treacherous if properly supported, and the mine has a record of no fatal accidents nor permanent disabilities under the present management. No difficulty is experienced in keeping the stopes open until the ore is extracted. In the table of costs at the end of this article it may be noted that the timber cost is 22.6c. per ton of ore; this is the bare cost of the timber delivered at the property, framing, transporting, and setting being 37.5c. additional. This 37.5c. is, of course, included in other items in the table.

Hand tramming is practiced on operating levels, with horse tramming from the lower tunnels of the south end, to the mill; and gravity tramming to the mill from the north end of the mine. The cost of horse tramming

moisture in the compressed-air line to the various tunnels formerly caused trouble by freezing. This has been obviated by burying the line in a ditch about a foot deep and at the critical point building a fire of scrap wood over it, and covering the whole with sawdust. The fire smoulders during the entire winter and keeps the air sufficiently warm to prevent freezing while outside of the mine.

Labor conditions are good, as no annoyance is caused by poor ventilation or water. The men must work to keep warm, which is not always true at Butte. The camp is not unionized, but working conditions in general are as good as where union rules prevail, and the miner has no dues to pay. Very little contract work is possible except in the long crosscut tunnels, as conditions are not favorable. The prevailing wage scale is similar to that in Butte, as follows:

Outside labor, \$4.25 per shift.

All underground men, millmen, power-plant men, and workers in the arsenic plant, \$4.75.

Timbermen, \$5.

Mine foremen, \$200 a month.

At the mill and arsenic plant, three eight-hour shifts are worked; in the mine, two shifts, 8 a.m. to 4:30 p.m., and 7 p.m. to 3:30 a.m., with a half an hour for lunch in each shift. Blasting is done about twenty minutes before quitting time on each shift, and some time is thus lost by not having a blasting shift, though with twenty scattered working faces this might not be advisable. Some places in the mine can be blasted at any time.

In the first six months of 1925, 2.76 tons of mill ore per man-shift was mined. Waste rock is not included, though all men on the mine payroll, including surface men, are considered.

In the early days all ore was stamp-milled, amalgamated, and cyanided directly, a procedure that was not metallurgically good nor economically sound, particularly on account of the large amount of arsenopyrite in the ore. The present management was faced with a mill equipped for that method of treatment, and as money has not been available to build a new mill, the old one has been made to serve as well as possible. A study of the flow sheet and the results secured should be made with these conditions in mind.

The mill is now handling roughly 225 tons per day. The total mill operating time for the first six months of 1925 has been 81.1 per cent of the possible; unusual delays have been caused by putting in concrete foundations for the stamps. About 85 per cent would be more nearly normal. The average battery feed for the first six months of 1925 was \$6.33 in gold and 4.91 per cent  $As_2O_3$ .

The flow sheet is self-explanatory. The stamps weigh 1,050 lb. each, and drop 6 to 7 in. 92 times a minute, in the order 1, 3, 5, 2, 4. A 10-mesh wire screen is used, and the stamps are crushing an average of 5.07 tons per stamp per twenty-four hours. Cast-iron shoes and dies made in local foundries compare favorably in cost per ton stamped, including labor of renewal, with those of forged steel. The replacement of wooden foundations with concrete has greatly increased crushing efficiency.

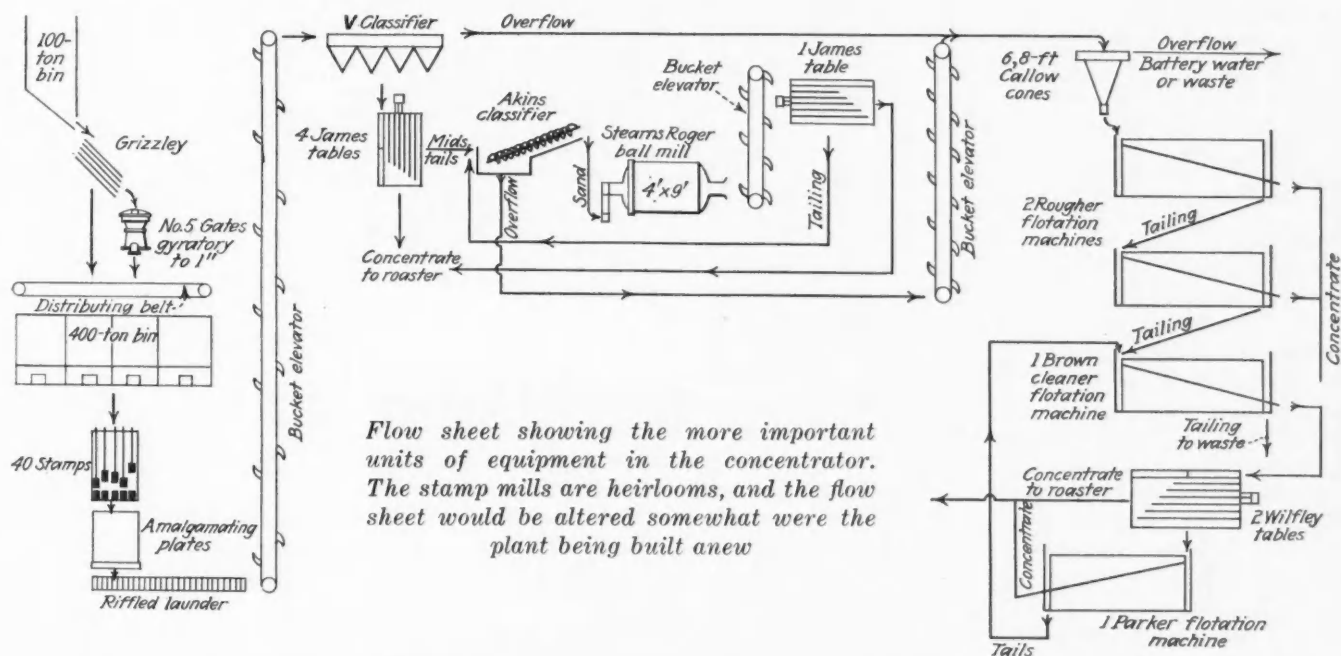
The 54 in. x 14-ft. amalgamating plates are of copper, silver-plated. They are dressed every shift, brushed up with whisk brooms, and quicksilver is added as necessary. It is difficult to keep them in good condition. The amalgam, scraped off every day with a piece of belting, is worth \$8.50 per ounce after removal of the

with rods of a maximum diameter of 3 in. The pulp was rather thin, and the wear was excessive, so 2½ in. balls have since been substituted to advantage. Thickening capacity is inadequate. The pulp is not so thick as it should be for the best flotation results, and the overflow from the cones, not all of which is used for battery water, is dirty and entails losses of fine sulphides. A 38x8-ft. Dorr thickener is now being installed to remedy this condition.

Most of the flotation machines are home-made, of the horizontal-impeller type. They are somewhat extravagant in power requirements, but that is not an important factor here. The single pneumatic machine in use is of the type admitting the air at 4-lb. pressure through a perforated pipe. The pipe wears rapidly, having to be replaced about every six weeks. Under conditions obtaining here, the machine also clogs badly, so is difficult to start after a temporary failure of the air supply, drainage, in this event, not being easy to accomplish.

Flotation oils are purchased from other large companies who buy in tank-car lots. Various combinations of Barrett No. 4, crude pine oil, coal tar, and coal-tar creosote are used. Until recently, hardwood creosote was used instead of coal-tar creosote, and somewhat less was required, but the supply gave out. The oils, with a little sodium sulphide solution, are added to the head of the first machine.

The function of the tables following the flotation machines is largely to break down the froth, as no thickeners are available. It is unusual to table flotation concentrate rather than flotation tailing. All the concentrates, after tabling, are sluiced through a 4-in. pipe by gravity to the arsenic plant, where they are mixed in



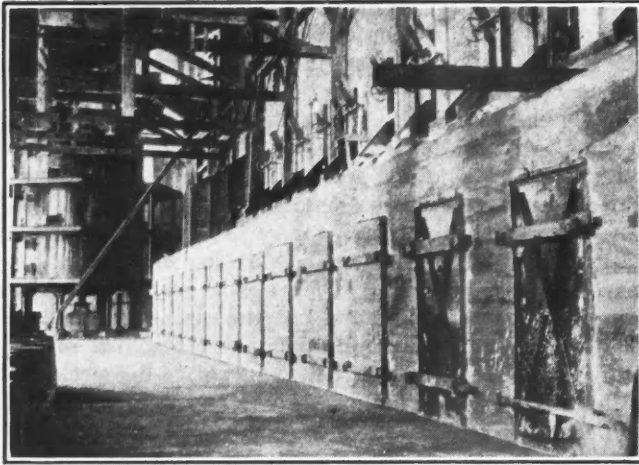
Flow sheet showing the more important units of equipment in the concentrator. The stamp mills are heirlooms, and the flow sheet would be altered somewhat were the plant being built anew

free quicksilver by squeezing through chamois or flannel. After retorting, the average fineness of the bullion is 850 fine in gold and 120 fine in silver. It is worth about \$17.50 an ounce, and is shipped either as sponge bullion or gold bars to the United States Assay Office at Helena. The riffled launders following the plates are cleaned up once a month.

The 4x9-ft. rod mill had a rated capacity of 200 tons from 10 to 80 or 100 mesh and was originally supplied

settling tanks, clear water overflowing the sides. Sometimes a little sulphuric acid is added as a coagulant.

When two more flotation machines are completed and proper thickening is installed, the mill will have a capacity of 250 to 300 tons a day. The ratio of concentration has recently been 12.5 to 1. The recovery of gold in the first half of 1925 has averaged 83 per cent; of the gold recovered 44.4 per cent was by plate amalgamation, 35.1 per cent by concentrating tables, and 20.5



*Two tiers of arsenic kitchens are here seen, together with the roasting furnace in the background, in which the arsenic in the concentrate is volatilized*

per cent by flotation. Arsenic recovery in the combined concentrates was about 75 per cent. These recoveries are thought to be susceptible of considerable improvement, and changes to effect better results have been planned. Now that the plant is making a profit, it is becoming increasingly possible to improve details.

One of the most modern and complete arsenic plants in the country has been built at Jardine as a result of the fancy prices at which that commodity sold in the years following the World War, and until the last few months. Formerly all concentrates were shipped to the East Helena smelter of the American Smelting & Refining Co., the arsenic content being more of a liability than an asset so far as the Jardine company was concerned. When arsenic came to be used on an extensive scale for the suppression of the boll weevil in the cotton fields of the South, its price advanced from 3 or 4c., at which it sold previous to 1917, to from 7 to 14c. in the succeeding years. Only in recent months has it declined, temporarily it is hoped, to the old level. When arsenic began to be valuable, the concentrates were forwarded to Tacoma, where this byproduct could be recovered, though, under the terms of the contract, the Jardine company continued to receive no benefit. Accordingly, it was decided to roast off the arsenic locally, thereby not only recovering a valuable byproduct, but also decreasing the weight of the gold concentrate and thereby effecting a considerable saving in the cost of hauling and freight. In fact, this decrease in the transportation cost alone substantially offsets the added cost of producing refined arsenic, so that the arsenic plant may be expected to operate regardless of the price of that product. A plant for treating twenty tons of concentrates per day, making refined arsenic therefrom, costs about \$90,000.

After settling, the concentrate is shoveled by hand into the boot of a bucket elevator, in which it is carried to the top of a 16-ft. inside diameter McDougall roaster having six hearths, including the drying hearth, which is inclosed. A little coal is fired in an external combustion chamber offsetting the next to the bottom hearth. The maximum temperature is reached on the two middle hearths, and ranges from 550 to 600 deg. C. It is closely watched, with the aid of a pyrometer. The furnace is really larger than is required, and would handle as much as forty tons of concentrates per day. No coal

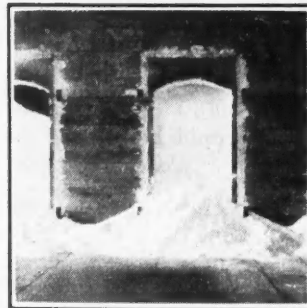
fuel is required if over twenty-five tons per day is charged.

The concentrates as charged to the furnace will average about as follows, assays being on the dry material:

Metallic arsenic, per cent .....	38
Sulphur .....	20
Iron .....	33
"Insoluble" .....	9
Gold, oz. per ton .....	2
Silver, oz. per ton .....	0.3

The calcines contain about 1½ per cent  $As_2O_3$  and 3½ oz. gold per ton. They are removed by a chain conveyor and elevated to the shipping bins outside of the building.

The gases from the roasting furnace contain the volatilized arsenious oxide ( $As_2O_3$ ), or perhaps I should say the sublimed arsenic, inasmuch as it is a solid at ordinary temperatures. This vapor must be cooled in a suitable flue system to about 218 deg. C., the condensation temperature, the falling particles having the appearance of snow, viewed through a peep-hole. Flues used for condensing arsenic are known as "kitchens," an old Cornish term of unknown derivation. After going through a dust chamber 14x20x18 ft. high, the gases pass into a large flue with a trapezoidal cross-section, with two vertical side walls of tile, 14 and 21 ft. high, a flat sheet steel roof 14 ft. wide, and a sloping bottom, discharge gates being placed at 7½-ft. intervals along the low side of the chamber. The entire length is 72 ft. Three sheet-iron baffles projecting about halfway into the flue from each side, six in all, and thus about 12 ft. apart, cause the fume to take a sinuous path. From the end of this flue the gas passes to a smaller flue, a part of the original installation, directly behind and parallel to the other, which is about 7 ft. wide and 10 ft. high. The floor of this small flue slopes from each side to the center, in which a screw conveyor operates to carry the dust to a convenient outlet, there being no room for bottom or side discharge hoppers. From this small flue the gas passes through two additional kitchens 10x10x8 ft. to a sloping wooden flue up the mountain side and thence to a steel stack, as shown in one of the illustrations. Only a slight amount of visible fume comes out of this stack, and the damage to surrounding vegetation is so slight as to be unnoticeable. Altogether, 35,000 cu.ft. of flue is provided, from which can be condensed about ten tons of crude arsenic (90 per cent  $As_2O_3$ ) per day. The



*Above is one door of the line shown on the right*



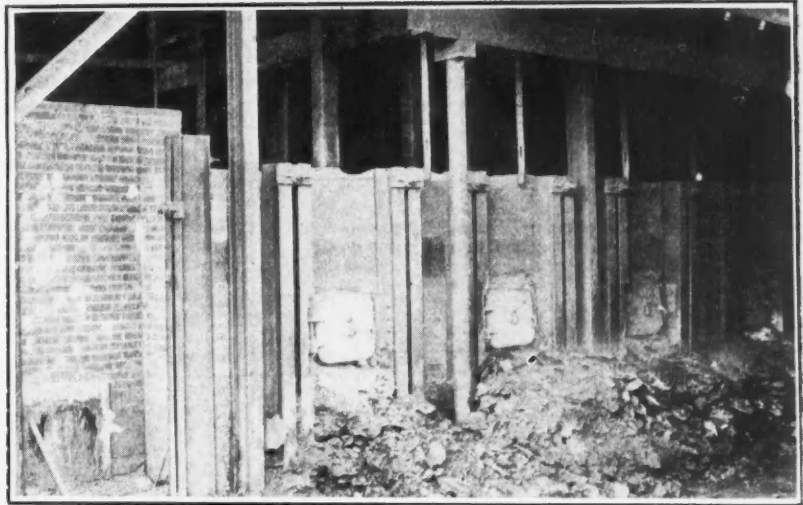
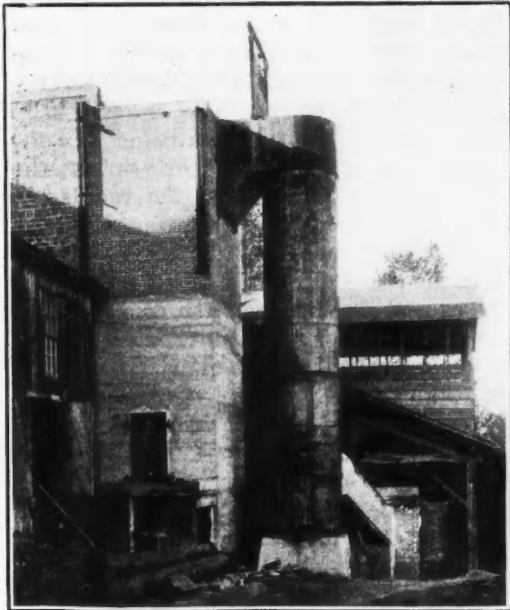
*It is hard to realize the poisonous character of these piles of white arsenic as the material is piled on the floor after removal from the kitchens*

temperature of the gas entering the large flue is 225 deg. C., and of that leaving the small flue, 70 deg. C.

The crude arsenic is suitable for some purposes, such as weed killer and grasshopper poison, and is occasionally sold in that form. The principal impurities are carbon, iron oxide, and aluminum oxide, and to remove these it is resublimed. Two reverberatory furnaces are used at Jardine for this purpose.

The smaller of the two refining furnaces is the original installation and was used, before the McDougall was installed, for subliming both crude and refined arsenic in successive runs. It is now used as a spare refining

The flue connection from the large refining furnace is clearly shown in an accompanying photograph. The furnace discharges into a vertical steel flue, 6 ft. in diameter and 36½ ft. high. This flue acts as a cooler, but is not so efficient as it might be in this respect, owing to the fact that the arsenic condenses on the walls, thereafter acting as an insulating medium for the heat interchange. From the top of this flue the gases discharge into a preliminary kitchen with a sloping bottom and two doors, one at each side. This is 27½ ft. high, 8 ft. long, and 9 ft. 8 in. wide, all inside measurements. The first 13 ft. of this is concrete and



*The new reverberatory refining furnace just after withdrawing the residue. To the left is seen the steel flue, and the brick, concrete, and tile kitchen*

furnace and will not be described in detail, inasmuch as the larger furnace, completed last year, is more up to date. The sketch on page 772 will make clear the general design of this furnace, for which C. R. Wraith is responsible. Mr. Wraith has specialized recently in the design of equipment for arsenic recovery, he having also been the engineer for and in charge of the Anacosta installations.

The side walls of the furnace are 13 in. thick, the inside tier being of firebrick; the firebox is also lined with firebrick. The roof is of 9-in. firebrick, and the hearth is made up of one course of brick laid on edge, 4 in. thick, over fill. A 3-in. expansion joint is left in the hearth near the bridge wall. The charge pipes are 6 in. in diameter, but should preferably be 8 in. The sliding gate is put very near the charge hopper where it will keep cool and not get sticky from partly fused material.

The charge to the furnace consists entirely of crude arsenic, one charge being treated per each eight-hour shift. The oncoming crew clean the residue out of the furnace through the side doors and wet it down; then clean the fire and add fresh coke. The charge is then admitted to the furnace and spread out in a bed about 8 in. deep. Sublimation soon begins and is aided by occasional barring of the charge. A Bristol recording pyrometer is installed in the flue of each furnace, and the temperature is supposed to be kept at 600 deg. C. at that point. The residue from the furnace, which contains both gold and arsenic, is returned to the McDougall roaster, so there are no losses from the refining operation.

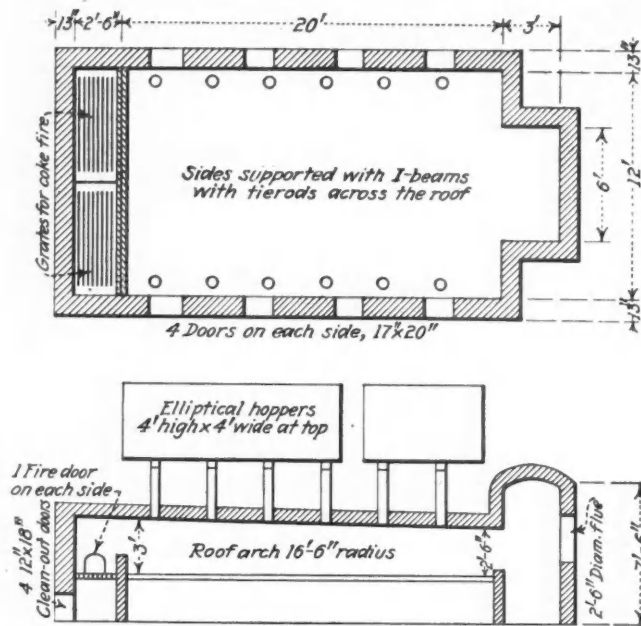
The remaining height of 14½ ft. is of brick. This discharges through an opening 4 ft. high x 6 ft. wide, the bottom of which is 6 ft. above the floor level, into two similar kitchens with a partition between them. These kitchens are each 30 ft. high (15 ft. of concrete and 15 ft. of tile) 9 ft. 9 in. long, and 9 ft. 8 in. wide. The gases then pass through twenty-four kitchens, 7x8x8 ft., and finally are delivered through a fan to a baghouse containing forty-eight 18-in. x 30-ft. woolen bags for a final separation of the finest dust. Total precipitating space, exclusive of the baghouse, is about 20,000 cu.ft., in which seven tons of refined arsenic could be economically precipitated in twenty-four hours when running to capacity. In the older designs, the kitchens were not built sufficiently high, and as a result, when arsenic collected in the bottom, the effective cross-section was rapidly reduced and the fume velocity correspondingly increased, carrying the lighter arsenic too far along the flue system for economical operation.

The refined arsenic averages 99.6 per cent pure and varies considerably in density. The average, when barreled for shipment, is about 138 lb. per cu.ft. Generally speaking, the denser material is deposited first; it is also of somewhat higher grade. The arsenic is barreled by machine, the barrels being made at the plant of the Western Cooperaage Co. of Seattle, and costing about \$2.17 each f.o.b. Jardine. Glass and chemical companies are the chief buyers, and practically all of the product is sold on contracts extending over several months or a year at a fixed price.

Care must be exercised in reverberatory refining that arsenic pentoxide ( $As_2O_5$ ) is not formed. Higher heat

and a freer supply of oxygen tend to produce this compound. Inasmuch as many of the tests for the purity of arsenious oxide do not indicate the presence of the pentoxide, this compound sometimes passes unnoticed. In making calcium arsenate, the first step in the process is the conversion of the trioxide to the pentoxide, and it is possible that this might be done more economically in the refining furnace. Makers of the trioxide would, I am sure, be willing to co-operate with manufacturers of arsenical insecticides in a study of this problem.

The Jardine plant is only 6 miles, by road, from the railroad station, so that all calcines and arsenic are hauled this distance by truck. The calcine is shipped in bulk, without sacking, and loaded in box cars.



The essential features of the arsenic refining furnace

Trucking is contracted, the cost being \$2.75 per ton for the 6-mile trip down hill over a rough dirt road to Gardiner. Freight to East Helena amounts to \$4 per ton. The gold content is about \$70 per ton, so that transportation costs about 10 per cent of the proceeds.

As gold is the only metal of importance in the calcine, the opportunity of cyaniding immediately presents itself. This was tried this year, but difficulties were experienced in getting more than 60 per cent of the gold into solution. Apparently the gold had become coated with some substance—possibly condensed arsenic—that prevented easy solution in cyanide, for tests showed the gold in the very fine pulp but little more soluble than that in the coarser material. Laboratory tests show these difficulties can be eliminated by re-grinding, and a 4x4 Allis-Chalmers ball mill has been installed, the re-grinding serving not only to brighten up the gold particles, but also to liberate the gold from the gangue in the coarser sand and thus improve the speed of leaching. Air agitation in pachuca will follow, then clarification in settling tanks, and ordinary zinc-box precipitation. The residue from the cyanide treatment will contain a small quantity of scheelite, which will warrant table concentration, though it slimes easily, so that when the planned improvements are completed the plant will be entirely independent of outside reduction works, making gold bullion (from amalgamation and cyanidation), arsenious oxide, and scheelite

concentrates. Some portions of the mine are known to be quite rich in scheelite; production from these sections has been held up, pending the installation of means for its recovery.

The present Jardine company is fortunate in having inherited a substantial hydro-electric plant, installed in 1903, which delivers about 400 h.p. at a cost, last year, of 0.39c. per kw.-hr., or about \$25 per h.p. year. Fifty per cent additional power may be obtained easily by increasing the power factor of the electrical system and making a few mechanical changes. Additional water is also available.

An open ditch with a few sections of wooden flume carries 10 cu.ft. of water per second about two miles along the mountain side, where there is a vertical drop of 860 ft., through an 18-, 16-, and 14-in. spiral riveted pipe to a 6-ft. Doble water wheel. The power line to Jardine is three miles long, transmission being at 4,400 volts. Some trouble was caused in former years at the intake of the ditch by ice forming on the regulating gate, thus cutting down the volume of water admitted. This has been solved by installing double gates and housing them, and the installation of a stove for heating. Some trouble is caused during the first cold weather in winter by anchor ice along the ditch and flumes; when the ditch was covered this was difficult to get at, but now it is left open throughout its length.

Costs are always interesting. Operating companies not on a strictly competitive basis are less secretive about them now than they were a few years ago, and I am pleased to have the opportunity of presenting those at Jardine for the first half of the current year.

Operating Costs per Ton Mined and Milled  
Jan. 1 to July 1, 1925.

Superintendents and foremen .....	\$0.338
Office expense .....	.086
General expense .....	.044
General repairs .....	.036
Traveling expense .....	.012
Legal expense .....	0.60
Taxes .....	.019
Fire insurance .....	.027
Hauling calcine .....	.100
Interest .....	.009
Power .....	.159
Power repairs .....	.004
Assaying .....	.080
Mine operation (includes all development):	
Labor .....	\$1,935
Timber .....	.226
Stable .....	.040
Explosives .....	.183
Miscellaneous supplies .....	.115
Total .....	2,499
Mill operation:	
Labor .....	.334
Miscellaneous supplies .....	.110
Repairs .....	.011
Flotation .....	.045
Shoes, dies, balls .....	.083
Total .....	.583
Marketing product .....	.002
Cyanide operation, labor .....	.018
Total .....	\$4.155

The general manager of this property, Harry C. Bacorn, especially desired that I give credit to the whole-hearted co-operation of his Eastern financial backers, who gave him their unqualified support during many lean years and without whose aid it would have been impossible to bring the property to a profitable basis. May I suggest, in conclusion, that this support would not have been extended had not these Easterners been assured of the honesty, economic wisdom, and technical ability of their operating manager. Credit should also be extended to Earl B. Young, a former Anaconda man, who has been general superintendent for the last two years. Though by training a geologist, he has efficiently conducted work in all departments.

# Mine Taxation in Arizona

*Metal-Producing Properties Valued at \$275,125,273 in 1924, Compared With \$496,262,860 in 1919—Shrinkage in Total Valuation Brings Increased Tax Rate*

By George J. Young  
Associate Editor

**M**INING, agriculture, and stock raising are the three important wealth-producing industries of Arizona. Agriculture is increasing in importance, mining is in a sustained position, and stock raising is about stationary. Copper production in Arizona, the leading copper-producing state, was 336,182.5 tons in 1924. The value of the mineral production, as

according to estimates of the U. S. Department of Agriculture, is given in Table I.

As will be noted from the table, the estimated tax levies are remarkably uniform and average 4.82 per cent of the average annual production value. According to my estimates, the mining industry paid in taxes from 1920 to 1923, inclusive, \$31,815,577 upon a total pro-

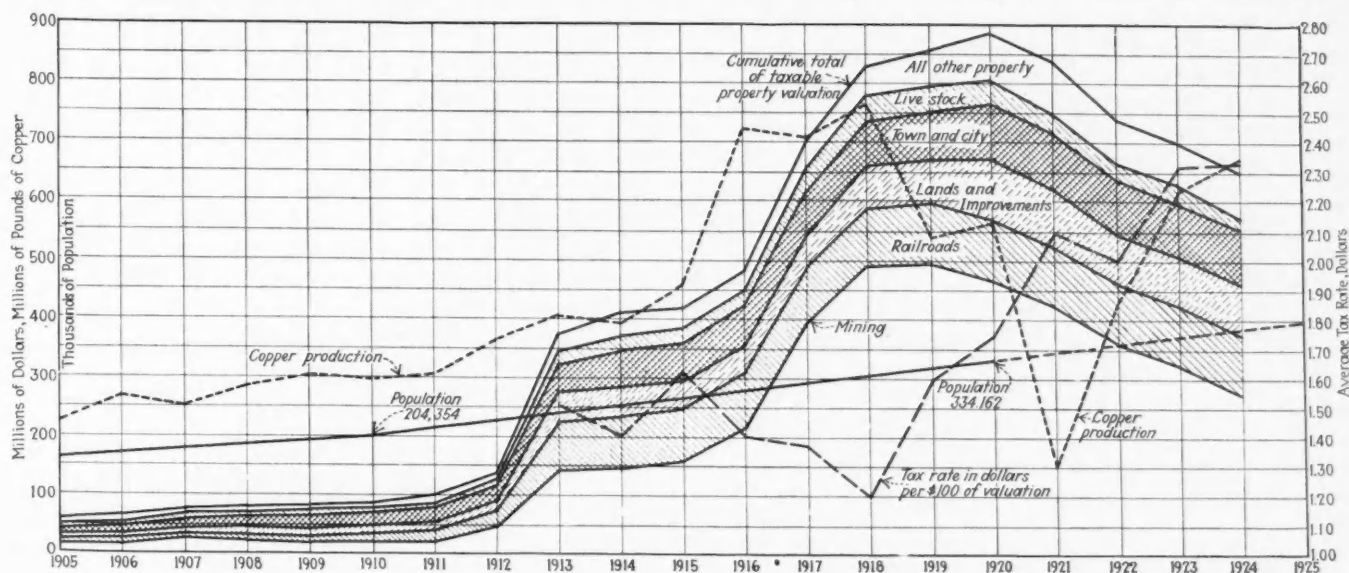


Fig. 1—Taxable property, tax rate, copper production, and population statistics for Arizona

given by the U. S. Geological Survey, was \$105,065,693 in 1923, \$63,737,720 in 1922, \$30,818,363 in 1921, \$116,383,335 in 1920, and \$112,512,239 in 1919. The average for the five years is \$85,703,470. Of the 1923 mineral valuation copper represented 86.6 per cent, gold and silver 11.6 per cent, and miscellaneous metal and non-metallic minerals 1.8 per cent. The state mine inspector's report for 1924 lists 92 active mines. Of these 28 each employs 25 or more men. The total number of men employed in metal mining is given as 13,276. The 1924 report of the Arizona State Tax Commission lists 22 mining companies as productive mines in 1924 and 17 in 1923. The U. S. Geological Survey states that the number of producers was 341 in 1923, and that the ore production was 17,015,178 tons, valued at \$104,301,200, or \$6.13 per ton for copper, gold, silver, lead, and zinc ores. The tonnage of non-metallic minerals is nominal. The mining companies paid \$7,514,279 in taxes in 1923 and \$6,410,419 in 1924, according to the assessed valuation and average tax rate. The 1923 mining tax amounted to 44.1c. per ton of ore produced, not including the incidental tonnage of miscellaneous minerals. The 1919 mining tax was \$7,940,205, or 57.8c. per ton, and the 1921 tax was \$8,911,677, or \$1.63 per ton. The year 1921 was a year of abnormally low production due to the shut-down of the copper mines.

The value of agricultural crops and animal products,

duction value of \$316,005,111, or at the rate of 10.06 per cent on the value of their product.

Arizona had a population of 334,162 and a total

Table I—Value of Arizona Agricultural Products

Year	Crops	Animal Products	Total	Estimated Tax (a)
1924	\$39,000,000	\$17,000,000	\$56,000,000	\$2,527,168
1923	38,000,000	17,000,000	55,000,000	2,586,624
1922	30,000,000	16,000,000	46,000,000	2,277,521
1921	25,000,000	16,000,000	41,000,000	2,673,588
1920	44,000,000	21,000,000	65,000,000	2,539,564
Average	\$35,200,000	\$17,400,000	\$52,200,000	\$2,520,693

(a) Based on the total of land and improvements plus livestock and average tax rate.

bonded indebtedness of \$39,807,764 in 1924, upon which \$2,387,579 annual interest was paid. The total tax levy for the last four years together with its distribution is shown in Table II.

Table II—Total Tax Levy State, County, and City Purposes

	1921	1922	1923	1924
State institutions	\$588,601	\$463,677	\$435,463	\$441,787
Interest and redemption (a)	1,258,971	1,097,328	1,014,861	1,122,110
Roads and bridges	3,547,577	2,905,199	3,451,409	2,734,623
Administrative and departmental	4,052,185	3,915,962	4,164,423	3,718,225
Educational	7,575,372	5,853,063	6,984,852	7,111,775
Miscellaneous	408,851	381,933	155,609	27,084
	\$17,431,558	\$14,617,163	\$16,206,616	\$15,155,575
Estimated per capita	\$50.21	\$40.58	\$40.58	\$39.26

(a) Other than school and road bonds.

In Table III the per-capita tax levy, assessed value, and public debt for 1912 and 1922 are given for the Western mining states. The cumulative totals of tax-

able property in Arizona for the years 1900 to 1924 inclusive are given in Fig. 1.

**Table III—Tax Levy, Assessed Valuation, Public Debt per Capita.**

	Tax Levy per Capita		Assessed Valuation per Capita		Public Debt per Capita	
	1912	1922	1912	1922	1912	1922
Arizona.....	\$22.26	\$42.88	\$608.03	\$2,033.77	\$45.01	\$124.61
California.....	37.28	48.32	1,095.13	1,153.20	55.01	142.81
Nevada.....	26.40	73.21	1,067.20	2,529.94	33.60	90.49
Montana.....	24.61	28.16	826.75	778.57	43.29	110.20
Utah.....	18.44	27.85	494.89	1,345.37	37.77	106.85
New Mexico.....	6.87	29.19	195.73	895.06	20.70	67.86
Colorado.....	17.75	32.28	478.14	1,591.13	44.89	101.78
Oregon.....	27.75	46.71	1,195.54	1,247.80	57.90	170.69
Washington.....	25.87	37.49	747.45	790.61	71.37	120.19

Arizona has shown no especial acumen in state expenditures. It has followed the drift of most other Western states in pyramiding governmental costs. The only special concern has apparently not been to cut expenses but to find new ways of getting more money or to squeeze more money from existing tax sources. Like other states, there has been an increase in wealth with the growth of population, but efficiency in governmental affairs is not conspicuous. The excessive cost of education and of administration is apparent.

**FOR TAX PURPOSES, MINES ARE CLASSED AS PRODUCTIVE AND NON-PRODUCTIVE**

Mining property is divided into two classes, productive mines, or mines which make a surplus of \$5,000 or more above operating expenses, and non-productive mines, which are mines operating at a loss or not making a surplus. The first group is assessed by the State Tax Commission of Arizona and the second group is left to the mercy of the county assessors.

In assessing "producing" mines, the method adopted since 1915 has been the capitalization of the average net income over a period of years. For the 1915 assessment a three-year period was used, and for 1916 a four-year period. Since 1915, a five-year period has been used except where new mines came into production, in which case a one-year period was taken to start with, and this was increased with the life of the mine. The 1922 tax commission report states that:

"So long as the mines continued to work fairly regularly,

with no shutdowns for a long period of time, a fairly good average could be struck by using this short period of years. However, when mines closed down entirely for a year or more, the five-year period is found to be entirely too short to reflect a true average net of the property for purposes of appraisal."

The commission, therefore, decided that an average over a ten-year period would more nearly reflect true conditions in the mines of Arizona. Starting with 1916, the full ten-year period will be reached in 1926. The commission states naively:

"While it is true that three of the years in question were years of large production and above normal, it is also true that the past three years were of small production and far below normal."

This was an attempt to defend the position of the commission in changing from a five- to a ten-year period. The state needed the money and the commission changed the arithmetic. However, if the method of averaging a period is to be used, it is admitted that the longer period will give a truer average. It would have been equally logical to take the whole life period of a mine and strike an arithmetical average of the cumulative annual surpluses.

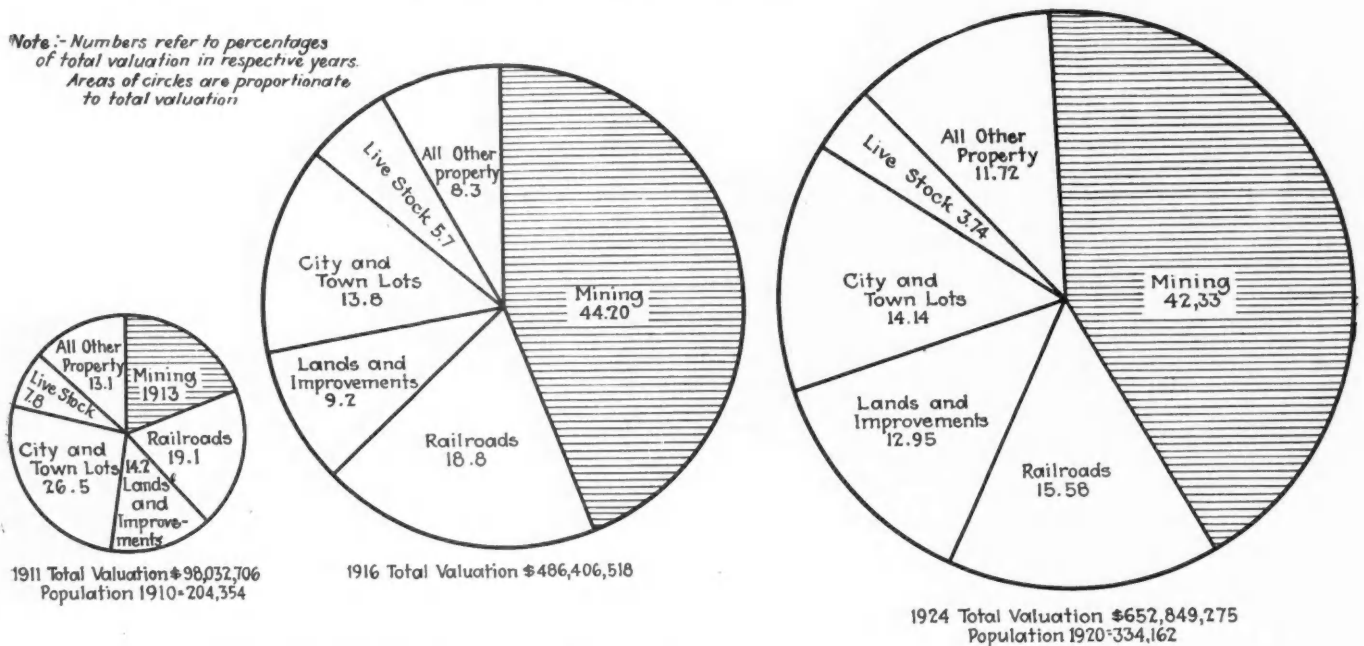
**MINIMUM FACTOR FOR CAPITALIZATION, 15 PER CENT**

The factor of capitalization is prescribed by law, and ranges from a minimum of 15 per cent, in the case of copper mines whose orebodies are found in veins, fissures, and lenses and do not show evidences of exhaustion, to a maximum of 30 per cent in the case of producing mines of irregular output. There are ten separate classifications, for example:

Class 2—Factor of capitalization, 15 per cent for copper mines whose orebodies consist of porphyry deposits and large acreages of contiguous ground largely unexplored and undeveloped and which do not show signs of exhaustion.

Class 3—Factor of capitalization, 15 per cent for copper mines whose orebodies consist of developed low-grade porphyry deposits and do not show signs of exhaustion.

*Note:—Numbers refer to percentages of total valuation in respective years. Areas of circles are proportionate to total valuation*



**Fig. 2—Segregation of property valuation in Arizona for 1911, 1916 and 1924**

From 1917 to 1923, the mine's valuation was for each year in sequence 56; 58.63; 57.66; 52.79; 50.75; 48.97; and 46.46 per cent of the total state valuation.



Class 6—Factor of capitalization, 20 per cent for gold and silver mines whose orebodies have not shown signs of exhaustion.

Class 7—Factor of capitalization, 20 per cent for zinc, lead, tungsten, asbestos, and molybdenum mines.

Subdivisions are made in the different major classifications. These consist of four:

A—Properties that have entered the profitable productive state during the period of years under consideration.

B—Properties that have suspended profitable production during the period under consideration for reasons other than market or physical conditions.

C—Properties that have suspended profitable production when said properties could have been operated during the period under consideration.

D—Copper mines of low ore reserves and whose production is largely from ore which requires concentration, or ore which contains an excessive amount of iron and other mineral content, resulting in an exceedingly low ratio of concentration, and orebodies found at great depth, intimately associated with an excess of water which retards development, all of which give rise to high costs. The subdivisions were used during the war and immediately thereafter, but are apparently no longer necessary.

In addition to the use of factors of capitalization and net earnings for a given period, the tax commission employs as a check the average stock-market valuation of the mining company. The stock sales as of the first and fifteenth of each month are averaged for the year and an estimated value is determined for the property.

#### DEPRECIATION AND DEPLETION PROVIDED FOR IN CAPITALIZATION FACTOR

Depreciation of plant equipment and the depletion of reserves, according to Charles R. Howe, member of the commission, are taken care of by the "large" factor of capitalization. In a letter to me, he states that the prevailing rate of interest for money in Arizona is from 7 to 8 per cent. As a mine is a more hazardous enterprise than many others, the commission is disposed to allow the mines 10 per cent earnings. As the lowest capitalization factor is fixed at 15 per cent, this would leave 5 per cent to cover all depreciation and depletion.

#### INCREASE IN VALUATION OF TAXABLE PROPERTY

The increase of valuation in taxable property in the state is shown graphically in the chart in Fig. 1 and in Fig. 2. The tax commission was formed in 1912. Beginning with this period all property values were increased and the aggregate tax levy was increased also. The two interrelated factors, assessed valuation and tax rate, follow different paths. The sharp increase in taxable property valuation was followed by a drop in the tax rate as shown in Fig. 1. Before valuations reached a peak, the tax rate began to increase, and when total valuation began to decline, the tax rate continued its increase, reaching the high point of \$2.33 per \$100 of valuation in 1924. Thus there was little net effect from diminished valuation, and the total amount paid by taxpayers was kept approximately the same.

The shifting of the tax burden to the mining industry and railroads is shown in Fig. 2. This was accomplished by valuation methods based on the capitalization of net earnings. Indirectly, the mining

industry contributes a considerable part of the railroad freight, upon which it pays its proportionate share of the tax. Also, some mining property is included under "all other property." It is fair to say that the mining industry, directly and indirectly, carries about one-half of the annual tax levy. Mines and railroads thus carry directly about 60 per cent of the tax load and the greater proportion of the population carry the remaining 40 per cent.

#### STATE GOVERNMENT SPENDING TOO FREELY

The fact that the state has a delinquent tax list, dating from 1918 to June, 1924, amounting to \$3,699,258 and generally distributed in the different counties, is an indication that it is spending for governmental activities a greater sum than can be collected from the taxpayers. Excessive taxation is one of the fundamental causes for inflation. Arizona, in common with other Western mining states, has allowed its expenditures to increase at a high rate. Contraction in governmental spending by local and state governments—in other words, economy and thrift—adequate return for expenditures—is the need of the times to prevent unhealthy inflation.

#### NET PROCEEDS FORMS PRACTICABLE BASIS FOR TAX

Mine valuation on the basis of net proceeds is a practicable and fair method of valuation. Factors of valuation are difficult to determine, but, in the case of Arizona, these appear to be conservative. The averaging of net proceeds over a period of years has the advantage of maintaining valuation, but a more exact and fairer method would be a valuation upon the net proceeds won during the tax year. The tax then would bear a definite relation to the net proceeds as indicated in Table IV, which shows the capitalization of \$1,000 of net proceeds at various factors legalized by the state, and the tax and per cent of net proceeds paid in taxes. It is apparent that with a high tax rate this proportion of net proceeds paid in taxes is abnormally high.

Table IV—Tax on \$1,000 of Net Proceeds at Various Tax Rates

Factors of valuation, per cent.....	15	16	18	20	30
Capital value of \$1,000 net proceeds	\$6,666	\$6,250	\$5,555	\$5,000	\$3,333
Tax at \$2 rate.....	133	125	111.10	100	66.66
Per cent of net proceeds.....	13.3	12.5	11.1	10	6.7
Tax at \$2.25 rate.....	150	140.62	125	112.50	75
Per cent of net proceeds.....	15	14.1	12.5	11.25	7.5
Tax at \$2.50 rate.....	163.85	156.25	138.88	125	83.32
Per cent of net proceeds.....	16.4	15.6	13.8	12.5	8.3

Averaging over a period of years might be, in the case of certain mines where regular production was maintained, an eminently fair method, but a mine which passed from a rich to a lean period would be at a great disadvantage for a period of years. Averaging the net proceeds during the entire life of a mine would entail a similar objection in some cases.

#### RECENT CHANGES IN VALUATION PROCEDURE

Valuation methods for the year 1925 have been changed from those previously employed which have just been discussed. On June 30, 1925, the State Tax Commission passed the following resolution:

Whereas, through the action of the last state legislature this commission has been deprived of any appropriation to pay its attorney or to defend its own action in pending or future litigation; and,

Whereas, there is now pending in the United States District Court, proceedings brought by the United Verde Extension Mining Co. petitioning for an injunction to enjoin

the commission from using the capitalization of net earnings as the method of finding the taxable valuation of producing mines; and,

Whereas, this commission deems it advisable to consider all information obtainable in order to arrive at the full cash value of the aforesaid producing mines; be it

Resolved: For the purpose of valuing and assessing the producing mines, in this state, for the year 1925, that the capitalization of net earnings method, heretofore used by this commission, be considered only as one of the factors entering into such value, and that the final valuation found be the result of the consideration by this commission of all information obtainable by it in order to arrive at the full cash value thereof.

Charles R. Howe, member of the commission, states in a letter to me that "the valuation found by capitalization of net earnings, together with the valuation shown by the stock markets as of a certain date, as well as the average stock value over a period of years and physical valuations made by engineers, were used in arriving at the final valuation."

Property valuation should be established by a set of definite principles so clearly set forth that the property owner could readily determine the assessed valuation of his holdings. The method used by the commission is vague and uncertain. Stock-market quotations are too strongly influenced by speculation and by the comparatively limited volume of stock sales to be of use in computing value. Speculative sales of land or city property are frequently taken by assessors as a measure of value, but here again is the factor of volume of sales, which is too restricted to give any indication of real value. The only fair criterion of value must be fundamentally based upon the earnings of a property, whether it be a mine or a piece of city property.

#### OPINIONS VARY REGARDING TAX BASIS

Opinion in Arizona on the subject of mine taxation appears to be sharply divided. Many mining men contend that the industry is overtaxed; others are indifferent. A part of the citizenry thinks that the mines should be more heavily taxed, reasoning that, as the wealth is apparently going out of the state, the only way that the state can participate in this wealth is through the avenue of heavy taxation. This is a fallacious point of view, for the only way in which mines can obtain money to meet payrolls and expenditures within the state is by sending their product outside of the state. The farmers and stock men also market a considerable portion of their products outside of the state. Arizona is exceedingly lucky in having an outside market to absorb its surplus products. Dependent upon its own consumptive capacity it would be a mighty poor state. If dependent upon its own ability to raise funds for mining operations, there would be only a fraction of the present activity.

On the whole, there appears to be a growing disposition to treat the industry fairly. The rôle played by mining in the economic history of Arizona does not seem to be generally appreciated by the people. Arizona mining is the resultant of the enterprise of mining men, the skill of technicians, and the courage of capitalists. Most of the capital originates outside of the state. Mining first provided a population nucleus and next stimulated the growth of transportation facilities. It provided a home market for intensive agriculture as well as affording industrial employment. The success of mining has done more to attract attention to Arizona than any other factor. It has therefore been the important fundamental element in the development

of the state. It deserves fair and considerate treatment as well as whole-souled appreciation by the entire citizenry. It is a part of the economic structure of the state and will be for a number of years. With reasonable encouragement outside capital may take many new adventures in Arizona mining districts and the establishment of important new mines is well within the possibilities of the state.

In the *Mining Journal-Press* of May 3, 1924, T. A. Rickard discussed at length the important phases of mining taxation in Arizona. He criticizes the action of the State Tax Commission in juggling with the periods taken in computing average annual net proceeds and does not spare the mining companies, who sometimes acted unwisely in opposing just taxation increases. He also points out the difficulties of using stock-market prices in computing valuations for comparative purposes. The adverse effects of high taxation in inflating values is discussed in an illuminating way.

Disregarding the mistakes of the past, it seems to me that the present tax situation in Arizona can be greatly improved by a more equitable equalization of assessments. This can best be done by bringing the city and general property, farm, grazing lands and livestock valuations more nearly in line with the horizon established in the valuation of mining, railroad, and public-service corporations. Another method would be a change in the valuation factors used in computing the assessed values of mining property. I have stated that these are conservative, although they appear to be materially higher than, for example, in Utah, which uses a general factor of three. When comparisons are made with other forms of property, the disparity becomes noticeable. Of fundamental importance to the welfare of the state is the need for close scrutiny of state expenditures and a more conservative budget. Equalization of property values and economy in government are the two important objectives to which the citizens and industries of Arizona may well turn their attention. Fully as important is the need for the establishment of a simple and fair method of valuation that will not be subject to frequent changes in principle.

### When Did the Last Ice Sheet Retreat in Eastern Canada?

The results of an attempt to fix the time of the retreat of the last ice sheet from eastern Canada are presented in a report by Ernst Antevs recently published by the Geological Survey of Canada. The method employed is one that has been used in northwestern Europe. It consists in counting and correlating the annual layers of sediments deposited in lakes lying at the edge of the ice sheet. A description is given of the unique method of correlation.

An interesting piece of work is that which shows that the retreat of the glacier from the mouth of Montreal River on Lake Timiskaming northward to Englehart was made in 600 years. Interesting notes are also given on the large lakes that occupied the basins of the Great Lakes during glacial times and on the flooding of the St. Lawrence and Ottawa valleys by the sea when the ice dam holding it back was removed.

A charge of 25c. is made for this publication. It can be had by applying to the Director of the Geological Survey, Ottawa.

## Useful Operating Ideas

### Making Primers Waterproof

By Ernest J. Ristedt

For some time past one of the copper-mining companies in Arizona has been waterproofing its primers, for blasting wet holes, by dipping the primers in an "air-drying insulator varnish." The varnish is made by the Westinghouse Electric & Manufacturing Co. and is listed as No. 416. Six or eight primers are dipped at one time to a depth of 4 to 6 in., allowing them to remain only a few seconds. After drying, the coating is flexible enough to permit of bending without cracking or scaling. The varnish does not penetrate the fuse except when gasoline is used to dilute it in case it becomes too thick. The Westinghouse company recommends 54 to 55 deg. naphtha for diluting. Alcohol has also been used successfully. One gallon of this insulator will waterproof at least 4,000 primers at a cost of about 5c. per hundred for the varnish.

As compared with the ordinary rubber cap protectors, it has been found that the number of misfires in wet holes is less with dipped primers, and the miners find them much easier to handle. The cost of the rubbers alone is 65c. per hundred. In addition, the time required to affix the rubbers individually is greater than that necessary for dipping a handful into the varnish at one time. In dry climates the rubber deteriorates rapidly, whereas the varnish, if only a small amount is kept in a stoppered can used for dipping and is replenished frequently or diluted when necessary, loses little. The method is superior to waterproofing with lubricating grease and is in addition more economical. The waterproofing with the insulator varnish is done in the fuse house when the fuses are made up, saving the miners another inconvenience.

[P. & B. paint, No. 1, has also been successfully used in many Western mines for waterproofing primers.—EDITOR.]

### Lead Filings Make Tight Pipe Joints

A heating contractor recently informed the U. S. Bureau of Standards that he had found that lead filings sprinkled on the threads of piping gave a tighter joint than when ordinary white or red lead paste was used, according to *Compressed Air Magazine*. The filings were made with a coarse rasp from a piece of lead pipe and were held in place by the cutting oil that remained on the threads.

As the method was new to the Bureau it was decided to make test joints of white lead paste, of lead paste and lead filings combined, and of lead filings only, for the purpose of ascertaining the relative merits of these different methods. The piping used was of ½-in. diameter, and the joints were tightened as nearly as possible to the same degree.

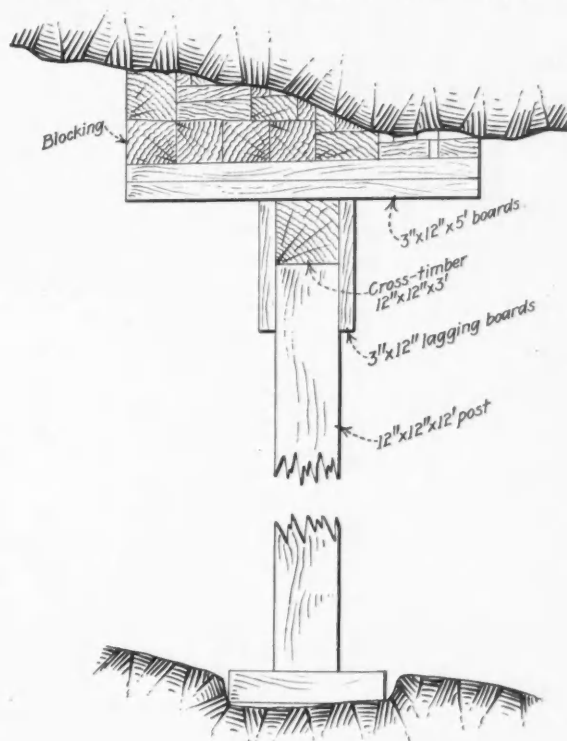
These joints were allowed to set for a week and were then tested under water pressure which could be raised to 8,500 lb. per square inch. Half of the lead paste joints leaked below that pressure, one failing at 1,050

lb. per square inch. One of the combined paste and lead filing joints leaked at 3,900 lb. pressure, while those in which lead filings alone were used uniformly withstood the full pressure of 8,500 lb. without leaking.

The force required to unscrew the joints was also measured. While it took more energy to unscrew the straight lead and the lead and paste joints than those made of paste, it should be borne in mind that the paste was still relatively fresh—not having had a chance to harden sufficiently. The lead joints all unscrewed readily; and it is obvious that time will not affect the straight lead joint as much as it would the paste joint. In short, the tests proved the lead-filing joint to be superior.

### Umbrella Stull

The term "umbrella stull" is frequently used to designate a stull that is so constructed as to distribute support over from 15 to 20 sq.ft. of wall area. This is accomplished by placing a cross-piece of 12x12-in. timber at the top of the stull, holding it in place by two side pieces of 3x12-in. lagging spiked to the stull and also to the cross-piece. A double layer of 3x12 in. x 5-ft. lagging boards is spiked to the cross-piece and the stull



Umbrella stull

is erected and supported by braces. The space between the lagging boards and the back is packed solid with blocking. The general arrangement is shown in the accompanying illustration, which represents a type of stull used in the Junction mine of the Calumet & Arizona Mining Co.

## Discussion

*"Engineering and Mining Journal-Press" is not responsible for statements or opinions published under "Discussion." In many cases the views expressed are diametrically opposed to editorial policy and belief.*

### Discovery of Andalusite in California

THE EDITOR:

Sir—I have read with lively interest the pleasantly imaginative editorial in the *Mining Journal-Press* on the discovery of andalusite in California and the rejoinder thereto by J. A. Jeffrey, president of the Champion Porcelain Co. Mr. Jeffrey's communication contains an extraordinary error. As I am primarily responsible for the discovery of andalusite in the White Mountains of California, even on Mr. Jeffrey's own admission, I may perhaps be permitted to give my version of the discovery.

In June, 1916, I was examining for the U. S. Geological Survey the tungsten deposits west of Bishop, Inyo County, Calif. Near the end of my stay, J. A. MacIver, of Lone Pine, Calif., mentioned to me that he had located an immense deposit of phosphate rock in the northern part of the Inyo Range (or White Mountains). It had previously been staked for silver by a prospector on account of the presence in it of a blue mineral mistakenly regarded as bromide of silver. From my knowledge of the geology of the southern part of the Inyo Range gained during 1912-1913, I told Mr. MacIver that I did not believe that he had a phosphate deposit. "Well," he said, "I have had chemical analysis showing phosphate." On my expressing further skepticism, he offered to take me to see the deposit. So we went, 25 miles from Bishop by automobile; and at a ranch at the foot of the range, we obtained saddle horses and climbed 3,000 ft. above the valley. There lay the "phosphate" deposit, an immense mass—hundreds of feet wide and hundreds of yards long, excellently exposed by nature. It was soon apparent that the deposit was not phosphate but consisted of some unknown silicate. Later, microscopical examination in Washington showed the unknown mineral to be andalusite, and the blue mineral that in the first place had attracted attention to the deposit to be lazulite.

Because of the scientific interest of so remarkable an occurrence of andalusite and also because of the possibility that the deposit might be of value as a source of refractory material, I published a description of the deposit, entitled "An Andalusite Mass in the Pre-Cambrian of the Inyo Range, California," in the Nov. 4, 1917, number of the *Journal* of the Washington Academy of Sciences. Soon afterward inquiries came to the Geological Survey concerning the andalusite deposit.

Mr. Jeffrey, however, leaves us to infer that he discovered a commercially valuable mass of andalusite in that remote and inhospitable desert range after reading my Professional Paper 110. Unfortunately for the complete accuracy of that statement, the Professional Paper was published more than a year after the

announcement of the *Journal* of the Washington Academy of Sciences, and it contains absolutely nothing about the andalusite mass.

Incidentally, if Mr. Jeffrey had had a geologist or mining engineer in his party, he would not have had to spend "several weeks of tireless effort" to find a deposit that had already been located and recorded, that had a trail leading to it, that has an imposing outcrop which is visible from many miles' distance, and that had been examined and described. The subsequent discovery of a commercially valuable deposit would then have been made by the exercise of some geological acumen and would not have been due wholly to "good fortune," to which Mr. Jeffrey ascribes his success.

After all, it seems to me that the main point the Editor desired to make, namely, that the discovery of commercially valuable andalusite in the White Mountains of Mono County, Calif., was primarily a byproduct of more abstract regional geologic studies, still holds true.

ADOLPH KNOPF.

Yale University, New Haven, Conn.

### Hydration of Anhydrite

THE EDITOR:

Sir—A letter by D. H. Newland in your issue of Oct. 17 on the subject of "Hydration of Anhydrite" seriously questions the possibility of commercial utilization for calcined products of gypsum containing anhydrite, because, to quote from his letter, "even a slight admixture of this parent substance of nearly all gypsum rock upsets the normal course of setting of the ordinary types of plasters." It is well known that the presence of very small amounts of old plaster in plaster of paris will greatly accelerate the time of set, but I have no information indicating that admixtures of anhydrite have any decided effect on setting time.

It has been reported that plasters containing 5 to 8 per cent anhydrite have commonly been sold through the regular channels of trade, and that such plasters conform fully with standard specifications. As no definite data on this question seemed to be available, a series of tests were run by E. E. Berger at the Non-metallic Minerals Experiment Station of the Bureau of Mines to determine just what effect anhydrite had on the time of set of gypsum plasters. To make the materials conform as nearly as possible with those obtained under commercial conditions the anhydrite used was calcined for two hours at the approximate temperature of the gypsum kettle. The stucco (plaster of paris) used was obtained from a manufacturer. It was approximately 88 per cent pure, the impurities consisting of silica and limestone with practically no anhydrite. The setting time tests were made according to standard specifications of the A.S.T.M. The following results were obtained:

Material	Time of Set Unretarded	Time of Set with 0.2 Per Cent Retarder
Stucco	13 minutes	4 hours 15 minutes
Stucco + 10 per cent anhydrite	12 minutes	No test made
Stucco + 25 per cent anhydrite	14 minutes	4 hours 20 minutes

These differences in time are within the range of

experimental error; therefore no noticeable effect was produced by the admixture of anhydrite.

As artificial mixtures of plaster of paris and anhydrite might not give the same results as natural mixtures, another test was made using a gypsum rock containing approximately 35 per cent of anhydrite. It was calcined in an electric oven, and tested for time of set. Unretarded it set in 9 minutes and with 0.2 per cent retarder in 2 hours 13 minutes. The sample used was considerably finer than commercial stucco, and as it was used shortly after calcination it contained an appreciable amount of soluble anhydrite. These two factors tend to hasten the time of set. However, a retardation from 9 minutes to 2 hours 13 minutes with a low percentage of retarder indicates that complete control of setting time is possible even when a large percentage of anhydrite is present.

These tests indicate that anhydrite has no marked effect on the time of set of gypsum plasters. Anhydrite, like any other impurity, tends to weaken the plaster, and it is probable that strength rather than setting quality will be the controlling factor governing the permissible percentage of anhydrite in any gypsum anhydrite mixture to be used for calcined products.

OLIVER BOWLES.

U. S. Bureau of Mines, New Brunswick, N. J.

### A Britisher

THE EDITOR:

Sir—What particular class of "Bohunk" American does your Editorials Pander to Why the Ever recurring Insults to Great Britain. Re Your Editorial "Oil in Mosul" Sept. 26, 1925. Surely a Magazine of International Repute should be above that Sort of Thing. Or is it That the Great & Only United States is suffering from "Sour Grapes" She has never "Grabbed anything" I suppose That Tosh Re the "Pure Mind of President Wilson." Even Your Own Country dropped him to their everlasting disgrace.

Further, when is Josiah Edward Spurr going to let up on his everlasting & now Stale Joke of His Colloidal Theory.

South Fork, B. C.

A BRITISHER.

Also Reader of Your Magazine since the Days of the Mining & Scientific Press, a Good Periodical now Spoilt.

### The Doodlebug Test

THE EDITOR:

Sir—Back in the early 90's of the last century lived Allen Hardy, a hardy mine owner of Webb City, Mo. There was traveling over the Joplin mining district at the time a doodlebug named McKinstry, locating ore deposits at \$5 per location. Allen Hardy had the reputation of being the hardest practical joker in the district, and when he employed McKinstry, and invited all his friends to be present, a treat was expected. As a reporter for a local paper I received an invitation.

A large crowd gathered at the appointed time on the shore of a pond at the Hardy & Lillibridge mine, on the Tracy land, in the south part of Carterville. It was an overcoat day, and all visitors not provided with top coats were shivering from a cold, stiff breeze from the northeast, to which the pond was fully exposed. When McKinstry came, dressed in shabby summer garb, Hardy, gruff and sharp-spoken, informed him that he

wanted located the head of a drift, somewhere under the center of that pond. Poor McKinstry must have needed the \$5 badly, for he stripped to his thin underwear and waded into the almost ice-cold water. He wanted to make a location when he was in knee deep, but Hardy would have none of that, and kept him wading to his armpits. Hardy paid the fee, and that was the last of McKinstry in these "diggin's." The effective feature was the large audience, including nearly every mine owner in the district.

Would not some similar experiment be a practical test for all doodlebugs?

REMINISCENCE.

Joplin, Mo.

### A Correction

THE EDITOR:

Sir—I have just received my Oct. 31 copy of *Mining Journal-Press* and note some mistakes and one omission in my article entitled "Geological Section Along Rio de San Lorenzo, in Sinaloa, Mexico." In reproducing the map and cross-section the volcanics just west of Santa Cruz have been mislabeled quartz monzonite; the name quartz monzonite is omitted from the small batholith at Cosala; the quartz monzonite intrusion near Guadalupe de los Reyes is mislabeled aplite, and the volcanic series around the same town, which consists of a series of andesitic and rhyolitic flows and tuffs, is mislabeled volcanic tuff.

You have omitted a reference to the work of Dr. W. H. Emmons on the difference between the mineralization in the region of Tertiary volcanics and that associated with the Cosala batholith.

Tucson, Ariz.

W. HORATIO BROWN.

### Superintendents vs. Master Mechanics

THE EDITOR:

Sir—I should like to ask through the *Mining Journal-Press* what there is so interesting about the mechanical trades that superintendents will neglect their own work to attend to that of their master mechanics? This practice has been so harmful in its effect that it is now hard to find a competent man employed as master mechanic, or even as machinist or electrician. The good men have become disgusted and have quit the business.

A good master mechanic should have spent four years learning his trade of machinist. He should have learned it by serving an apprenticeship. The handy-man route never makes mechanics. He should have worked at least four years as machinist and about as much more as electrician, pipe fitter, and engineer. He should be a draftsman and should have as good a technical education as a mechanical engineer is supposed to have.

Now, Mr. Superintendent, is your master mechanic that kind? If he is not it is your fault. If he is, do you consider yourself fitted by education and experience to meddle with his work?

Another thing: Why are superintendents of the mining engineer variety afraid to hire men of ability and education? Most that I have met suffer so much from an enlarged ego that they want no one with ability around them. Ought they not to observe that jobs are not lost to rivals in the organization, but by not having an organization?

H. L. TURNER.

Victor, Colo.

## Consultation

### How Much Is a Cord of Ore?

"According to newspaper reports, two gold bricks amounting to 132 oz. were produced, by amalgamation, from twenty-six cords of mill ore treated for the month of September at the Buell mill, Gilpin-Eureka mine (Colo.), operated by Peter Macfarlane. The ore averaged over 5 oz. of gold per cord and made in addition at least one-half ton of lead concentrate to the cord, which is worth from \$100 to \$120 per ton, which reduced to ounces and added to the 5 oz. saved by amalgamation, would bring the average yield close to 9 oz. of gold to the cord, a grade of ore that tallies with the early grade shipments from the best mines in the country. How much is a cord of ore?"

The term "cord" in its common usage represents "a quantity of firewood or other material originally measured with a cord or line; a pile containing 128 cu.ft., or a pile 8 ft. long, 4 ft. wide and 4 ft. high." In Sussex, England, a cord is a pile of wood 3 ft. wide, 3 ft. high and 14 ft. long, or 126 cu.ft. In Derbyshire, England, there are three "cords" in use having a volume respectively 128, 155, and 162½ cu.ft.

The actual amount of wood in a cord varies considerably, according to the sizes of the material piled. For example, corded firewood which is over 6 in. in diameter represents 75 cu.ft. of solid wood, or 69.4 per cent of the volume of the cord. Wood 3 in. in diameter or over amounts to 60 cu.ft. of solid wood per cord, or only 55½ per cent of the cord. Timber cut in mixed sizes (run of forest), which in mining parlance would be analogous to "run of mine," represents 80 cu.ft., or 74.07 per cent solid wood per cord. One cord of first-class split wood obtained from sound wood 12 in. in diameter contains 102.4 cu.ft. of solid wood.

While the cubic yard is now the more common measure used in stone masonry a common term of measuring stonework is the perch, 24.75 cu.ft., which is a unit of cubic measure usually 16½ ft. long, 1½ ft. wide, and 1 ft. high, but varies considerably. In Philadelphia a perch in stone masonry is 22 cu.ft. The term "cord" has also been used in stone masonry, but not very extensively. According to Kidder, stone is measured in Chicago by the cord of 100 cu.ft. Since masonry is usually measured in the wall, Kidder's statement can be interpreted as 100 cu.ft. in the wall, being approximately the "run of quarry" stone in a cord of 128 cu.ft. No doubt it is from this latter usage that the term "cord" has been carried by stone masons or contractors into the Colorado mining district.

Assuming for convenience a cord of run-of-mine ore at 128 cu.ft. and 200 lb. per cu.ft., a cord would weigh 25,600 lb., or 12.3 tons. Therefore, 5 oz. per cord would equal 0.406 oz. per ton, or \$8.39 per ton (gold value). The value of the lead concentrate on this basis would be about \$4 per ton of ore, making the total value of the ore \$12.29 per ton.

### The Biggest Copper Producer

"Can you tell me just what properties the Kennecott Copper Corporation controls?"

In addition to its own property in Alaska, Kennecott owns \$15,433,000 of the \$16,244,900 stock of the Utah Copper Co.; 2,582,792 out of 2,590,700 shares of the Braden Copper Mines Co.; \$3,839,432 of the \$4,500,000 stock of the Alaska Steamship Co.; all stock and bonds of the Copper River & Northwestern R.R.

Co.; and all stock of the Alaska Development & Mineral Co.

The Alaska Development & Mineral Co. is said to own 1,150,600 of the 2,500,000 shares of the Mother Lode Coalition Mines Co. It is understood that enough additional stock is held by interests associated with Kennecott to give that company a 51 per cent interest in Mother Lode Coalition. Utah Copper owns 61 per cent of the capital stock of the Nevada Consolidated Copper Co. Thus Kennecott, in addition to its own property, owns 99.7 per cent of Braden; 85.2 per cent of Alaska Steamship; 100 per cent of the C. R. & N. W. R.R.; 51 per cent of Mother Lode; 95 per cent of Utah Copper; and 58 per cent of Nevada Consolidated. Should the proposed amalgamation of Nevada Consolidated and Ray Consolidated go through, which is probable, Kennecott will also have an interest in the Ray Consolidated and Chino properties. Based on 1924 production figures, Kennecott's own production plus the proportionate share of that of the companies in which it is part owner is 226,000 tons of copper per year, Anaconda on the same basis produces 187,000 tons.

### Treating a Vanadium Concentrate

"I am interested in treating a vanadium concentrate which contains practically no other metal, using a wet (acid) extraction process, afterward precipitating as vanadate of iron, and reducing to ferrovandium. The process is satisfactory in its recovery, but the finished product contains too much phosphorus. The concentrates contain about 0.40 per cent P<sub>2</sub>O<sub>5</sub>, and evidently this is extracted, and carried down in the precipitate. Can you inform me if there is any wet recovery known whereby the phosphorus is not carried through into the vanadate, or of any process in which it could be thrown out?"

John B. Kasey, of Newark, N. J., who read the above inquiry in the *Mining Journal-Press* of Oct. 10, submits the following suggestion:

"The acid solution of vanadate and small amount of contained phosphate is treated with a solution of zirconium chloride prepared by dissolving crude zirconium hydrate in hydrochloric acid. The hydrate of zirconium is prepared from the mineral zirkite. The reaction takes place in strongly acid solutions as well. The vanadate is not affected. The precipitated zirconium phosphate can be recovered and used over again. It is taken for granted that calculated amounts of the precipitant be used in order to prevent contamination of the vanadate."

### Weights of Metals

"To settle an argument, will you please let me know the weight of a cubic foot of gold; also of lead and platinum."

A cubic foot of gold, platinum, and lead weighs:

Gold,	1,465 lb. (troy)
Platinum,	1,621 lb. (troy)
Lead,	710 lb. (avoirdupois) <sup>1</sup>

The above weights are average values, the density of metals being somewhat greater when they are rolled, compared with when they are cast.

This is reminiscent of the old query as to which is the heavier, a pound of gold or a pound of feathers, a pound of feathers being the heavier because it is weighed by avoirdupois weight, in which a pound consists of 7,000 grains, whereas gold is weighed by troy weight, in which a pound is only 5,760 grains. This variation in the meaning of the word "pound," "ounce," and "ton" causes many misunderstandings and is one of the chief arguments for the metric system.

<sup>1</sup>Equivalent to 863 lb. troy.

# News of the Week

The Mining News of ENGINEERING AND MINING JOURNAL-PRESS 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.

## Summary

**A**NACONDA COPPER and W. A. Harriman & Co. have secured control of Giesche Heirs German-Polish zinc and coal mines, which have been operated for 220 years and have a capacity of 150,000,000 lb. of zinc per year.

International Nickel purchases British America Nickel Corporation—Mond Nickel operating sulphuric acid plant—Additional power to be developed on Michipicoten River.

October shipments from Michigan Copper mines, 13,000,000 lb.—Mohawk increases production—Quincy increases recovery of silver from copper.

Gila Copper Sulphide Co. taken over by F. A. Woodward, et al.—Increased production from Tom Reed.

Cold weather in Minnesota retards iron-ore transportation; shipments to continue through November—M. A. Hanna & Co. to operate Hiawatha and Rogers mines.

Possible oil areas, Sydney Basin, Australia, being studied—Great attention given to Rhodesian mineral deposits—Increased production in Transvaal over last year.

Yukon Gold Co. dismantles dredges preliminary to transferring equipment and personnel to Malaya tin mines; change foreshadowed months ago.

Portland Port wants less moisture in export zinc concentrates—Utah-Apex installs concentrator for zinc—Callahan Zinc Lead Co. developing Galena group.

## Giesche Zinc Mines, Silesia, Pass Into Control of Anaconda and Harriman

Plant Operated 220 Years; Present Capacity 150,000,000 Lb. of Spelter—Coal Lands Included in Deal—Large Known Orebodies

**C**ABLE ADVICES from Breslau, Germany, are to the effect that W. A. Harriman & Co., of New York, and the Anaconda Copper Mining Co., of Montana, have jointly taken over the German-Polish holdings of the Georg von Giesche Heirs, Inc., which firm is reported to have been in financial straits. The holdings comprise zinc mines, smelters, and coal mines.

Under the terms of the agreement a new American corporation is to be formed, in which the Harriman and Anaconda interests will control a majority of the stock. The Giesche heirs are to receive the minor balance. The Giesches' holdings, though remaining in the estate's hands, will be under the direction of the two American concerns. The Anaconda company acquires rights over the sale of all products of the German zinc mines for twenty-five years.

The Harriman and Anaconda companies guarantee credits sufficient to operate the mines and smelters. The amount of this guaranteed sum, which is necessary to enable the Giesche heirs to liquidate credits which will soon fall due, is said to be \$12,500,000, which the Harriman and Anaconda companies expect to cover through an American loan.

The negotiations were concluded despite the Prussian State Mining Corporation's efforts to acquire control of these mines. In order to keep the American financiers from the field, they extended credit to the Giesche heirs to the extent of 15,000,000 marks when the money was needed to keep the mines open. However, their attempt to convert the properties into a stock company with the Prussian State Mining Corporation holding control was rejected in favor of the American financiers' offer to leave the title of the German properties in the hands of the Giesche heirs and at the same time furnish the necessary operating funds and re-equip the mines.

The acquisition of the German mines, together with the American mines already owned, will give Anaconda control of between 16 and 17 per cent of the world's zinc production. The German mines have been in the control of the von Giesche family for 220 years.

### EARLY HISTORY OF THE GIESCHE MINES

The zinc-mining industry of Silesia began to assume important proportions when Georg von Giesche, a merchant of Breslau, received from Emperor Leopold, on Nov. 22, 1704, the privilege of

exploiting zinc deposits of the Beuthen domain and the right of selling the ore outside of Silesia, which grant was prolonged until 1802 by agreement with the Counts Henckel, the great landlords of the district. During this 100 years of operation, the Giesche heirs produced from 500 to 900 tons of calcined calamine per year. No attempt was made to produce metallic zinc.

Early in 1809 competitive firms began the production of metallic zinc, and on Dec. 16, 1809, the Giesche heirs put in a zinc furnace with four muffles at the calcining works of Scharley, and the following year ten furnaces were added. During 1811 to 1814, 313,950 kg. of spelter was produced from the two plants then in operation.

In 1815 the low price of zinc and the high cost of coal were such a factor as to cause anxiety on the part of the mining company. As a result, a complete new zinc works, "Georgshütte," was established near the coal mines of Michalkowitz. This plant was soon in operation, and during the following year the eight furnaces with eight muffles each produced 131,900 kg. of zinc at a cost of 90 marks (\$22.50) per 1,000 kg. The original Scharley Works were permanently closed in 1818. In 1822 the "Georgshütte" was increased by the addition of eight furnaces of ten muffles each and during that year produced 428,550 kg. of zinc at a cost of \$12.80 per kg.

Operations continued for many years with practically no change except that they gradually increased in magnitude. From 1883 to 1891 the production of the Giesche mines varied from 15,400 to

18,700 long tons of spelter per year, out of a total production of Silesia of 70,400 tons to 87,000 tons per year. At the beginning of 1900 the Giesche heirs were producing two-thirds of the cadmium produced in the Province of Silesia, which also represented approximately two-thirds of the world's production of cadmium. About this time, from 1890 to 1908, various attempts were made to organize the zinc industry into a single unit, but without much success. In 1908 the German Zinc Convention was formed, in which all of the German producers took part, with the exception of the Giesche heirs. The absence of the latter was understood to be a matter of principle against entering into a formal alliance rather than a manifestation of opposition, as the firm expressed a willingness to abide by the prices fixed by the syndicate. The Giesche heirs, however, held aloof, as they desired to retain the historic policy of independence.

Under date of Feb. 17, 1923, the *Engineering and Mining Journal-Press* published the following statement regarding the Giesche mines:

"The Giesche mines is not only the most important zinc producer of Germany, but the managers are, also, at liberty to offer freely—that is, not through the hands of the three great merchant firms of Aaron, Hirsch of Halberstadt, and the two Frankfort establishments, Beer, Sondheimer & Co. and the Metallgesellschaft. Another feature of the Giesche company is its independence of French and British capital participations, whereas other large members of the Zinc Syndicate have lost their independence irretrievably, as it would appear."

The purchase of these mines by American interests ends the two-century family control of a property that has been an important factor in the German zinc industry.

According to John D. Ryan, chairman of the Anaconda Copper Mining Co., "The von Giesche mines constitute one of the largest known bodies of high-grade zinc ore in the world. It has produced more zinc than any other single property has ever done, having been worked for generations. Very large tonnages of high-grade and medium-grade ore are blocked out and available for mining, and it is proposed to remodel the metallurgical works as quickly as possible, taking advantage of all modern developments in the metallurgy of zinc. The von Giesche works have at present a capacity of about 150,000,000 lb. of zinc a year, and that capacity will be considerably increased when our program is carried out. The von Giesche coal mines underlying the zinc mines are among the most important coal producers in Germany; they not only produce coal for all of their own operations but furnish a great part of the supplies for industrial plants in Eastern Prussia. The coal mines are also included in the trade. The Anaconda company will not incur any permanent financial obligations in the acquisition of these properties, making only a temporary loan during the period of the option and until permanent financing can be arranged by the bankers."

### International Nickel Purchases British America Properties at Sudbury

IT IS officially reported that the International Nickel Co. has purchased the Sudbury properties of the British America Nickel Corporation. Subsequent to liquidation these properties were invested in a company called the Anglo-Canadian Mining & Refining Co. It is understood that the transaction does not include the refinery at Deschenes, Quebec.

The financial statements of the International Nickel Co. show that substantial progress is being made, net profits for the six months ended Sept. 30, being \$2,715,235, compared with \$795,456 in the corresponding period of the previous year.

### Mond Nickel Sulphuric Acid Plant in Operation

The new sulphuric acid works at the smelter of the Mond Nickel Co., at Courston, in the Sudbury district of northern Ontario, has been completed and is now in successful operation. It is designed on the most modern and approved lines, and the product, which is of the highest commercial quality, includes acid of all strengths. This is the first successful effort to recover as a byproduct the sulphur which has hitherto gone to waste in the nickel smelting process in the Sudbury district, to the serious detriment of vegetation in the neighborhood.

### Old Mines in Sierra County, N. M., Reopened

Log Cabin Mine Sold at Auction—State Highway From San Lorenzo to Kingston Assured

By Alford Roos  
Vanadium, N. M.

On Oct. 10, at the County Court House, the Log Cabin, the Carbonate, and the Cockrobin and Robincock mines, situated in Sierra County, N. M., were put up and sold to the highest bidder, by Special Master William P. Kil, to satisfy a suit in equity which has been pending in the courts for many years. The Log Cabin claim was sold to C. A. Stokes, of Mancas, Colo., for \$4,500. Carbonate was sold at a lower price to D. M. Miller, of Lake Valley, N. M., who was one of the litigants. Cockrobin and Robincock were sold to Ray McPhearson, of Tierra Blanca, N. M.

The sale of these mines by the court closes a period of bitter litigation which has lasted many years and has prevented the further operation and development of these promising properties. The Log Cabin was located in 1886 by Pete Kinney and L. M. Sleight during the closing period of the Apache Indian hostilities. The mine is in the Tierra Blanca district of the Black Range. Soon after its location, and up to 1888, the locators, handicapped as they were by hostile Apaches, no roads, and lack of equipment and funds, pro-

duced in net smelter returns in excess of \$60,000. The ore was shipped to the Billings Smelter, at Socorro, N. M.; also to the Denver Sampling Works and to the Silver City smelter.

At a time when the mine seemed on the road to prosperity, with plenty of ore in sight, and stockpiles accumulating, the locators took in a third partner. Some time thereafter, the new partner and the locators could not agree, and a deadlock ensued, which lasted many years. None of the contestants would permit favorable offers of sales to be consummated. It is known that from time to time offers of from \$50,000 to \$75,000 had been made in terms of initial and short-time payments for the property, which shows how, when a property is sold at a forced sale, it brings a far lower price than could otherwise be secured.

The ores of the Log Cabin contain gold and silver and shipments have shown values of from \$5 to \$120 in gold and from 50 to 450 oz. in silver. The silver minerals are purple bromides and green chlorides. It is from the former that the district is commonly and officially called the Bromide mining district of New Mexico.

D. M. Miller and T. B. Everhart, of Socorro, N. M., are operating the Bridal Chamber mine and adjacent property under lease. They have to date shipped 53 cars of silver ore to El Paso. While low in silver, it is recalled that from a cave in this mine was taken out what is perhaps the largest single mass of silver ever mined. Government statistics record a single mass of 2,500,000 oz., with the adjacent masses making up a total yield of 5,000,000 oz. and all within a very short period after the discovery, in the early '80s.

D. M. Miller has just sold under lease and bond the Dude mine, on Mancho Creek, in the Mancho district, 7 miles from Lake Valley, to A. L. Owens, of Santa Rita, N. M. One small car of high-grade silver-lead ore was shipped to the smelter at El Paso recently.

At the Graphic mine, where diamond drilling is going on, \$3,500 worth of diamonds were lost by the Sullivan company, which is doing the drilling for Sam Houghton and associates. Evidently the drill struck an inclined fissure, which broke the drill shank. The drilling is being done in an attempt to locate the lost vein beyond the fault which has cut it off. The old Graphic mine was a fair producer a quarter of a century ago. The principal value is lead, occurring as galena, carrying some silver. The mine is 13 miles north of Deming, N. M.

A new highway from San Lorenzo, Grant County, and Kingston, Sierra County, is assured by state and federal authorities. The estimated cost of the 30 miles is \$1,250,000. It crosses a wilderness in which not even a wagon road has ever been attempted. While it will take at least two years to build this road, it is expected that prospecting will be carried on in this wild country. It connects two important and established mineral regions, which have heretofore been separated by the impassable Black Range. As a scenic highway it will not be surpassed by any in the state.



### Demand for Iron Ore Extends Shipping Season

Iron-ore shipments from the Lake Superior district will be maintained up to Nov. 25 if possible, to meet the extremely large demand from Eastern mills, according to W. J. Olcott, president of the Oliver Iron Mining Co. Most of the operations of Minnesota iron ranges are usually over by Nov. 1, but the heavy steel demands throughout the country have caused ore shipments further into the winter than usual.

That situation is also true of several independent companies, which are now expected to ship as long as weather will permit. Some of those mines had closed down through cold weather, but with better conditions setting in this week, they have resumed moving ore to Lake docks.

### Early Cold Weather Retards Iron Ore Shipments

That it pays to ship iron ore early was plainly demonstrated recently when 8 deg. above zero settled on the Mesabi range for almost a week and curtailed shipping. The railroad companies had their thawing equipment in operation, but this so increased the haulage costs that to save money no mines were furnished cars unless a boat was in the harbor waiting for the ore. This program increased the time of loading a boat from two to twenty hours and slowed up shipping until as many as twenty boats were waiting at the docks to load. All of the extra time consumed by the boats entails added expense to the mining companies, and where the railroads save money by this plan the mines lose in the same proportion.

The Shenango Furnace Co. completed shipments from the Shenango and Webb mines, increasing the shipments from 270,000 tons in 1924 to about 900,000 for this year.

All the mines tributary to Gilbert are now inactive. The Mariska mine of the Bowe Burke Co. at Duluth pulled the pumps after completing the season's shipments and allowed the mine to flood.

### Utah-Apex Installs Concentrating Plant for Zinc

The zinc-separating equipment of the Utah-Apex Mining Co. is being installed rapidly and should soon be turning out a product of 45@50 per cent zinc concentrate carrying 3 per cent lead.

President Haffenreffer says that information has been received that a new orebody has been encountered on the 2,000 level in what is known as the Highland Boy limestone carrying fairly high-grade copper. This strike is now being developed, and should soon add to the daily shipments.

Utah-Apex earnings naturally have been adversely affected by reason of inability to produce at capacity and the fact that the company has been unable to take advantage of the present strong lead and zinc market so far as the high-grade ore on the 2,400 level is concerned.

### M. A. Hanna Co. Operate Hiawatha and Rogers Mines, and Introduce Electric Shovels on Marquette Range

The M. A. Hanna Co. has taken over the operation of the Hiawatha and Rogers mines, on the Menominee range. The former operators were the Munro Iron Mining Co., a subsidiary organization of the Rogers-Brown Ore Co. The Rogers mine has been idle since last May, but will be placed in operation the first of the year. The shaft is now being retimbered and made ready for hoisting ore.

The first electric shovel to arrive on the Marquette range has been received at Palmer by the M. A. Hanna Co. It will be put to work on lands recently acquired and which will require some stripping before mining can be started. The shovel is of Bucyrus manufacture, of the full revolving type, and will be operated by direct current. The company now has several electric shovels in use in open pits in Minnesota.

### October Shipments of Michigan Copper Approach 13,000,000 Lb.

Refined copper shipments by boat out of the Michigan district in October were 9,910,000 lb. Calumet & Hecla Consolidated shipped 8,260,000 lb.; 1,508,000 lb. left the docks of the Michigan smelter, which treats Copper Range and Mohawk mineral; and Quincy shipped 142,000 lb. Approximately 3,000,000 lb. of metal moved forward by rail in October, bringing shipments for the month up to 12,910,000 lb. Considerably more copper was shipped in October than in September, when boat shipments were only 6,640,000 lb. As November is the last full month of navigation, particularly heavy shipments by boat are expected this month on account of the lower Lake carrying charges.

Development of the Mid-West market is one of the important factors in Calumet sales, and the bulk of deliveries now goes to the Chicago district and lower Michigan, instead of New England and New York, which previously absorbed from 50 to 75 per cent of the entire output.

### Diamond Drilling Stopped on Treasure Hill Mines, Hamilton, Nev.

Diamond drilling in the old Treasure Hill mines, near Hamilton, Nev., has been suspended for the winter. The work was conducted by Joralemon and Hamilton, engineers, of San Francisco. No report has been issued on what has been accomplished, but operators state that work may be resumed in the spring.

There is considerable activity in the lead territory around Hamilton, and some production is being made. The Tonopah Belmont Development Co. is doing some work on a promising prospect in this section, and the results of the work will govern other operators in the district.

### Yukon Gold Dismantles Dredging Equipment

The Yukon Gold Co. has decided to withdraw from Yukon Territory, and is dismantling its machinery preparatory to sending that which can be used to its placer tin properties on the Malay Peninsula, where the staff also will go. Besides the dredges, the company has a complete machine shop, including an electric iron-melting furnace, and there during the dark winter months the buckets of the dredges were rebottomed and the whole of the equipment was reconditioned for the following season's work. It has also a complete hydro-electric plant.

The change had been forecast for the last few years in the annual reports of the Yukon Gold Co., which continued to show a deficit despite efforts to reduce expenses of mining to the minimum. In 1923 a deficit of \$421,909 was reported, following a deficit of \$511,162 in 1922.

Under primitive methods the Alaska gold mines yielded more than \$100,000,000 to miners who left their homes with pick and shovel to join in the gold rush. The Guggenheims believed that with scientific treatment they would produce many times that amount. In recent years the gold supply in Alaska has become so small that the expense of overcoming the physical difficulties to get it exceeds its value.

The principal operations of the Guggenheims in the North will hereafter be confined to copper mines.

### Finland Plans to Return to Gold Basis

According to a report from Helsingfors, a bill is now ready which provides for the return of Finland to a gold basis. It is proposed that gold coins should be minted of the value of 100 and 200 marks, the former containing 3.15/19 and the latter 7.11/19 of a gram of fine gold. The small change will remain as at present, the nickel mark, with nickel and bronze coins for smaller sums.

### Oil-Refining Clay Mined at Draper, Utah

An aluminum silicate deposit worked by the early Mormon pioneers is now being extensively exploited by the Refineries Clay Company for its oil-refining properties. The company is shipping 200 tons weekly from its mine at Draper, 30 miles south of Salt Lake City, Utah. Installation of additional driers will increase the output to 400 tons weekly.

The early Mormons were attracted to the deposit because its greasy nature (common to all talc) gave rise to the hope that candles could be made from it. All attempts to develop the mine were unsuccessful until California interests acquired the property and started to prepare it for oil-refining purposes. Demand for the material is rapidly increasing because of its purity and its efficiency in refining petroleum, cottonseed, and other oil products.

## Flin Flon Sale Practically Assured

It is believed that papers may be signed any day now for the conclusion of the negotiations for the acquisition of the Flin Flon property, in northern Manitoba. This property was discovered about ten years ago and was taken over by Jack Hammill, a well-known Toronto mining man, and his associates. A considerable amount of drilling was done by the Fasken interests, who were largely interested in Nipissing and power projects throughout northern Ontario. This drilling disclosed approximately 16,000,000 tons of low-grade copper ore, carrying gold, silver, and zinc. The property was sub-

## Washington News

By Paul Wooton  
*Special Correspondent*

### Bureau of Mines Plans to Help Mining Industry to Help Itself

In the form which the reorganization of the U. S. Bureau of Mines is taking there is recognition of the principle of central responsibility for the special problems of mining and of the principle of close co-ordination of the economic with the technical. There is the acceptance of the point of view that whatever

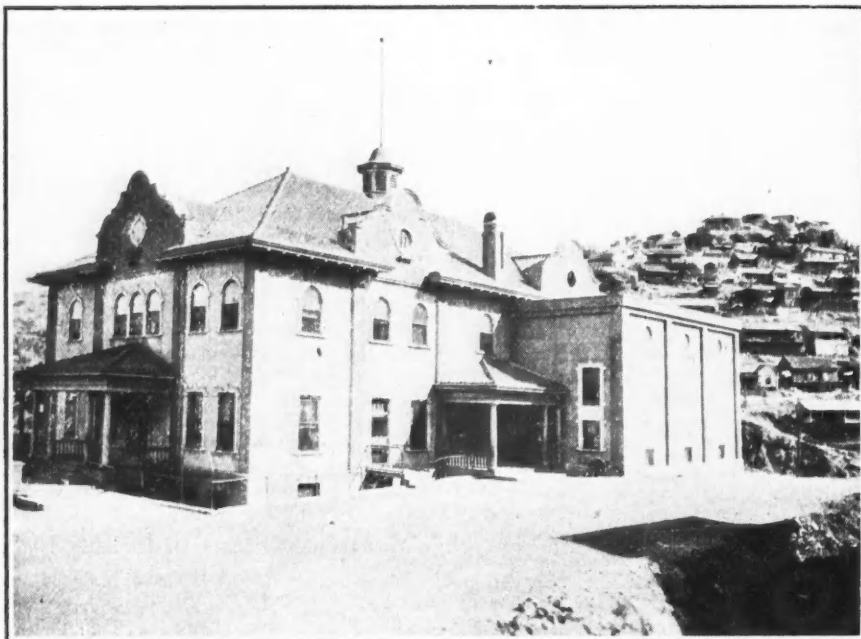
the consolidated efforts should be administered by the Bureau of Mines or by the Bureau of Standards.

### ADVERSE RULING IN CASE OF COPPER COMPANY RAILWAYS

The U. S. Interstate Commerce Commission has ruled adversely in the claim of the Bingham & Garfield Railway Co. for \$1,064,951; the Nevada Northern Railway Co. for \$282,108.01, and the Ray & Gila Valley Railroad Co. for \$160,357.85. These carriers are subsidiaries of copper-mining companies, which contribute the bulk of the traffic on the lines. The claims include the results of certain interplant and intraplant operations during the period of federal control. The commission rules that these operations may not be included properly in the computation of railway operating income, although four of the members of the commission subscribed to a dissenting opinion and the majority members embodied in the decision the statement that the action is taken "with the hope and in the expectation that it will result in an authoritative construction in an appropriate proceeding in court of the term 'deficit' as that term is used in Section 204 of the transportation act of 1920."

The majority view is that the words "deficit in its railway operating income" as used in the transportation act mean an excess of railway operating expenses over railway operating revenues.

The Bingham & Garfield Railroad is 37 miles long and runs between the towns from which it takes its name, connecting with the Western Pacific Railroad. The Nevada Northern is 168 miles in length and runs between Cobre and Ely, Nev., and connects with the Southern Pacific Railroad. The Ray & Gila Valley is 7 miles long and connects Ray and Ray Junction, connecting with the Arizona Eastern Railroad.



*Morenci Club and Library, Morenci, Ariz.*

sequently taken over by the Mining Corporation of Cobalt, which did a certain amount of underground work to confirm diamond-drill results and acquired more property. The principals in the new negotiations have not been disclosed.

Two essentials for development are transportation and power. The property will require a railroad at least 100 miles long, but it is believed that if the owners will guarantee production on a minimum basis, the Provincial and Dominion governments will assist in railway construction.

The Saskatchewan-Manitoba inter-provincial boundary cuts through the center of the ore body. Ample power can be obtained from the Churchill River to the north.

### Dos Amigos Mine, Arizpe, Being Developed

Jones and Wallace have taken up the Dos Amigos claim, adjoining the La Union mine, in the Oso Negro camp, Arizpe district, Sonora, Mexico. Development work is being pushed by John Hughes, of Douglas. This district is well mineralized, and with metallurgical methods now available should prove to be a promising field.

is done in the interest of the mining industry and to build up that industry is a contribution to the public welfare.

Secretary Hoover has been particularly anxious to help the mining industry to help itself. The reorganization, which he has guided, amounts to a rebirth of the Bureau of Mines. Members of his advisory committee predict that it will stand as a permanent monument to his organizing ability.

The detailed work of the reorganization is assuming finished form. All of the subcommittees will have tentative reports to submit at the next meeting, which has been set provisionally for the first week in December. Scott Turner, the new Director, is expected to meet with the committee at that time.

Because of the highly specialized character of the problem as to the ceramic work of the Bureau, Secretary Hoover determined to leave the solution of it to the industries directly concerned. Representatives of these interests assembled in Washington on Nov. 6. They found themselves to be in complete accord in the matter of consolidating ceramics research in one agency, but there was distinct difference of opinion as to whether or not

### Callahan Zinc-Lead Co. Developing Galena Group

The high price of zinc is causing the Callahan Zinc-Lead Co. to give consideration to resuming operations at the Callahan mine, according to announcement by C. W. Newton, manager of the Callahan. If, however, it is decided that conditions warrant resumption, it will not be until early spring, owing to the approach of cold weather, which adds materially to the cost of milling operations.

In the meantime, the company has acquired and is developing the Galena group, consisting of 84 claims and one homestead, having a total area of 1,459 acres, extending from the city limits of Wallace on Placer Creek west almost three miles.

What is known as the Galena vein has been explored by the Galena tunnel and by drifts on shaft levels, an aggregate of 16,911 ft. Of this development work, 3,736 ft. was done by the former owners of the property, leaving 13,175 ft. to the credit of the Callahan Zinc-Lead Co. during the last four years while the Callahan mine has been idle.

### Gila Copper Sulphide Co. Purchased by F. A. Woodward, Et Al.

The property formerly operated by the Gila Copper Sulphide Mining Co., at Christmas, Ariz., has been taken over and reopened by a group of Eastern mining men headed by F. A. Woodward, general manager of the Iron Cap Mineral Products Co., of Copper Hill, Ariz. The property has been operated off and on for the last twenty-five years, and during that time has produced about 1,000,000 tons of ore.

The workings consist of four shafts and about 20,000 ft. of underground development on levels from 100 to 500 ft. deep. The hoist and compressor are electrically operated. There are enough houses at the property to accommodate a population of 500.

The present operators are employing a crew of forty-five men and are mining about 100 tons of ore per day. This ore is being shipped to the Hayden smelter without being concentrated, as there is no mill at the mine. Although the work at the Christmas property is being supervised by Mr. Woodward, the new company has no connection with the Iron Cap Mineral Products Co.

### Lead Mountain Mines Installing Equipment

The Lead Mountain mines, near Barstow, Calif., is installing milling equipment, and it is expected that milling operations will be started soon. The mill is to be equipped with Simpson pneumatic flotation cells and will have a capacity of 150 tons per day. J. T. Anderson, of Los Angeles, is president of the company.

### Cons. Mining & Smelting Co. Options Claims in Rouyn

The Consolidated Mining & Smelting Co., of British Columbia, is reported to have taken options on a large group of claims throughout the Rouyn district. Several executives of the company recently made a trip to Rouyn, following which an option was taken on the Wrigetts group, consisting of forty-two claims in Boischatel Township.

Diamond drilling is proceeding on the Waite discovery, and though no official information has yet been given out, results are believed to be encouraging.

### Portland Port Wants Drier Zinc Concentrate for Belgium

G. B. Hegardt, chief engineer of the public docks, Portland, Ore., was guest of the Mining Bureau of the Spokane Chamber of Commerce on Oct. 26, and explained that he was en route to the Cœur d'Alenes to see if it is possible for the mining companies to ship drier zinc concentrate to Belgium. The concentrate is shipped through the port of Portland via the Panama Canal, and Mr. Hegardt explained that in spite of the 45 deg. at which the cars are tipped the concentrate sticks to the side of the cars and adds to the cost of han-

dling, which exceeds the 50c. charge which the port makes.

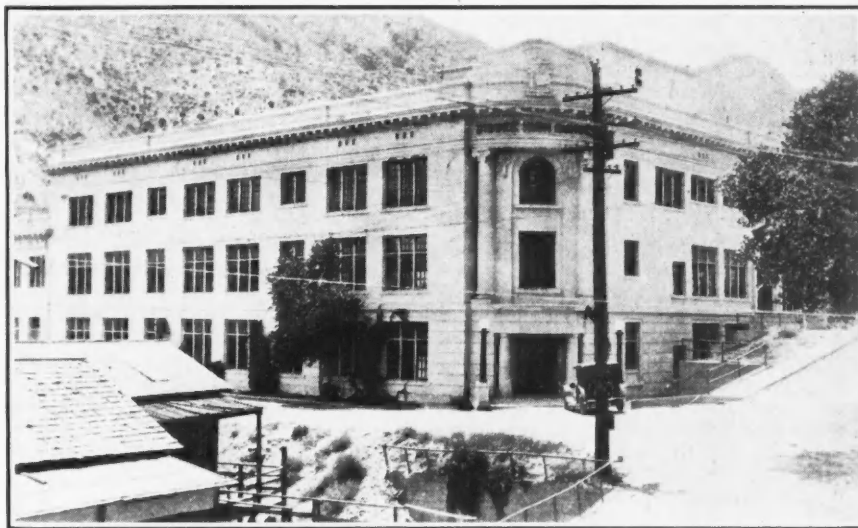
Frank M. Smith, chairman of the Spokane Mining Bureau and smelter director of the Bunker Hill company, stated that "Flotation has introduced new troubles to smelters, railroads, and terminals, for ordinarily the water in the concentrate averages 20 per cent. We have reduced the water content in the Star concentrate to about 14 per cent, but it should be much less."

"The port of Portland," said Mr. Hegardt, "is now handling 100,000 tons of zinc concentrate a year en route to Belgium, and expects this tonnage to increase to 150,000 tons a year."

### Increased Production at Tom Reed Property

The leasors on the Tom Reed property, at Oatman, Ariz., are fast recovering from the effects of the fire which destroyed the surface buildings and shaft at the Aztec mine recently. Work on an aerial tramway between the mine and mill is being rushed in order to eliminate the truck haulage as soon as possible.

The mill is now handling 100 tons of ore a day from the Tom Reed leases alone, and will be called upon to take an additional 25 tons per day as soon as production begins at the United



High School Building, Bisbee, Ariz.

### Activity at Canyon City, Ore.

The Miller Mountain Mining Co., owning a mining property on Miller Mountain, five miles south of Canyon City, Ore., has spent \$25,000 during the last year in exploration and development. An ore stope 150 ft. long has been developed by a 350-ft. tunnel and two raises aggregating 192 ft. in length. The vein is quartz carrying gold. A ten-stamp mill has been completed and was placed in operation on Oct. 20.

### Quarterly Production of Mining Corporation 545,000 Oz. Silver

It is reported that during the quarter ended Sept. 30, the Mining Corporation of Canada, from its Cobalt and South Lorrain properties, had a total production of 545,000 oz. of silver. Several new high-grade discoveries have been made, and an interesting feature of the company's position is the fact that substantial quantities of new ore are being discovered on the old Cobalt properties. During the same period the Lorrain Trout Lake, which is operated by the Mining corporation, produced 95,000 oz. The mill ore sent to Cobalt averaged 22 oz. a ton.

The new shaft has been completed to a depth of 350 ft., and what appears to be the Woods vein has been encountered, which shows a substantial width, with low silver values.

American. This mine is about ready to start stoping the section of the high-grade Aztec vein orebody which lies on the east side of the Aztec-United American property line. With mill construction work at the Gold Dust and Oatman United properties nearly completed, it is expected that both these mines will soon start operations on a larger scale.

### Additional Power to Be Developed on Michipicoten River

A supply of power for the development of the Michipicoten and Goudreau gold fields of northern Ontario has been assured by the purchase by the Insull interests of Chicago of the Michipicoten Falls power plant from the Algoma Power Co. J. A. McPhail the representative of the purchasers, announces that their plans involve an increase of the present development of 2,000 hp. to 25,000 hp., in order to supply the electricity needed to develop the Michipicoten mining area 6 miles distant and the Goudreau gold field, distant 25 miles from the falls. A new power house will be built at Michipicoten Falls, where the present head of 128 ft. will be raised to 160 ft. and various control dams will be constructed along the headwaters of the Michipicoten River, the most important storage basin being Manitowick Lake. The projected developments involve an ultimate outlay of \$4,000,000.

## Johannesburg Letter

By John Watson  
Special Correspondent

### Gold Production Increases—Prospecting Permits Issued in Excess of Previous Year; Platinum Possibilities Encouraging

Johannesburg, Oct. 6—The Department of Mines abstract for August, just issued, shows that the mineral production of the Union totaled in value £4,581,968. For the first eight months of the last two years, the total value of minerals produced was as shown in the accompanying table:

	1925	1924
Gold (at standard price) .....	£27,218,792	£26,878,898
Silver .....	116,438	136,912
Osmiridium .....	91,885	50,860
Diamonds .....	5,303,690	5,347,991
Coal .....	2,593,655	2,520,296
Copper .....	355,022	330,953
Tin .....	186,277	182,031
Other minerals ..	186,912	197,062

There has been an increase in the number of prospecting permits and claims held in recent months. Prospecting permits at the end of August totaled 2,567, compared with 1,856 at the end of June and 807 at the end of last year. The increase has been fairly evenly spread over all the Mining Commissioners' districts; in the last two months the Johannesburg figures have risen from 488 to 580; Barberton from 200 to 256, Pilgrims' Rest from 441 to 640, and Pietersburg from 644 to 960. The total claims held at the end of August was 165,133, against 112,335 at the end of 1924. Nearly all of this increase has been in the Pietersburg district (from 24,882, Dec. 31, 1924, to 65,353 at the end of August, 1925). The whole of this increase has been confined to base-metal claims.

The annual report of Sir Robert Katze, the Government Mining Engineer, has recently been published. Referring to platinum prospects, the report says: "The great range of the Lydenburg rocks and the high platinum contents make this discovery as remarkable as that in the Waterburg district; but their magnitude and importance greatly transcend it. These should make the Transvaal, at no distant date, a large producer of platinum. The Transvaal is already the largest producer in the world of the allied metal iridium, which is won as osmiridium from blanket concentration by the Rand gold mines. It would appear that, in the near future, platinum may be expected to rank about fourth in the Union's list of mineral exports, coming next in importance after gold, diamonds and coal."

Of late years there has been an increasing tendency to tax the gold mines and for Union legislators to interfere with the practical working of the mining regulations and rates of wages. The Chamber of Mines recently issued an invitation to members of the Senate and of the Legislative Assembly to come and see for themselves how the operations of the gold mining industry are being conducted. As a result numerous members of both houses of Parliament spent three days

in September at Johannesburg and along the reef, as guests of the Chamber of Mines. Most of the visitors arrived on the evening of the 15th and were met by the president of the Chamber, P. M. Anderson, and the general manager, W. Gemmill, of the Chamber, Sir William Dalrymple, Sir Ernest Oppenheimer and other prominent mining men. An informal dinner was held at the Carlton Hotel, no public speeches being made. Next morning, six parties were taken by motor to six different mines, where the legislators signed the accident indemnity book, donned overalls, with oilskin hats, and were lowered to the workings underground. The six mines visited were: New Modder, Government Areas, Crown Mines, City Deep, Randfontein, and East Rand Proprietary.

During the last week there has been marked activity on the Johannesburg Stock Exchange, chiefly in platinum and diamond shares; but, also, to a large extent, in dividend-paying gold shares.

### Buckeye and Mohave Mines Reopened—Underground Drifts at Butte Total 2,700 Miles

J. E. Sheldon, J. A. Kuusinen, and their associates have started operations on the Buckeye property, about two miles east of Sheridan, Madison County, Mont. The ore is in a quartz vein about seven feet wide, and sulphides are encountered close to the surface. The main tunnel will be driven north on the vein, and the zinc-lead-silver ore will be shipped to the Timber Butte Milling Co., at Butte. The operators have given a contract to the Butte Machinery Co. to furnish an electrically driven compressor and other mining equipment.

The Mohave Mining Co., headed by J. V. Priest, is reopening the Bielenberg & Higgins property, at Bear Gulch, near Twin Bridges, Madison County, Mont.

The *Anaconda Standard* states that Butte is a city with 195 miles of streets on the surface and 2,700 miles underground. It says further that of the 400,000 incandescent lamps burned in the city over 25 per cent are burned underground.

### Mohawk Increases Production

Mohawk, in the Michigan copper district, will show a considerable increase in refined production in November, daily rock shipments having increased from an average of 2,300 tons to 2,500. The capacity of the Mohawk stamp mill is 2,640 tons daily, and it is expected this soon will be reached. Mohawk's underground force has recently increased in numbers.

At Calumet & Hecla Consolidated, Nos. 2 and 4 shafts, Calumet conglomerate branch, remain closed on account of the presence of gas, which still lingers in the openings as the result of the fire in No. 4. Nothing has been lost through the closing of these units, however, as the men have been transferred to the recently opened Nos. 14 and 15 shafts on the Osceola amygdaloid lode.

### General Asbestos Co. Files Petition to Appeal Adverse Decision

Samuel W. Cohen and the General Asbestos Co. have filed an appeal for reversal of Chief Justice Martin's refusal to issue an interlocutory injunction to hold up the organization of a merger in the asbestos industry. The petition, presented by counsel for Cohen and the General Asbestos Co., sets forth numerous reasons why permission to appeal should be granted, following, along general lines, the pleadings in the court below. Justice Letourneau took the petition under advisement.

The application for an injunction was refused by Chief Justice Martin on several grounds. It was shown, according to the Court, that Cohen had acquiesced in dealings contrary to the terms of the contract which he invoked. The Court also stated that the petitioners' remedy, if any, was in damages, and that they were not entitled to an injunction under the circumstances. The whole matter will again be threshed out in appeal, however, if Justice Letourneau grants the petition presented.

### Zinc-Lead Ores, San Fernando Mine, to Be Developed

Murray N. Colman, consulting metallurgist of San Francisco, is at the San Fernando mine making preliminary investigations for reduction plant recommendations. This property is two days by trail southwest of Oaxaca and is managed by Gus Scogland. The property has been operated by various people, and attempts have been made to smelt the ores in the past, but they being zinc-lead the efforts were not successful; however, it is now believed that their treatment has been solved, and steps are being taken to install a plant for their reduction. Water and hydro-electric power are available.

The property is owned by private individuals who have held it for a number of years and have done extensive development. A. P. Ennis, manager of a sugar company in Cuba, is the representative of the owners, while the exploiting syndicate is headed by W. H. Catlin, of the Electric Share & Bond Co., of New York. W. B. Stephens is resident representative in Oaxaca. The operators have recently added a large area to the holdings of the mine by denouncement.

### Sylvanite Mine Plans 200-Ton Mill

The Sylvanite Mining Co., of Kirkland Lake, northern Ontario, is planning the erection of a mill which will probably have a capacity of 200 tons daily. Development has been carried to a depth of 1,300 ft., opening up a number of oreshoots, the most important of which is now being drifted on at the 1,000 level.

The mine is owned largely by a group of Buffalo capitalists, and the expenditure in securing control and carrying development up to the present stage has been approximately \$1,350,000.

## London Letter

By W. A. Doman  
*Special Correspondent*

### Low-Grade African Platinum Deposits Do Not Warrant Ruling Stock Prices

London, Oct. 27.—A mining engineer just returned from a tour of the southern half of the African continent has been expressing to me his views on the prospects of its metalliferous mines. Speaking of platinum, he says that the metal is there all right, and in due course may be profitably extracted, but he advises that it would be foolish to buy shares in even the best companies at their ruling prices. Despite what has been said of successful treatment tests, extraction has not yet been tried on any large scale, and costs will play an important part. Platinum is found in many districts, but the proportion of low-grade ore is high. The share market has got ahead of actual work on the claims, and the time for the speculative investor is not yet.

Of copper in Rhodesia there seems to be an almost unlimited amount. The ore varies greatly in value, and much capital is being expended in various parts of the country. At present, however, work is mainly of a development character, and some time must elapse before any substantial addition is made to the copper supply of the world. My informant was impressed with the sound type of mining engineer and mine manager running the various undertakings. They are all keen on their jobs, and apparently are not likely to waste capital. The Bwana M'Kubwa is one of the most important companies, though much work has yet to be done before the producing stage is reached.

My informant was impressed most by the Rhodesia Broken Hill deposits. Originally started as a lead mine, it is, he says, more on its zinc content that it will make its name. This runs as high as 30 per cent, and one can walk over it for miles. It is remarkably pure, and the great Mulungushi water scheme, recently initiated by the Prince of Wales, will enable operations to be conducted on a large and economical scale. He does not expect dividends for two years or more; then they should be bumper. The general public, he states, does not realize the importance of this vast deposit. Railway freights are high, and he hopes to see them reduced, though he recognizes that the railway companies have to earn interest on their capital.

Greater attention is probably being paid to Rhodesian minerals than to any others at present. A new company is being formed with a capital of £200,000 in 5s. shares, of which £65,000 will be cash working capital. It will take over a concession of some 13,000 square miles in Northern Rhodesia, formerly held by the Consolidated Gold Fields and the Rhodesia Broken Hill Co.

Although the directors of the Russo-Asiatic Consolidated hope to have their properties returned by the Soviet some

day, there does not seem to be any change in the position. Leslie Urquhart is now paying a visit to the company's Villemagne interests in the south of France, and will report within about a month. The aerial ropeway and the mill will, it is expected, be nished early in the new year, when production will begin.

The East Rand-Cinderella negotiations bid fair to reach a successful conclusion. One East Rand Proprietary share will be exchanged for three Cinderellas, and for every £100 of Cinderella's debentures holders will receive £50 of East Rand debentures.

W. R. Feltmann is leaving on Saturday for South West Africa to take over the management of the South West Africa Company.

### Iron-Ore Deposits of Oaxaca Being Investigated

Local engineers have gone into the Sierra Culebron section of the Mixteca, Mexico, about three days' ride west of Oaxaca, to survey a tract of iron-ore lands recently denounced by the Monterey Iron & Steel Co. The area of the denouncement is not known, but one of the surveyors stated he expects to be engaged three or four weeks on the survey. A branch of the Mexican Railway from San Marcos may be extended to tap this new iron field. As the iron deposits are practically continuous to the Pacific coast, conditions appear favorable for the extension of the line to one of the numerous ports there.

These coal and iron deposits were the subject of exhaustive examinations made some years ago by John Birkenbine, of Philadelphia.

### Compañía Explotadora Makes Shipment of Silver From Experimental Plant

Dr. W. E. McCarty, of Tulsa, Okla., president of the Compañía Explotadora de Minas de Mexico, la Majestic, has returned from a visit to the properties at Totolapam, bringing with him a 35-kg. bar of silver, the product of the first run of the experimental mill. This company took over the La Leona mine and has sunk a 600-ft. shaft, and crosscut under the old workings, which were inaccessible. All of the known veins have been found at that depth, with the values holding up to the standard which gave the La Leona its reputation in early days. The company is financed by Tulsa and Kansas City oil men.

### Swiss Iron Mines Ship Ore to Germany

The Gonzen iron mines, in Switzerland—the only iron mine in that country—produced in 1924 a total of 61,498 tons of ore. In view of the low water level of the Rhine, shipments have been much curtailed, thus necessitating a considerable reduction in the mining operations. The plan of working up the ore in the country has been abandoned for the present. Thus far the entire production has been shipped to Germany.

## Melbourne Letter

By Peter G. Tait  
*Special Correspondent*

### Sydney Basin May Contain Oil- Bearing Structures—Tests to Be Made

Melbourne, Oct. 5.—The Hunter River Oil Co. during the last three years has expended £3,000 in geological investigation work on a portion of the Maitland coal areas. Dr. Wade, on behalf of the Commonwealth Government, inspected the areas, and in a summary of his report he states that the upper marine and lower marine series of the Permian-carboniferous system of the Sydney basin contain the most likely strata for the production of oil or natural gas. He regards the Hunter River district, on the northern and northwestern margin of the basin, as containing the best geological structures, wherein it may be possible to find oil.

Dr. Wade states that apart from the faulted nature of the country the carbon ratios in the coal measures are, for the most part, too high for the occurrence of petroleum in commercial quantities in any part of the basin. He recommends that the Belford dome should be tested for gas by drilling to at least 3,000 ft. Both the Lochinvar and the Belford domes should receive careful consideration, as they exhibited the most suitable structural features he had so far seen in his investigations in Australia.

The Hunter River Oil Co. is planning to form a new company to sink a bore on the Belford dome, which comprises 7,000 acres on the western part of the present company's holdings. The new company will have a capital of £750,000 in £1 shares, of which 150,000 shares will be offered for public subscription and 250,000 paid-up shares will be issued to the vendors.

C. Martin, general manager of the Hunter River Oil Co., says that the Commonwealth Government has offered to subsidize the work of boring on the dome to the extent of £22,500 on the £1 for £1 basis. He also states that exemption from labor covenants until the end of the year has been obtained, and further consideration regarding exemption would then be given if desired.

### Encouraging Developments at Tough-Oakes Burnside

Developments at the Tough-Oakes Burnside (Ontario) have been very encouraging and the company is now making substantial profits. A new orebody has been cut on the 1,025 level east of the diabase dike, which is the first discovery of importance made in this section of the property.

The shaft is now being raised from the winze level at 1,100 ft. to the 1,025 level, and during the progress of this work about 60 per cent of the ore going to the mill is from surface dumps, which will probably lower the average grade.

## Situation at the Mines

By Albert H. Fay  
Assistant Editor

**T**HE continued good prices for lead, zinc, and silver, and an increasing market for iron and steel, are stimulating the mining industry to an extent not felt for several years. Reports from many districts indicate that the production for the first nine months of this year is in excess of the total production in 1924.

Average Metal Prices, May-October, 1925  
In Cents

Period	Copper	Lead	Zinc	Silver
May .....	13.347	7.985	6.951	67.580
June .....	13.399	8.321	6.999	69.106
July .....	13.946	8.151	7.206	69.442
August .....	14.490	9.192	7.576	70.240
September .....	14.376	9.508	7.753	71.570
October .....	14.300	9.513	8.282	71.106

**Copper**—While the price of copper declined slightly during the month, mining operations continue on about the normal level. Litigation in the case of the Iron Cap company vs. Arizona Commercial company regarding title to claims has closed, and at the same time the Arizona Commercial company filed suit for \$6,000,000 against the International Smelter for recovery of ores shipped by the Iron Cap company. The merger of the Nevada Consolidated and Ray Consolidated, including Chino, is still pending. The Shattuck-Denn Mining Corporation filed articles of incorporation to begin operations in the old Denn property, which has been idle for a number of years. The Consolidated Mining & Smelting Co. started the new blast furnace, turning out twenty-five tons of blister copper per day. The Tidewater Copper Co. of British Columbia was sold recently at auction.

Granby Consolidated M. S. & P. Co.; the Consolidated M. & S. Co. of Canada; and the Britannia M. & S. Co. are operating their respective plants at capacity. The Allenby Copper Corporation, a subsidiary of the Granby company, is milling only 1,000 tons per day. Noranda smelter site, Quebec, has been chosen and plans to finance the plant have been initiated. At Rio Tinto, Spain, the mines are prosperous, paying a dividend of 15 per cent.

Refined copper production in the Michigan district in October was 9,910,000 lb., of which Calumet & Hecla produced 8,260,000 lb.

**Lead**—Lead mining continues to be on the upward grade, and a number of new installations have been reported. A 250-ton flotation plant is planned for treatment of the complex ores of Leadville. Incomplete but comparative computations by the traffic department of the Denver & Rio Grande Western Railroad as of the date of Sept. 30 reveal that that road in the first nine months of the present year hauled to the smelters of the American Smelting & Refining Co. at Leadville approximately 40 per cent more ore than was hauled during the same period a year ago. By reason of alleged mismanagement, the minority stockholders have applied for a receivership for the Annapolis Lead Co., Annapolis, Mo. The Utah mines have to date distributed larger dividends this year than in 1924, Parke City paying 70 per cent of its net earnings as dividends, while many others are paying 50 per cent of the net earnings. The Rex Consolidated Mining Co., of Wallace, Idaho, has filed a petition in bankruptcy. A flotation plant has been installed at Berkeley, Calif., to treat lead-zinc-silver ores on a custom basis. Federal Mining & Smelting Co. has reopened the Old Page mine near Kellogg, Idaho.

**Silver**—The continued high price of silver and the good market for lead and zinc have stimulated the silver-mining industry. Mexico has suspended the coinage of silver temporarily. Apex litigation between the Mid-West Butte and the Butte-West Side is retarding the operation of these two properties. The Hawthorne Mines Co. is constructing a 200-ton flotation plant at the Lucky Boy mine, in Nevada. Many companies in Ontario are enlarging their mills.

The action of Poland in restoring silver as the basis of its monetary system has been the greatest stabilizing influence of recent months. Peru, Guatemala and other South American countries are following suit and are purchasing silver in the United States.

**Gold**—Gold mining continues active, with a number of

new plants being installed. The La Rose-O'Brien boundary litigation in Ontario was closed by settlement out of court. Hollinger Consolidated, in Ontario, is installing a 10,000-cu.ft. air compressor. Old mines that had been considered as worked out are being rejuvenated in the Transvaal, South Africa. Alaska Juneau milled 291,000 tons of ore in September, showing an operating profit of 20.79c. per ton. The North Star Mine, at Grass Valley, Calif., discovered a good vein of ore in the new shaft now being sunk.

**Zinc**—The continued high price of zinc due to the foreign demand has resulted in the opening of new zinc deposits and a continued rejuvenation of many old mines. A shipment of 500 tons of zinc concentrates was made from Wrigley's mine, at Santa Catalina Island, Calif., to the Selby smelter. Plans for 100-ton plant for concentrating zinc ores at Hachita, Mexico, are under way. The Tri-State 350-ton mill at Cardin, Okla. is nearing completion. The Zinc Ore Producers' Association in the Joplin-Miami district is considering ways and means to get a better co-operation of zinc smelters to continue advertising campaigns to stimulate the use of zinc.

**Iron**—Lake shipments to the close of Sept. 30 amounted to 42,812,085 tons, compared to 34,961,635 for the same period in 1924. Prospects as found in a mid-October survey point to an active winter on the iron ranges, with preparations for a brisk season in 1926, expected to be even more profitable than the season now drawing to a close.

The ore-shipping season will extend well into November this year, regardless of weather. There is much ore to go forward yet, and range railroads have prepared to use their ore-steaming plants, a sign that shipping will be continued freely until well into the winter. It is believed that October shipments will exceed those of September. This is unusual, but increased demands on the Lake Superior iron mines were made early in October.

Consumption of iron ore by furnaces normally supplied by Lake Superior mines is greatly in excess of a year ago, and stocks of ore on hand on Lake Erie docks and in furnace yards are more than 500,000 tons less than a year ago, despite increased shipments this season. Iron-ore production from the state lands of Minnesota to the close of September surpasses the total for the entire year of 1924.

The Cleveland-Cliffs Iron Co. is planning the construction of a new crushing plant for the Maas mine, at Negaunee, Mich. The European iron and steel industry is about 65 per cent normal, but the trend is upward.

**Labor**—The labor situation, while not serious, is assuming the status of an unequal distribution. There has been a steady improvement in labor conditions in the Michigan copper district by reason of a return of a large number of former employees from the automotive and other industrial fields. Also, a few men are returning to the mines from the agricultural districts. The shortage of labor in the Michigan copper district as well as many other copper mining districts is being partly relieved by the installation of mechanical equipment. At the iron mines in Minnesota, where iron mining has developed into a seasonal occupation, there is a surplus of labor during the winter, and measures have been taken to meet the situation by organizing a committee to make a study of the problem. In Colorado the increased activity in lead, zinc and silver mining has brought about a condition whereby there is an actual shortage of skilled miners. Cripple Creek and Leadville both have sought the assistance of the mining association in an effort to obtain the services of men to carry on the mining work in those regions. Cripple Creek asked for seventy-five men while Leadville sought one hundred. The long period of inactivity of many of the Colorado mines has resulted in miners leaving the camps during the last ten years for other localities. In Australia the labor situation has become more serious in that a strike at the Mount Morgan mines has resulted in the mines closing down indefinitely. In Mexico, at the Cinco Minas, Guadalajara, there is serious consideration of closing the mines by reason of the increasing demands of miners, involving about 1,000 men. The labor shortage continues in Brazil, due to high wages paid in the coffee and rubber plantations.

## Societies, Addresses, and Reports

### Easier Conditions for Gold Producers Sought California Mining Conference at Sacramento Recommends Exemption From Federal Income Tax and Assistance in Building Debris Dams—Revision of Hampering Laws Asked

By George J. Young  
Associate Editor

AT Sacramento, Calif., on Nov. 2, a mining conference was held under the auspices of the California Development Association, which is seeking to find out and remedy adverse conditions in the mining industry of California. The meeting restricted itself to the consideration of certain resolutions which had been adopted by previous meetings held at Grass Valley, Redding, and Stockton. Secretary Callbreath of the American Mining Congress attended. Charles W. Merrill presided and was assisted by Charles S. Knight, of the Development Association. A number of mining men, a few government officials, and several state officials were present.

As in previous meetings, there were flashes of feeling. The resolution asking for the removal of federal income tax on gold bullion was altered when Mr. Callbreath pointed out that there was no federal tax on gold bullion. After resubmission to a subcommittee, the resolution finally adopted provided for the petitioning of the proper federal authorities to incorporate in the proposed new federal income tax a clause exempting gold mines from any tax provision. In addition, a resolution was passed endorsing the efforts of the American Mining Congress to eliminate from the federal income tax the capital stock tax and the stamp tax on stock certificates.

#### AID IN BUILDING DÉBRIS DAMS ASKED

A resolution asking for government assistance for the construction of hydraulic mining debris dams under the provisions of the Caminetti act was passed after considerable discussion. Major C. S. Ridley, member and secretary of the U. S. Débris Commission, stated that the commission was now interested in an investigation of the practicability of the resumption of hydraulic mining on a large scale because the members of the commission felt that there was a demand for such an investigation and because there was a large amount of gold in the gravel deposits of the state. Conditions have changed since thirty years ago and the Sacramento River is now able to handle the debris that comes to it. Another important phase of the problem is the relation of dam construction to irrigation and power development. The commission has gone about the selection of suitable dam sites with due consideration of the needs of both power and irrigation interests and has already decided upon the American, Bear, and Yuba rivers as of greatest importance.

The field work on the Bear River has already been initiated, and the investigations have been practically completed. A start has been made upon the other streams mentioned. A broad consideration of the question, including power development with debris storage, may be the solution of the hydraulic mining problem, as the question is largely an economic one.

J. B. Stewart, a hydraulic miner, stated that he was interested in the resumption of hydraulic mining, as he had available for mining about 90,000,000 cu.yd. of gravel. The interests which he represents are willing to build a dam, if a suitable site can be found, provided the government will pay for the storage of the products of natural erosion, which will be held back by the dam. "That is all," he said, "that we want the government to do."

#### NO BOND WANTED FOR PROSPECTORS

A resolution calling upon the California Development Association to take steps to secure the removal of the bond required of prospectors entering upon lands taken up under the stock grazing act was passed. The resolution pointing out the need for copper refineries and copper fabricating plants in California was likewise passed after it was shown that progress had already been made in establishing fabricating plants in the Pacific region.

The resolution endorsing the method of rehabilitating gold mines by community subscriptions as well as by outside capital also was adopted. F. W. Nobs, of the Empire mine of Grass Valley, in speaking to this resolution, instanced the case where a group of Nevada City business men obligated themselves to pay \$20 per month each until \$120 had been contributed by each man. A small property was bought in the Nevada City district and preliminary work started. The mine was then transferred to a company. In this way the old New England mine was reopened and ore found. Development work is now in progress. The effect of this effort was to raise the hope that gold mining would again be resumed in this district, so long neglected. Nobs stated that wherever such a plan had been carried out outsiders were attracted. Apparently the initial spark to kindle interest can be created by local interest in the mines. A similar plan has been successfully initiated in Placer County, and as a result one mine is in operation and another, the Pacific mine, is about to be reopened.

The California corporate securities law and its administration has been a target for mining men who feel that it has seriously hampered small mining operations. The resolution asking for a revision of this law by the next legislature was endorsed. Another resolution, asking for an investigation of the administration of the industrial accident compensation law, was sponsored by many, who have felt that the cost of industrial compensation insurance in the case of operating mines is excessive. However, opposing views caused the chairman to defer the resolution until further information about the status of the law could be obtained. G. McM. Ross pointed out that the increase in the number of mine accidents is due to the low efficiency of labor. J. B. Stewart brought out the point that state industrial insurance does not insure employees against lawsuits by injured workmen.

A resolution suggesting that as a means of securing more efficient labor in California mines modifications be made in the present immigration restrictions was deferred. The resolution calling for the strict enforcement of the California high-grading law was passed. A resolution for the promotion of greater development of non-metallic mineral deposits through finding and creating new markets and the bringing of new industries into the state that would utilize these minerals in manufacturing was also passed. Charles S. Knight stated on behalf of the California Development Association that particular efforts were being made to bring producers and buyers of non-metallic minerals together and that the association hoped to be able to create new business in these minerals to the extent of \$5,000,000 per annum.

A resolution calling for a more equitable method of taxing mines was discussed at length. It was considered impracticable to change the present method of county taxation, as it would be necessary to secure a state constitutional amendment before anything could be done. A committee to study the whole subject was suggested. A resolution asking for the repeal of the California foreign corporation tax was passed, as it was shown that capital is chary about investing in a state which attempts to levy a tax upon the capitalization of a foreign corporation operating mines in the state. The resolution calling for the maintenance of highways and roads in mining districts by the state highway commission was likewise passed.

The relation of the California State Mining Bureau to the mining industry was discussed at length. A resolution calling upon the mining bureau to prepare a bill to establish a state department of mines and mining as well as to prepare a report upon mineral surveys that are needed at present and the cost of making such surveys was passed. This throws upon the mining bureau the necessity of preparing a program involving its own activities. The support of the association will be given no doubt after such a program has been discussed and adopted.

### Tuolumne Society Hears Fletcher Hamilton

Fletcher Hamilton, formerly State Mineralogist of California, addressed the members of the Tuolumne Mining Society at Sonora, Calif., recently. He took for his subject his recommendations made at the time of the hearing made by the Senate Commission into the problems confronting the mining man of today.

After Mr. Hamilton's talk a general discussion was entered into by all present, and many questions pertaining to the condition in Tuolumne County were taken up and suggestions given by Mr. Hamilton.

C. E. Shafer presided at the meeting. W. J. Woolsey, secretary, announced that many mining properties had been listed and that information had been supplied by him to a large number of mining men in other states and districts.

### Bureau Comments on Cold Water Thawing Near Nome

Word from Alaska as to the success of thawing operations near Nome has important significance, it is pointed out at the Bureau of Mines. Great difficulties were overcome to get three 9-ft. dredges into the region. Since that time their operation has been limited greatly because of the thawing problem. Steam, which was tried first, was abandoned for cold-water thawing. The presence of large boulders and cemented gravel have made it very difficult to get the points down to bed-rock, which occurs at depths varying from 40 to 60 ft.

### North of England Institute Meets at Newcastle

A general meeting of the members of the North of England Institute of Mining and Mechanical Engineers was held in the Neville Hall, Newcastle-on-Tyne, on Oct. 24, when A. M. Hedley was elected president in succession to Philip Kirkup.

In taking the chair, Mr. Hedley thanked the members for the honor they had accorded him. He then delivered his inaugural address, in the course of which he pointed out that, when the Institute was founded in 1852, it was stated that its objects were to render mining safer and generally to improve the methods used. That these two points had been kept in the forefront from the very first and that much had been accomplished was known to all, and it should be a source of gratification that the Institute had invariably taken a prominent lead in matters which were primarily responsible for safety and efficiency in mining.

Mr. Hedley also referred to the continued progress made by the associates and students' section of the Institute. As a body, they were most enthusiastic and that they justified their existence was evidenced by the papers contributed by them and the excellent program of visits to collieries and works in the district which had been arranged.

### State Geologists Meet

The annual fall field meeting of the Association of American State Geologists was held recently in eastern Pennsylvania, the Pennsylvania Geological Survey acting as host. Four days were spent in the vicinity of Harrisburg, Hummelstown, Cornwall, Port Clinton, Pottsville, Mahanoy, Hazeltown, Mauch Chunk, Lehigh Gap, Slatedale, North Hampton, and Nazareth in observing the excellent exposures of the stratigraphy and structure and the remarkable penepain remnants, and in reviewing the mineral resources of that part of the state, including the southern anthracite field, the slate area, brownstone quarries, cement plants, and the Cornwall magnetite mine. Evenings were devoted to discussions of matters pertaining to State Survey policies and activities and to discussions of the geological problems of the areas covered.

The state geologists were accompanied by a number of guests, including Dr. W. C. Mendenhall, Chief; Messrs. E. O. Ulrich, Charles H. Butts, G. W. Stose, and Miss Jonas, all of the U. S. Geological Survey; Dr. David White, chairman of the division of geology and geography, and Dr. Albert L. Barrows, chairman of the division of states relations, National Research Council; Prof. W. H. Bucher, of the University of Cincinnati, Prof. B. L. Miller, of Lehigh University, Judge James R. MacFarlane of the Court of Common Pleas, Pittsburgh, and members of the Pennsylvania Geological Survey.

The following state geologists represented their respective surveys: George H. Ashley, Herman Gunter, H. B. Kummel, M. M. Leighton, Raymond Moore, Wilbur A. Nelson (since resigned), and David Reger (representing I. C. White). The meeting closed at Bethlehem, Pa., with a dinner at the Hotel Bethlehem, at which President Richards of Lehigh University and a number of the faculty were present.

### Joint Safety Conference Next Week

A safety conference will be held in the Engineering Societies Building, 29 West 39th St., New York, under the joint auspices of the A.S.S.E.-Engineering Section of the National Safety Council, the American Society of Mechanical Engineers, the American Institute of Electrical Engineers, the American Society of Civil Engineers, and the A.I.M.E.

### California Producers Elect Officers

The California Metal and Mineral Producers' Association has elected the following new directors: George W. Starr, E. C. Hutchinson, and H. V. Maxfield. W. P. Henry was also elected to fill the unexpired term of O. J. Egleston, who resigned when he went to Nome. The following officers were elected: P. C. Knapp, president; E. C. Hutchinson, first vice-president; A. B. Foote, second vice-president; George W. Starr, third vice-president; Robert I. Kerr, secretary-treasurer, and W. E. Colby, attorney.

### Zinc Institute to Speed Up Metal Statistics

The meeting of the directors of the American Zinc Institute which was preceded by a meeting of the committee of six appointed at the 1925 annual meeting of the Institute to compose existing differences between zinc miners and smelters was well attended. This committee advised the board that it had increased its number to ten and felt encouraged with what had been done.

It was voted to release slab zinc statistics by night letter each month, to be followed by a mailed summary. Authority was given for prompt completion of the zinc handbook and the preparation and publication of a treatise on zinc. The Institute plans to exhibit products of the industry at the Sesquicentennial at Philadelphia, 1926.

St. Louis has been decided upon as the place for holding the 1926 annual meeting, on April 19 and 20. A. J. McKay, president of Matthiessen & Hegeler Zinc Co., was elected a director, succeeding Mr. Heller, who resigned.

### Seattle Mining Club Delegates

Trustees of the Seattle Mining Club have announced the election of Maurice D. Leehey, W. C. Shaw, Falcon Joslin and Milnor Roberts, dean of the School of Mines at the University of Washington, as delegates to the thirtieth annual convention of the Northwest Mining Association, to be held at Spokane, Nov. 30 to Dec. 5. An exhibit of ores and minerals from the western states, British Columbia and Alaska will be displayed at the convention.

### Arranging Geological Congress at Madrid, Spain

The fourteenth International Geological Congress will be held in Madrid, Spain, in May and June of 1926. This congress is expected to be of really exceptional importance, as it will be visited by eminent geologists, geographers, and engineers.

Among the questions which, it is expected, will be discussed during the congress are the following:

- "The World's Resources of Phosphates and Pyrites."
- "Geology of the Mediterranean."
- "Cambrian and Silurian Fauna."
- "Geology of Africa and Its Relation to That of Europe."
- "Vertebrates of the Tertiary."
- "Hercinian Folds."
- "Foraminifera of the Tertiary."
- "Modern Theories on Metallogeny."
- "Vulcanism."
- "Geophysical Studies."

Excursions will be arranged to Seville, Cordova, Algeciras, Ronda, northern Morocco, Granada, Almeria, Linares, Huelva, Burgos, Bilbao, Asturias, Catalonia, Toledo, Escorial, and to the Balearic and Canary Islands, where the most interesting districts from a geological, mining and industrial point of view will be visited.

Those who wish to take part in this congress or to receive particulars about it have been requested to write to the Secretary of the Organizing Committee, Instituto Geológico, Plaza de los Mostenses, Madrid, Spain.



## Men You Should Know About

**W. L. Honnold and Seeley W. Mudd** have returned to Los Angeles from New York.

**Lloyd T. Emory** has returned to New York after making a short professional trip to Prescott, Ariz.

**P. R. Bradley** has returned to San Francisco from Alaska, where he has been for the last few months.

**Ben Stanley Revelt** has returned to San Francisco from Denver, where he has been for the last six months.

**James Hopkins**, consulting mining engineer, has removed his offices from the Foster Building, Denver, Colo., to 950 Clarkson St., that city.

**Courtenay De Kalb**, director of the department of mining engineering at the University of Alabama, has returned to the university after a professional visit to northern Louisiana.

**James P. Porteus**, of Lordsburg, N. M., who has been engaged for the last sixteen months on mineral surveys in Portugal, Spain, and Afrique du Nord, has returned to New York.

**C. N. Schuette**, mining engineer, of San Francisco, has returned to that city from Lincoln, Calif., where he had been engaged in opening the new clay quarry and in erecting the new plant of the Clay Corporation of California.

**H. H. Angst**, superintendent of the Maroco mine, on the Cuyuna range, has been promoted to the general superintendency of the Marquette Ore Co., to succeed **W. B. Pattison**, who resigned to go into private business in Minneapolis.

**Manufacturing Co.**, died in Chicago on Oct. 28 after an illness of about two years. **Mr. Greenfield** was a graduate of the Rensselaer Polytechnic Institute. He served in the American army in Porto Rico during the Spanish-American War, and later engaged in mining in Mexico. In 1908 he entered Allis-Chalmers employ as an engineer in the Mexico City office. A few years later he became district manager of the company for Mexico. During the time **Mr. Greenfield** was in charge of the Mexico office the Madero revolution broke out. At the time of the Huerta revolution he was in Mexico and had many exciting experiences. He served



Roy C. Greenfield

### Obituary

**Allen L. Burris**, formerly president of the old El Paso Consolidated Gold Mining Co., at Cripple Creek, Colo., died recently at Bartow, Fla.

**H. S. Whitelaw**, eld geologist of the Victoria Mines Department at Bendigo, Victoria, Australia, died recently at the age of fifty-two, from pneumonia. Before going to Bendigo **Mr. Whitelaw** was attached to the staff of the department in the Gippsland district, Ballarat and Daylesford. He was appointed field geologist at Bendigo twenty-three years ago, and one of his most notable works was his survey of the Bendigo gold fields.

**Henry C. Krause**, eighty-six, a pioneer mill man of the Michigan copper district, died recently at his home in Houghton. For thirty years he was in the employ of the Calumet & Hecla as mill foreman. In 1898, he became superintendent of the Arcadian stamp mill and upon suspension of mining operations at Arcadian he retired. **Mr. Krause** was of an inventive turn of mind and appliances perfected by him still are used in mill practice in the district.

**Roy Castle Greenfield**, mining and mechanical engineer, for many years connected with the Allis-Chalmers

as one of the guards of the American embassy in Mexico City. During the revolution, while living at the American Club in Mexico, a three-inch shrapnel shell burst in his room, wrecking a portion of the building. After the death of Madero, **Mr. Greenfield** managed to escape from the country, but only with considerable difficulty and delay. In 1910, when on account of the revolution the company offices in Mexico were closed, **Mr. Greenfield** came to the home office of the Allis-Chalmers Manufacturing Co. in Milwaukee, as a general salesman, which position he held until about two years ago. His illness, which finally resulted in his death, is attributed to an injury received during his army service in Porto Rico. **Mr. Greenfield** had a very wide acquaintance among the mining men not only in the United States but particularly in Mexico, where he had lived for many years.

**William J. Uren**, aged sixty-two, general manager of the Seneca Copper Co., in the Michigan copper district, died suddenly in his office on Nov. 6. He was a graduate of the Michigan College of Mines, class of 1888, and was at various times connected with a number of the copper mines of Michigan. For a number of years he was in charge of the Tamarack, Osceola, and Ahmeek mines for the Bigelow inter-

ests, and served as general manager of Seneca since its organization. **Mr. Uren** is survived by his widow and four children.

**Samuel P. Conger**, who is given credit for the discovery of tungsten in Colorado, died at his Denver home, on Oct. 23, at the age of ninety-two. Despite his advanced years, **Conger** made a trip to New Mexico a few months ago, still prospecting, as he put it. The discovery of the Caribou claim in 1862; the Buckeye claim in 1863, and the Poor Man mine, in Boulder County, brought **Conger** vast wealth, but adventure, another rich opening—the pleasure of finding and not keeping—were the things that gave pleasure. He came to Colorado in 1860 from Marietta, Ohio. He had up to that time been successful in unearthing lead in Wisconsin and gold in California and Oregon. His partner in Colorado was **Nels D. Wanamaker**, and to **Wanamaker** goes the 50-50 honor of the tungsten discovery.

**Lewis Thomas Leyson**, metallurgist, soldier, pioneer, died recently in California. He was born in 1882 at Neath, South Wales, and educated at Bromsgrove College and London University, where he took his degree in chemistry and metallurgy. After graduation he went to South Africa, where he was for some years at the Cape Explosive Works and later joined the metallurgical staff of the Rand Mines, Ltd. As an assistant of **F. L. Bosqui** he performed invaluable work in connection with the first filter installations for the treatment of slimes on the Rand. On the outbreak of war in 1914 he went with the Imperial Light Horse to German South West Africa, where he was one of a detachment of men with chemical training who preceded the main body of troops into hostile territory in order to test the water supplies. The German troops were withdrawing into the interior desert country, poisoning all springs and water wells as they went. It was necessary for the advance guard to determine the kind of poison, discover the source, and remove it. On account of the scarcity of water this duty was extremely arduous and exacting, and **Leyson's** health broke under the strain. After months in the hospital he was discharged from the army as unfit for further duty. He then returned to England, where he was occupied with the production of electrolytic zinc for munition purposes and subsequently went to the United States for the same purpose. Jointly with **U. C. Tainton** he presented a paper last year to the A.I.M.E. entitled "Electrolytic Zinc from Complex Ores." For the last two years **Leyson** had been in Tonopah in charge of the development of some new methods in cyanidation. Owing to excessive work his health was again impaired and he went to California for a rest. Here he contracted pneumonia. **Lewis Leyson** was a pioneer. All of his life was spent in advance of the main army preparing the way for others to follow. Of no man could it be more truly said, "He fought a good fight; he kept the faith." It is tragic that he was not allowed to finish the course. **U. C. TAINTON.**

## Recent Technical Publications

Reviews, Abstracts, and References

### A Practical Book on Petroleum

**The Oil Industry.** By Ernest Raymond Lilley. Published by D. Van Nostrand Co., New York. 548 pp. Price \$6.

The author has succeeded in presenting a terse and clear account of the petroleum industry in its various branches, in comparatively small space. In the past Dr. Lilley has had much experience in lecturing to classes of business men, so it is not surprising that in his book he treats his subject in such a business-like, practical way. He omits the superfluous and sets forth essentials in the language of the industry. The book is in no way academic. It is intended for those in the petroleum industry who want to know something about the other branches than the one in which they are employed. It is not avowedly a textbook, although from the pen of an assistant professor at New York University, but there is no reason why it cannot be used as one. Furthermore, the book is attractively written. Petroleum is a subject full of human interest, no doubt because the work of producing oil offers so many gambling chances. More than one investor will find the book helpful in getting some idea as to why he lost his money.

Following a preliminary chapter on the nature and origin of hydrocarbons, in which Dr. Lilley says that nearly all scientists accept the organic theory of origin, but fails to add that there is a point or two in favor of possible inorganic petroleum, a few pages are devoted to a discussion of the products and the organization of the oil industry. Then come forty pages on exploration, in which structures, seepages and other indications, mapping, and the instruments used are described. Dr. Lilley here briefly refers to his modification of the carbon ratio theory which he had previously discussed at greater length in the *Mining Journal-Press*. The subject of oil lands and leasing—in the United States and abroad—is dealt with in the next two chapters, which re-traverse in a way the ground covered by Johnson, Huntley, and Somers in their book, "The Business of Oil Production," which appeared two or three years ago. Three excellent chapters follow on drilling, drilling-in operations, and lease operation respectively. In these the equipment and methods used are described so well, in text and illustration, that even the layman can readily understand.

A fifth of the book, following, is devoted to a description of American and foreign fields. The domestic fields the author treats by "provinces"—a term and a classification used by him in an article some time ago in the *Mining Journal-Press*, though "province" in the sense used is not original with Dr. Lilley.

Logically, the author now arrives at the subject of transportation and storage, which he discusses from the time when oil was carried from the field in barrels and tanks on horse-drawn carts up to today, when the pipe line, tank

car, and tanker are the means of moving the product of the wells. Discussion of the marketing of crude oil follows, as a matter of course. Each of Dr. Lilley's chapters, save this, ends with a selected bibliography. No reference is made to L. M. Fanning's "Marketing of Petroleum," which appeared last year in the *Mining Journal-Press* as one of its series of articles on marketing. Some other similar omissions in the bibliographies might be mentioned.

The rest of the book is devoted, for the most part, to the subjects of refining, cracking, blending and compounding, and the marketing of refined oils. Chapters on corporation activities and on competitive industries follow, the book ending with a forecast of the future. Numerous illustrations help the text. Dr. Lilley has made free use of charts, flow sheets, and tables.

From every angle, the book is well worth having. It treats a big subject briefly without being superficial, and in a most readable way.

A. H. HUBBELL.

**Arizona Guidebook**—Another of the interesting guidebooks to Southwestern desert regions has been issued by the U. S. Geological Survey, this being Water-Supply Paper No. 499, 436 pages, by Kirk Bryan. This describes in detail the so-called Papago country, lying south of the Gila River between Tucson and Yuma, which has had, until recently, only a few white inhabitants and has seemed so waterless and formidable a region that it has rarely been visited by white men. "It has been a sort of strange wonderland, isolated and different from the rest of the country—a desert that has perhaps taken a larger toll of human life than any other arid section of the United States, yet green and tree-covered, and for unknown generations providing a home and livelihood for a simple-hearted peace-loving tribe of Indians. . . . Near its southern margin runs the dreaded Camino del Diablo, along which it is estimated not less than 400 wayfarers have perished at one time or the other." There is the setting, and if you want to know more about it send 85c. to the Superintendent of Documents, Washington, D. C., for a copy. Detailed automobile logs are given, and several maps.

**Transvaal Mining**—The thirty-fifth annual report of the Transvaal Chamber of Mines, Johannesburg, covering the year 1924, has recently been issued as a 203-page bound book. This book gives a large amount of information pertaining to the economics of mining in South Africa, including statistical tables of mineral production and dividends.

**Colorado Mining**—Courtney Ryley Cooper has a descriptive article in the Oct. 31 *Saturday Evening Post* (Philadelphia; price 5c.) about the early days of Colorado mining, entitled "The Gem of the Rockies." He tells of Nevada-

ville, Carbonate, and other deserted mining towns and of the contrast between present conditions and those obtaining when they were in their prime.

**Mining Practice**—The *Bulletin* of the Canadian Institute of Mining and Metallurgy for November (603 Drummond Building, Montreal; price \$1) contains two articles descriptive of mining methods, one of 14 pages, "The Creighton Mine," by W. E. Bawden, and the other "The Square-set Method of Stopping at Butte," by J. B. Mawdsley, 16 pages.

### Patents

**Hydrometallurgy of Zinc**—No. 1,554,575. Sept. 22, 1925. E. W. Hale, Greenwich, Conn., and C. G. Fink, Yonkers, N. Y., assignors of one-half to the Dorr Co., New York City. Zinc is extracted from zinc sulphide by dissolving the zinc of the sulphide in bromine, which in turn is dissolved in a solution of a salt, in which it is more soluble than in water; partially depositing the zinc therefrom by electrolysis; discontinuing the electrical action while the liberated bromine remains in solution; and using the solution of bromine and bromide resulting therefrom to treat additional zinc sulphides.

**Reverberatory Copper Smelting**—Nos. 1,559,508 and 1,559,509. Oct. 27, 1925. G. W. Prince, Clemenceau, Ariz., and Archibald Douglas, New York City, assignors to United Verde Extension Mining Co., New York City. The first patent covers a method of reverberatory smelting in which the charge is piled in a mound along the length of the furnace and away from the side walls. The second patent covers the same thing except that two or more longitudinal mounds of charge are made instead of one. These patents show the results of efforts made to get away from the method of smelting covered by Carson's patents, in which the charge is piled along the sidewalls.

Nos. 1,559,510 and 1,559,511. Oct. 27, 1925. J. A. Church Jr., New York City, assignor to United Verde Extension Mining Co., New York City. These patents are similar to the two described above except that the mounds are built higher at the back of the furnace so that there is a gradually increasing space for the matte and slag as it flows to the front of the furnace. The first patent covers one longitudinal mound and the second, two.

**Centrifugal Concentrator**—No. 1,557,672. Oct. 20, 1925. H. A. Doerner, Reno, Nev. A device for separating solids of high specific gravity from those of less specific gravity by means of centrifugal force. A liquid seal is used and the separated solids are kept in a mobile condition by the action of a fluid other than the sealing liquid.

**Metallurgy of Vanadium**—No. 1,554,917. Sept. 22, 1925. George Kunkle, Grand Junction, Colo. Ground vanadium ore is heated in a furnace to about 1,000 deg. C., under the influence of an oxidizing atmosphere so as to change water-insoluble compounds to soluble forms. The furnace charge is then placed in water and the soluble salts are removed.

## New Machinery and Inventions

### Controlling Peak Loads

**Power Demand Liminator Operates Automatically—Intended for Use on Electric Systems Where It Is Desired to Cut Readiness-to-Serve and Other Heavy Charges**

A new model of the Edmoore power demand liminator, an electrical device for automatically controlling maximum demands or peak loads on electric power systems, has been announced by the manufacturer, Edward T. Moore, 500 Cahill Building, Syracuse, N. Y. The liminator is said to be finding wide use in connection with the control of loads on electric melting furnaces as well as electric annealing furnaces, electric ovens, electrically driven air compressors, pulp wood grinder motors, and, in fact, for controlling any motor where the load may be reduced for a few moments or entirely interrupted for short periods of time.

This power demand liminator is an entirely new piece of apparatus for automatically controlling and limiting the "power-demand," "peak-load" or "readiness-to-serve" charges on large power loads, where the charge for peaks drawn on "readiness-to-serve" is such a large fixed part of the total power bill as to make the liminator worth while. The demand charge or peak load is generally rated on the highest integrated peak load averaged for one to five peaks per month, the peaks generally being figured for 15, 30, or 60 minutes' time.

It becomes very expensive for a power consumer to draw a heavy peak for only a few minutes per month and then to continue to pay the "readiness-to-serve" charge, or the demand charge, for the remainder of the month. With the ordinary metering facilities at the consumer's command, it is highly desirable that the consumer should avoid drawing short-time, excessive peaks, but with the ordinary meter installation it is practically out of the question for the consumer to watch and regulate the peak demanded by his load.

The power demand liminator does automatically what both the customer and the central station would like to have done; that is, to limit any unnecessary, unusual, or short-time power peaks demanded.

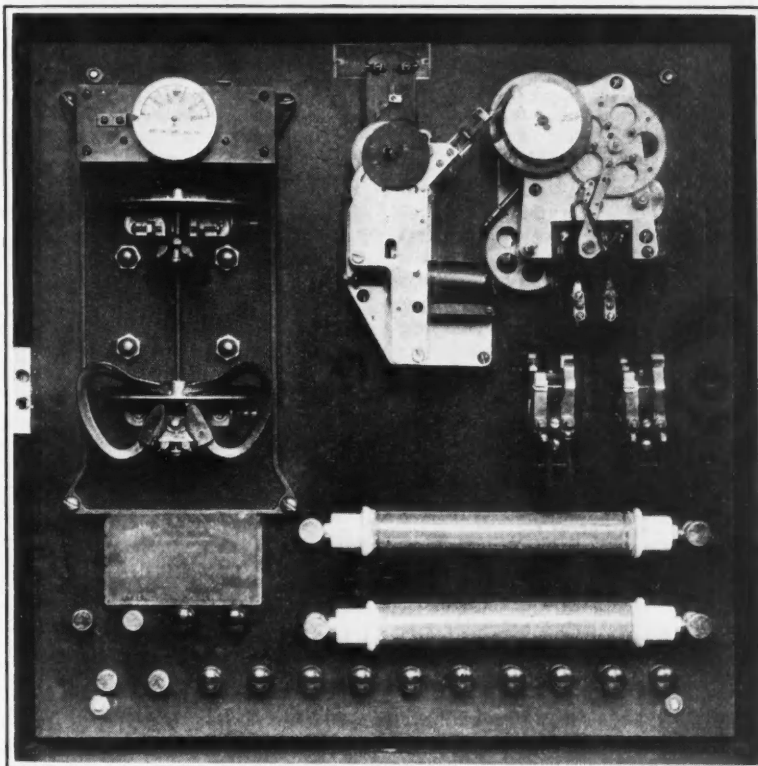
Under other conditions it is sometimes desirable to limit the demand load to a lower value during the central station's characteristic daily peak. There is nearly always some load on almost all plants of large power consumers which can temporarily be cut off in whole or in part for short periods of time. This operation is just what is done automatically by the liminator.

To carry out the purpose and intent of this apparatus, it is necessary to have the liminator actuated from the source of power at the main metering point which it is desired to limit as to peak load. Ordinarily it can be arranged by putting a contact in on the power company's watt-hour meters and using their instrument transformers, as the device itself requires only an extremely small amount of energy to

actuate it. However, where such conditions are not found, it is entirely feasible for the consumer to install his own integrating meter and instrument transformers, for the expense is comparatively trifling as regards the savings effected.

ing resistances to be connected into the circuit of the furnace regulator panel contact-making ammeters, and reducing the power input. The auxiliary clock mechanism operates a demand-period cam, permitting the integrated load over any pre-determined demand period to be secured.

The power demand liminator fills a dual rôle: It regulates the momentary fluctuations in power and limits the integrated maximum demand. The integrated element obviously would allow large draughts of power in any period of the demand interval, but so long as the average or integrated value did not exceed the predetermined amount, there would be no reduction in load on the



*Apparatus intended for automatically controlling and limiting power demand, peak load or readiness-to-serve charges on large loads*

The senior type of liminator, or Model 1-A liminator, has a watt-meter element which is connected to the current and potential transformers at the main metering point of the power entrance to the consumer's premises and an electromagnetic mechanism is embodied in the machine, which is actuated periodically, depending upon the period of the demand, by a set of contacts mounted in a standard totalizing watt-hour meter.

Referring to the illustration, two induction elements mounted on a common shaft will be noted. The torsion on the suspending wire is varied by the rotating dial indicating the secondary watts, so that any load setting may be obtained. When power in the circuit reaches the amount indicated by the dial setting, movable and stationary contacts co-act, closing the lock-in relay. A load-adjusting rotating cam, mounted to engage the trip finger of the transfer switch of the integrating mechanism, closes a second relay which opens the relay of the furnace control panel connecting the three-load adjust-

furnace. The watt-meter element obviously would not allow the continuance of any momentary or short peaks, as the furnace power would be reduced instantly when the predetermined amount has been reached. This is particularly advantageous where power schedules have a clause which provides that when the instantaneous peaks exceed a certain amount, these peaks will be used for billing purposes in lieu of the integrated peak. Another advantage in limiting these instantaneous peaks is the fact that while a greater number of kilowatt hours will be introduced into the furnace during excessive peaks, they are always accompanied by a corresponding period of reduced power and less kilowatt hours input.

#### Quickly Adjusted Pliers

In the new pliers shown in the accompanying cuts adjustments are changed quickly by pulling the lever open to its limit, and the jaw may be moved with the thumb until the new adjustment is made. To engage the



*These pliers are instantly adjusted by moving the jaw with the thumb until the desired opening is reached*



*Through the leverage obtained by these pliers there is no danger of slipping in removing cotter pins*

jaw the lever is closed, and the device maintains a powerful holding force. The notches in the jaws make it possible to obtain a variety of holds on nuts which may have damaged corners or sides, so that there will be no slipping of the tool. The pliers are made by the Grip N Stik Co., Dover, Ohio.

### Curve-Drawing Instruments in Two New Types

Two new types of portable curve-drawing instruments, the CP-4 and the CP-5, have been introduced by the General Electric Co. These instruments are intended for alternating-current work, the first being equipped with a Chelsea clock paper drive and the second, with a Warren motor. With them, chart speeds of 1, 3, 6, or 12 in. per hour can be obtained, and all instruments are equipped with a gear shift which changes from inches per hour to inches per minute, or vice versa, on either clock or motor driven charts.

The new instruments are high-torque devices; damping is unaffected by temperature and is sufficient for rapidly fluctuating loads, such as electric furnaces; pen points have sufficient force to minimize errors as a result of friction with the paper; instruments are shielded from stray fields, and the re-roll cannot be damaged by pulling out. The instruments are small, light in weight, of high voltage capacity, and have small internal losses.

All parts of the new instruments are mounted on aluminum alloy castings. The instrument element is assembled on a cast aluminum alloy frame, making a complete unit. This frame carries the armature, field coils, iron core, and shield, an inkwell, and a pen.

The instrument frame is, in turn, mounted on a main frame, to which are hinged front and back covers which form the case of the instrument. The main frame also carries the chart carriage assembly, mercury damper, potential switch, and terminals. Covers are of cast aluminum alloy.

The potential resistance is mounted in two ventilated compartments in the back cover and is separated from the

instrument proper by bakelite panels. The construction is such that the potential circuit is broken at the terminals when the back cover is open. Persons operating the instruments are thus protected from the high voltages.

The chart carriage is hinged at the bottom and may be tilted forward, thus making it easy to install new charts. All parts of the instruments are easily accessible.

The complete line comprises ammeters, voltmeters, and single phase and polyphase wattmeters. All are self-contained. The voltmeters and potential circuits for the wattmeters are triple rated 110/220/550 volts and the ammeters and current circuits of the wattmeters are rated up to 20 amp.

### Foreign Solid-Injection Diesel Engine to Be Made Here

Exclusive rights to manufacture and sell the Benz solid-injection Diesel engine in the United States and Canada have been acquired by the Chicago Pneumatic Tool Co. from Motoren Werke, Mannheim, Germany. This engine is of the vertical, multiple-cylinder type, built on the four-stroke principle.

Among the advantages claimed for this engine is that its design is very simple and clear, eliminating the use of a high-pressure compressor, an injection cylinder with high pressure pipe line, and injection valve. There is no ignition device, which eliminates the use of a rather delicate apparatus as well as spark plugs, cables, etc.

Due to its having automatic regulation and its simple operation, it can be operated by men who have had very limited engine experience, which tends to lower the cost of operation. It will operate on all kinds of petroleum and its derivatives, such as gas, oil, kerosene, crude oil, paraffine oil, and lignite tar. Regulation is effected by a precision governor which acts on an admission valve of the fuel pump, the quantity of fuel delivered being strictly in proportion to the load on the engine. The fuel consumption is said to be much lower than in any other engine manufactured.

### Trade Catalogs

**Thickeners**—Bulletin 30 of the Hardinge Company, York, Pa., is devoted to a description of the Superthickener and clarifier now made by this company. Pages 12.

**Boiler Room Operation**—The Republic Flow Meters Co., 2240 Diversey Parkway, Chicago, announces that it has had prepared a series of articles on "Combustion," by G. F. Gebhardt; a series on "Heat Treating," by H. M. Boylston, and a third series, on "Ceramics," by C. W. Parmelee. Copies will be sent on request.

**Fans**—American H. S. single inlet fans are described in the 32-page Bulletin No. 6103 issued by the American Blower Co., Detroit, Mich.

**Conveying Belt**—The Robins Conveying Belt Co., Park Row Building, New York, has prepared a new handbook, of 270 pages, on all phases of material handling. It is well illustrated, showing all of the company's standard products and plants throughout the country, equipped with its machinery.

**Flow Meters**—Bulletin GEA-10, just received from General Electric Co., Schenectady, N. Y., is devoted to G.E. mechanically operated flow meters for measuring fluids and gases. It contains 44 pages.

**Catalogs**—Christopher H. Ting, 8th Mid. School, Changchow, Fukien, China, writes of the possibility of beginning a mining enterprise near Changchow and would like to receive catalogs of mining-machinery manufacturers.

**Explosives**—A short paper on "Filling Tamping Bags Above Ground," by George S. Brown, is contained in the E. I. du Pont de Nemours & Co. Explosives Service Bulletin for October.

**Patents**—The third edition of the treatise on patents prepared by Richards & Geier, patent and trade-mark attorneys, 277 Broadway, New York, has recently been published and made available for distribution, together with the fourth edition of the firm's trade-mark book. Copies will be mailed without charge.

**CO<sub>2</sub> Recorder**—New bulletins No. 118 and 118-A, describing the Apex CO<sub>2</sub> recorder and indicator, are now ready for distribution by the Uehling Instrument Co., of Paterson, N. J. These instruments operate on the orifice principle and do not employ chemical solutions. The principle of operation is fully explained in the bulletins.

**Diamond Drills**—The Sullivan Machinery Co., Chicago, Ill., has just issued Catalog No. 80-0, "Diamond Drilling for Oil," third edition, containing 80 pages, with the cover in two colors. A large amount of new material has been added. An article on the use of the diamond drill in structure testing by Kay Peters, of Tulsa, Okla., is included. Copies will be sent upon request.

**Paint**—Three bulletins on industrial paints have been issued by W. P. Fuller & Co., San Francisco, Calif. No. 1 covers metal painting; No. 2 standard colors for factory pipe lines; and No. 3 waterproofing and damp-proofing concrete.

# The Market Report

## Metal Markets Quiet Down

Prices, in General, Are Somewhat Lower, With Lessened Demand and Freer Supplies

New York, Nov. 11, 1925—Most metal sellers report a quiet week. Copper has been unusually dormant in the domestic market, and the decline in London today did not help matters. Prices have dropped but little, however. Lead has sold well, thanks to more adequate offerings rather than to an increase in inquiries. Zinc has reacted somewhat after its recent rapid advance, but continues fundamentally

very strong. Tin and silver are substantially unchanged from last week's levels. The violent decline in the stock market yesterday has no doubt had an important effect in the metal market, though it was a speculative reaction, and not based on any decline in business, present or expected. It should, therefore, have no more than a psychological effect on the metal market, and producers continue optimistic.

### Copper Back to 14 $\frac{3}{4}$ c.

Copper exhibited little strength at the 14 $\frac{1}{4}$ c. level of last Wednesday and Thursday; in fact, the market never really reached this level for Connecticut deliveries, as there were always sellers willing to shade quotations slightly. In the Middle West, however, 15c. was reported to have been done. On Friday and Saturday, most of the business was done at 14.80c. for Valley deliveries, and in the last two or three days producers have found it necessary to come to 14 $\frac{3}{4}$ c., delivered, to get any orders. In fact, large buyers have had offers today at fractionally under 14 $\frac{3}{4}$ c., though they have shown slight interest, perhaps having been made a little skittish by the drop of 15s. in London electrolytic today. The volume of sales for the week has been markedly less than that of last week, though one large buyer has been actively in the market. Most of the orders have been for December-January shipment. Prices show little variation with the time of delivery. Several producers continue to hold at 14 $\frac{1}{4}$ c. delivered Down East, though admitting the impossibility of doing any business at that level. Little pressure on the market can be expected with their present sold-up condition.

Foreign demand has been fairly good at 14.90@14.95c. c.i.f., though today's weakness in London has, of course, affected quotations abroad.

### Lead Available at 9 $\frac{3}{4}$ c.

The contract price of the American Smelting & Refining Co. for New York lead continues at 9 $\frac{3}{4}$ c. per lb., with offerings at that level, even for prompt delivery, much more free than they were a week or two ago. In fact, reports of prices up to 10c., and even 10 $\frac{1}{4}$ c., in the last two or three days must be entirely nominal, for none of the large producers are getting more than the Smelting company's quotation, and all are selling at that level. In the Middle West, the market has not yet declined to the 9 $\frac{1}{4}$ c. level at which the principal producer has been releasing limited tonnages, for supplies seem to be still somewhat less than the demand. Inquiries, however, have been noticeably less. The outside market in St. Louis, for the entire week, has been about 9 $\frac{3}{4}$ c. The volume of the sales for the week has been greater than that of last week, owing to the more liberal attitude of sellers. Occasional carloads of prompt shipment are in demand, indicating that some consumers are using a little more lead than they had expected to, but in general the requests are for November-December shipment. The business has been widely distributed, all classes of consumers entering the market.

Considerable foreign-ore lead has been sold for domestic consumption in the last two or three weeks.

### Daily Prices of Metals

Nov.	Copper N. Y. net refinery*	Tin		Lead		Zinc
	Electrolytic	99 Per Cent	Straits	N. Y.	St. L.	St. L.
5	14 625	61.75	63.25	9.775	9.50@9.75	8.60@8.90
6	14.55	61.625	63.00	9.775	9.50@9.75	8.70
7	14.55	61.25	62.50	9.75	9.50@9.75	8.70
9	14.525	61.125	62.25	9.75	9.50@9.75	8.70
10	14.525	61.25	62.25	9.75	9.50@9.75	8.65
11	14.50	61.75	62.75	9.75	9.50@9.75	8.60
Av.	14.546	61.458	62.667	9.758	9.625	8.683

\*The prices correspond to the following quotations for copper delivered: Nov. 5th, 14.875c.; 6th and 7th, 14.80c.; 9th and 10th, 14.775c.; 11th, 14.75c.

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. Quotations for lead reflect prices obtained for common lead, and do not include grades on which a premium is asked.

The quotations are arrived at by a committee consisting of the market editors of Mining Journal-Press and a special representative of the Bureau of Mines and the Bureau of Foreign and Domestic Commerce.

### London

Nov.	Copper			Tin		Lead		Zinc	
	Standard		Electrolytic	Spot	3M	Spot	3M	Spot	3M
	Spot	3M							
5	62 $\frac{1}{4}$	63 $\frac{1}{8}$	69	282 $\frac{7}{8}$	281 $\frac{5}{8}$	37 $\frac{1}{8}$	36 $\frac{9}{16}$	39 $\frac{1}{16}$	39 $\frac{1}{16}$
6	62 $\frac{1}{4}$	63 $\frac{1}{4}$	69	282 $\frac{7}{8}$	281 $\frac{5}{8}$	37 $\frac{1}{8}$	36 $\frac{1}{2}$	39 $\frac{7}{16}$	38 $\frac{1}{8}$
9	62 $\frac{1}{8}$	63 $\frac{1}{8}$	68 $\frac{3}{4}$	280 $\frac{3}{8}$	280	37 $\frac{3}{8}$	36 $\frac{1}{16}$	38 $\frac{3}{4}$	38 $\frac{7}{8}$
10	62	62 $\frac{7}{8}$	68 $\frac{3}{4}$	280	279	37 $\frac{1}{2}$	36 $\frac{1}{16}$	38 $\frac{9}{16}$	38 $\frac{1}{16}$
11	61 $\frac{1}{2}$	62 $\frac{1}{2}$	68	280 $\frac{5}{8}$	279 $\frac{3}{8}$	37 $\frac{3}{8}$	36 $\frac{5}{8}$	38 $\frac{7}{8}$	38 $\frac{5}{16}$

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

### Silver, Gold, and Sterling Exchange

Nov.	Sterling Exchange "Checks"	Silver		Gold London	Nov.	Sterling Exchange "Checks"	Silver		Gold London
		New York	London				New York	London	
5	4.84 $\frac{1}{2}$	69 $\frac{3}{8}$	32 $\frac{1}{8}$	84s11 $\frac{1}{2}$ d	9	4.84 $\frac{1}{2}$	69 $\frac{3}{8}$	32 $\frac{5}{16}$	84s11 $\frac{1}{2}$ d
6	4.84 $\frac{1}{2}$	69 $\frac{3}{8}$	32 $\frac{1}{4}$	84s11 $\frac{1}{2}$ d	10	4.84 $\frac{1}{2}$	69 $\frac{1}{8}$	32 $\frac{3}{16}$	84s11 $\frac{1}{2}$ d
7	4.84 $\frac{1}{2}$	69 $\frac{3}{8}$	32 $\frac{1}{4}$	....	11	4.84 $\frac{1}{2}$	69 $\frac{1}{8}$	32	84s11 $\frac{1}{2}$ d

New York quotations are as reported by Handy & Harman and are in cents per troy ounce of bar silver, 999 fine. London silver quotations are in pence per troy ounce of sterling silver, 925 fine. Sterling quotations represent the demand market in the forenoon. Cables command three-eighths cent premium.

Corroding grades continue unchanged at premiums of \$2@\$3 per ton over common lead, and antimonial lead has been sold in the Middle West at 9½c.

**Zinc Reacts Slightly**

Conditions in the zinc market show little change, though the volume of business in the last week has not been large. A few good-sized orders have been placed, principally for January-February delivery, at around 8.60c. The premium on near-by zinc continues, today's quotations being approximately 8.80c. for prompt, 8.70c. for November, 8.60c. for December, and further discounts for deliveries into the new year. Stocks of zinc have declined to unusually low proportions, as is indicated by the premium, the statistics of the American Zinc Institute for October being as follows:

	Tons
Stock, Oct. 1.....	11,796
Produced .....	50,497
Shipped .....	54,818
Stock, Oct. 31.....	7,475
Shipped from plant for export..	5,365
Stored for customers.....	60
Retorts operating, Oct. 31.....	89,877

Brass Special grades continue almost unobtainable, with premiums nominally about 15 to 20 points above Prime Western. High-grade zinc is quoted at 10¼@10½c.

**Tin Between 62 and 63c.**

Little of interest has occurred in the tin market in the last week. The discount on 99 per cent grades and English refined tin is much less than formerly, owing to the absorption of supplies. Future tin has sold for about ¼c. less than spot.

**Silver Lower**

The decline in silver, although interrupted temporarily, continues, and new low prices on this movement were established both abroad and in New York on Nov. 11. At the lower rates the Indian bazaars, which have recently supported to a moderate extent the selling policy of China, are beginning to show interest as buyers, and the tone of the market accordingly looks somewhat better.

Mexican Dollars: Nov. 5th, 53½c.; 6th and 7th, 53½c.; 9th and 10th, 53½c.; 11th, 53½c.

**Francs Below 4c.**

Francs are again below the 4c. level, sharing this distinction with lire. Closing cable quotations on Tuesday, Nov. 10, were: Francs, 3.975c.; lire, 3.99c.; and marks, 23.815c. Canadian dollars, ¼ per cent premium.

**Other Metals**

Quotations cover large wholesale lots unless otherwise specified.

Aluminum—99 per cent grade, 29c. per lb.; 98 per cent, 28c. London, 98 per cent, £118 per long ton.

Antimony—Per pound, f.o.b. New York: Chinese brands, spot, 20c. December, 18½@19½c. Cookson's "C" grade, spot, 21c. Oxide and needle antimony unchanged from Nov. 7.

Bismuth—\$2.65@\$2.70 per lb., in ton lots. London, 10s.

Cadmium—60c. per lb. London, 1s. 9d.  
Nickel—Ingot, 34c.; shot, 35c.; electrolytic, 38c.; London, £170@£175 per long ton.

Platinum—\$120 per oz. refined officially quoted. Sales also at \$115@\$118. Crude, \$113.50@\$114.50. London, £24 for refined; crude £22.

Quicksilver—\$86@\$87 for spot. San Francisco, \$85.00. London, £14½.

The prices of Cobalt, Germanium Oxide, Iridium, Lithium, Magnesium, Molybdenum, Monel Metal, Palladium, Osmium, Radium, Rhodium, Ruthenium, Selenium, Tantalum, Tellurium, Thallium, Tungsten and Zirconium are unchanged from the Nov. 7 issue.

**Metallic Ores**

Manganese Ore—Per long ton unit of Mn, c.i.f. North Atlantic ports: Brazilian, 42@44c., nominal; Indian, 44c., nominal; Caucasian (unwashed), 42c.; Caucasian (washed), 44c. Demand moderate, but price firm.

Tungsten Ore—Per unit of WO<sub>3</sub>, N.Y.: Wolframite, \$11.50@\$12; Western scheelite, \$12@\$12.50. Market quiet as a consequence of large buying during September.

Chrome Ore—Indian ore—second grade—offered c.i.f. New York at \$19 per long ton. High-grade Indian ore, \$22@\$23. Rhodesian ore offered at \$23. Prices largely nominal.

Galena and Pyrite Radio Crystals, Iron Ore, Molybdenum, Tantalum, and Vanadium Ores are unchanged from quotations in the Nov. 7 issue.

**Zinc Blende and Lead Ore Both Higher**

Joplin, Mo., Nov. 7, 1925

Zinc Blende	Per Ton
High .....	\$62.10
Premium, basis 60 per cent zinc .....	\$60.00 @ \$61.00
Prime Western, 60 per cent zinc .....	\$59.00
Fines and slimes, 60 per cent zinc .....	\$57.00 @ \$54.00
Average settling price, all .....	\$56.21
Galena	
High .....	\$131.10
Basis, 80 per cent lead..	\$125.00 @ \$130.00
Average settling price...	\$125.22

Shipments for the week: Blende, 20,360; lead, 3,361 tons. Value, all ores the week, \$1,567,380.

Sellers were asking \$60 basis, but at the close accepted \$59 basis for a part of the reserve stock, and a few sold unmined ore. Approximately 8,000 tons are sold ahead of production, the purchase for the week being 13,430 tons. No ore was sold for export this week, on account of a reported slump in London metal prices.

Buyers will admit only \$125 basis for lead, but sellers report 1,000 tons sold on \$130 basis. Approximately 10,000 tons of unsold lead is in storage.

Zinc production has passed 17,000 tons per week, and with an increasing number of mills operating overtime, may reach 17,500 tons in two more weeks.

Platteville, Wis., Nov. 7, 1925

Zinc Blende	Per Ton
Blende, basis 60 per cent zinc.....	\$60.50
Lead Ore	
Lead, basis 80 per cent lead.....	\$132.50

Shipments for the week: Blende, 762 tons; lead, 40 tons. Shipments for the year: Blende, 40,232; lead, 1,991 tons. Shipments for the week to separating plants, 1,247 tons blende.

**Non-Metallic Minerals**

Amblygonite, Andalusite, Asbestos, Barytes, Bauxite, Borax, Celestite, Chalk, China Clay, Diatomaceous Earth, Emery, Feldspar, Fluorspar, Fuller's Earth, Garnet, Gilsonite, Graphite, Greensand, Gypsum, Ilmenite, Iron Oxide, Lepidolite, Limestone, Magnesite, Manjak, Mica, Monazite, Ocher, Phosphate, Potash, Pumice, Pyrites, Quartz Rock Crystals, Rutile, Silica, Spodumene, Sulphur, Talc, Tripoli, and Zircon are unchanged from prices in the Nov. 7 issue.

**Mineral Products**

Arsenious Oxide (White arsenic)—3.50c. per lb. Business amounted to several carloads. London, £15 per long ton.

Copper Sulphate, Sodium Nitrate, Sodium Sulphate, and Zinc Oxide are unchanged from prices in the Nov. 7 issue.

**Ferro-Alloys**

Ferrocerium, Ferrochrome, Ferromanganese, Ferrophosphorus, Ferrosilicon, Ferrotitanium, Ferrotungsten, Ferro-uranium and Ferrovandium are unchanged from the prices in the Nov. 7 issue.

**Metal Products**

Rolled Copper—Sheets, 23¼c.; wire, 16¾c. per lb.

Nickel Silver—29¾c. per lb. for 18 per cent nickel Grade A sheets.

Yellow (Muntz) Metal—Sheets, 20¾c. per lb.; rods, 17¾c.

Lead Sheets—Full, 13¼c. per lb.; cut, 13¾c.

Zinc Sheets—12c. per lb., f.o.b. works.

**Refractories**

Chrome Brick, Firebrick, Magnesite Brick, Silica Brick, and Zirkite are unchanged from prices in the Nov. 7 issue.

**Steel and Pig Iron Advance—Coke Lower**

Pittsburgh, Nov. 10, 1925

Production of steel ingots in October was approximately 3,892,946 tons, making 36,303,634 tons in the ten months of the year. Prices are higher.

Pig Iron—Prices as recently advanced are easily held, furnaces having no particular desire to sell, on account of uncertainty as to coke cost when present contracts expire, on Dec. 31. There has been enough buying to test prices, at \$20.50 for bessemer, \$19.50 for basic, and \$20 for foundry, f.o.b. Valley furnaces.

Connellsville Coke—A continuance of the light inquiry from the East has resulted in a further drop in Connellsville coke, forty-eight-hour being now \$6.50@\$7, or \$2 under its recent high, and foundry coke off \$1 in sympathy, at \$8@\$8.50.

### United States Zinc Smelters at 69 per Cent of Capacity

At the middle of 1925 there were in the United States twenty-three zinc smelters in operation, with a total of 118,906 retorts, of which 84,634, or 71.18 per cent, were in use. In addition there were six idle plants with an aggregate of 20,984 retorts. Most of these smelting plants were being maintained in good order and could quickly be made productive if there were any need for them, according to the American Bureau of Metal Statistics. These smelters are divided as eastern and western plants, the former being those to the east of the Mississippi River and the latter those to the west.

The western plants all use natural gas as fuel. The eastern plants all use coal as fuel, except two in West Virginia that use natural gas. In the main the plants of both the eastern and western groups are alimented with the same kind of ore, chiefly blende, and produce the same grades of zinc; but Palmerton distills willemite and produces high-grade zinc, its practice being unique.

The plants active, with their number of furnaces (blocks) and number of retorts, are given in the accompanying table.

Zinc Smelters in United States

Works	Location	Number of Blocks	Number of Retorts
<b>East</b>			
Mineral Point Zinc Co.	Depue, Ill.	12	9,068
Illinois Zinc Co.	Peru, Ill.	6	4,400
United Zinc Smelting Co.	Moundville, W. Va.	4	2,368
New Jersey Zinc Co. of Pa.	Palmerton, Pa.	30	7,200
Matthiessen & Hege's Zinc Co.	La Salle, Ill.	7	6,132
Grasselli Chemical Co.	Meadowbrook, W. Va.	10	8,400
Grasselli Chemical Co.	Clarksburg, W. Va.	10	5,760
Grasselli Chemical Co.	Terre Haute, Ind.	5	4,200
American Zinc Co. of Ill.	East St. Louis, Ill.	7	5,610
American Zinc & Chemical Co.	Langeloth, Pa.	8	4,864
American Steel & Wire Co.	Donora, Pa.	10	9,120
Heger Zinc Co.	Danville, Ill.	6	5,400
<b>Totals</b>		<b>115</b>	<b>72,522</b>
<b>West</b>			
Athletic Mining & Smelting Co.	Fort Smith, Ark.	4	3,328
U. S. Zinc Co.	Kusa, Okla.	5	3,700
U. S. Zinc Co.	Henryetta, Okla.	4	3,200
U. S. Zinc Co.	Amarillo, Tex.	5	4,000
Quinton Spelter Co.	Quinton, Okla.	4	2,688
National Zinc Co.	Bartlesville, Okla.	6	3,616
Falcon Zinc Co.	Van Buren, Ark.	4	3,200
Edgar Zinc Co.	Cherryvale, Kan.	8	4,800
Eagle-Pieher Lead Co.	Henryetta, Okla.	6	4,800
Blackwell Zinc Co.	Blackwell, Okla.	12	9,600
Tulsa Fuel & Manufacturing Co.	Collinsville, Okla.	5	3,392
<b>Totals</b>		<b>63</b>	<b>46,384</b>

Composite Position of the Above Plants

Group	Number of Plants	Number of Retorts	Capacity of Retorts, Cu.Ft.	Number of Retorts in Use July 1, 1925	Per Cent in Use	Per Cent Feet in Use
East	12	72,522	116,876	49,298	67.98	67.81
West	11	46,384	78,645	35,336	76.18	71.07
<b>Total</b>	<b>23</b>	<b>118,906</b>	<b>195,521</b>	<b>84,634</b>	<b>71.18</b>	<b>69.12</b>

The eastern plants if operated at full capacity would require of roasted blende or calamine 2,090 tons per day and would produce 1,150 tons of zinc. The western plants would require 1,370 tons of ore and would produce 763 tons of zinc. Together they would need 3,460 tons of ore and would produce 1,913 tons of zinc. An average operation of 360 days per year would require about 1,250,000 tons of ore and would produce about 690,000 tons of zinc. The requirement of raw ore would be considerably larger, inasmuch as the furnace charge has experienced a loss of weight in roasting blende, which is by far the major source of supply.

Anaconda's capacity for producing electrolytic zinc at this time was about 90,000 tons per annum, and will be increased to 120,000 soon after the end of this year. The total capacity of active plants in the United States was therefore about 780,000 tons of zinc at the middle of 1925, which will soon become about 800,000 tons. The actual production of zinc, distilled and electrolytic, in 1924 was about 553,000 tons.

Enumeration of the number of retorts in existence and in use does not in itself afford a conclusive figure of percentage. The retorts used by American smelters vary in their internal volume from 1.5 to 1.9 cu.ft. If density of charging be the same, the larger retort obviously takes

more ore than the smaller. There are co-ordinating technical factors to be taken into consideration, but on the whole the percentage of cubic feet of retort volume is a truer index than the percentage of number of retorts.

On July 1, 1925, the percentage of capacity in use on the basis of volume was about 69. This would indicate the making of distilled zinc at the rate of about 40,000 tons per month. Electrolytic zinc being then produced at the rate of about 7,500 tons per month, the total would be about 47,500 tons, which checks with the reported production of 47,583 tons in July.

The reports of the several smelters show a wide variation in practice. The percentage of zinc extraction in respect of Joplin blende ranges from 84 to 90 on the basis of the ore charged to the distilling furnaces. On the basis of raw ore the percentage of extraction is less, owing to losses in handling and roasting. This wide range is not to be taken as reflecting a similar difference in economic results. The smelter who gets a high extraction may experience a relatively high operating cost; oppositely, the smelter experiencing a low extraction may have a relatively low operating cost. On the other hand, high extraction and low cost, or low extraction and high cost, are not incompatible. The only deduction that is safely to be made is that American zinc-smelting results vary widely in respect of both extraction and cost, and any generalization of this subject is both difficult and dangerous.

### Domestic Copper Consumption Shows Little Change

Estimates just compiled by the American Bureau of Metal Statistics afford a fairly accurate idea of the trend of domestic copper consumption. The figures are in tons of 2,000 lb.

	1924				1925		
	First Quarter	Second Quarter	Third Quarter	Fourth Quarter	First Quarter	Second Quarter	Third Quarter
Electric manufactures	50,000	52,500	48,000	45,000	45,000	42,500	43,000
Automobiles	26,400	24,250	22,150	20,900	25,475	32,000	27,200
Buildings	9,900	10,700	11,300	8,550	9,250	9,550	13,500
Ships, commercial	350	900	400	450	500	550	700
Locomotives	850	750	900	850	650	700	600
Railway cars	1,300	1,500	2,400	1,950	1,800	1,700	1,000
Railway bearings	4,050	3,900	4,250	4,350	3,900	4,100	4,300
Manufacturing for export	12,500	13,700	15,000	12,900	13,400	15,850	14,350
Total of above	105,350	108,200	104,400	94,950	99,975	106,950	104,650
Total estimated	195,400	200,800	193,500	175,800	185,350	198,300	194,000
Domestic deliveries from primary refineries	223,649	195,126	150,408	175,206	191,771	194,177	210,163

The trend of business with the largest electrical manufacturing companies is shown by the following statement of their bookings and billings.

1924	General Electric		Westinghouse Electric	
	Bookings	Billings	Bookings	Billings
First quarter	\$73,487,903		\$37,860,000	\$44,680,000
Second quarter	71,219,984		40,030,000	38,260,000
Third quarter	58,389,832		34,705,000	39,573,000
Fourth quarter	80,009,978		38,654,000	41,088,000
<b>Year</b>	<b>\$283,107,697</b>	<b>\$299,251,869</b>	<b>\$151,249,000</b>	<b>\$163,601,000</b>
<b>1925</b>				
First quarter	\$83,846,236		\$40,106,000	\$40,550,000
Second quarter	66,468,992		44,432,211	38,268,378
Third quarter	73,561,483		43,285,770	40,170,058

### Arsenic Stocks Gradually Rise

Data just released by the American Bureau of Metal Statistics show total crude and refined arsenic stocks in the United States on Sept. 30 as 7,493 tons, compared with 7,190 in August, 7,085 in July, 7,018 in June, 6,505 in May, 6,676 at the end of 1924, and 1,046 at the end of 1923. Refined-arsenic production in September was 866 tons, compared with 749 tons in August, 804 in July, and a monthly average of 1,120 tons for the first half of 1925. In addition, some crude was produced and sold as such.

Imports of white arsenic have recently been as follows: September, 657 tons; August, 410 tons; July, 875 tons; and 984 tons monthly average for the first half of the year. Exports of white arsenic from Mexico have been much greater in 1925 than in 1924, amounting to 2,434 tons for

the first six months of 1925, compared with 1,425 tons in the entire year 1924.

Arsenic prices have recently been at 3½c. per lb., with several carloads reported sold each week at that price, for forward delivery. Some would-be sellers, however, report an almost total lack of interest in the market, and say that they would be delighted to find buyers even at the low level mentioned. Should the boll weevil be active next year, a sudden demand would probably assert itself, which would quickly absorb stocks, increase prices, and result in a sudden expansion of production and imports. If not, there would seem to be little hope for an improved market. Both production and imports have recently been only about two-thirds what they were for the first quarter of the year, but, even so, stocks have accumulated slightly.

### Peak Prices for Canadian Gold and Silver Stocks

The northern Ontario mining market is apparently trying to emulate that of New York, new high records having been established among both the gold and silver issues, but principally in the gold. Hollinger, McIntyre, and Teck-Hughes have made new highs, and other stocks are much stronger.

Hollinger at over \$17, which means a market value of about \$80,000,000, is apparently discounting the prospective increase to 8,000 tons a day, which now seems certain to come into effect some time next year. Underground developments during the last six months have been particularly favorable, and the grade of the ore going to the mill has shown a gradual increase.

McIntyre stock, selling at \$22 a share, has a market valuation of \$17,500,000. With the completion of the new deep shaft next year, it should be possible to increase the tonnage going to the mill, and well-informed people consider that within the next three years net profits of 60 per cent are a conservative estimate.

Teck-Hughes, in Kirkland Lake, sold at \$2.25 a share, placing a valuation of approximately \$11,000,000 on the property. This is one of the highest grade mines in Ontario, and several new important discoveries have been made recently. The main vein has been proved for a width of about 50 ft. on the new 13th level. Two sections, each 8 to 10 ft. wide, are of high-grade ore, and the vein material between the sections indicates the possibility of mining the full width. The enlarged mill is now being put into operation; it is expected to have a capacity of at least 250 tons a day. The average recovery of the Teck-Hughes for the first six months of the present year was \$18.85 a ton. Dividends on this property are expected to start the first of the year.

Dome stock has also been particularly strong on the report of new discoveries in the igneous formation, but little information is yet available regarding these.

### Industrial Activity Increased in September

Manufacturing production in September, at 123 per cent of the 1919 average, was greater than in August, according to the index number of the Department of Commerce covering 64 commodities, and was 8 per cent higher than in September, 1924. The principal increases over August occurred in the production of textiles, with a gain of 7 per cent, iron and steel, with a gain of 2 per cent, chemicals and oils, with a gain of 6 per cent, tobacco, with a gain of 3 per cent, and miscellaneous items, with a gain of 3 per cent. Decreases from August occurred in the production of lumber, stone, glass and clay products, and non-ferrous metals, while no change occurred in the production of leather and the output of paper and printing. Compared with a year ago all groups, except manufactured foodstuffs, showed increased output.

The output of raw materials was 2 per cent less than in September, 1924, the marketings of animal products decreasing 5 per cent, crop marketings 2 per cent, and mineral products 2 per cent, while forestry products increased 9 per cent.

The index of unfilled orders showed no change from August, but was 13 per cent greater than a year ago, both the iron-and-steel and building-materials groups being higher than in September, 1924.

Some of the index numbers of the Department of Commerce are given below:

Production (Index numbers: 1919=100)	1925			1924	
	July	Aug.	Sept.	Aug.	Sept.
Raw materials—Total.....	97	114	149	121	152
Minerals.....	136	142	126	122	128
Manufacturing, grand total (adjusted).....	128	121	123	109	114
Total (unadjusted).....	128	121	123	109	114
Iron and steel.....	105	116	118	87	95
Other metals.....	190	187	183	165	164
Stone and clay products...	152	162	148	141	134

## Company Reports

### American Metal Raises Dividend to \$4

The American Metal Co., or American Metals as it is, for some reason, known to the New York financial press, has increased its quarterly dividend on the common stock to \$1 per quarter, that amount being payable on Dec. 1 to stock of record on Nov. 20. The usual preferred dividend of \$1.75 will be payable at the same time, to stock of record on Nov. 21. Formerly the common dividend has been 75c.

For the quarter ended Sept. 30, the net income of the company, after deductions for federal taxes, depreciation, depletion, and preferred dividends, was equivalent to \$1.88 a share on the 593,015 outstanding shares of common stock, of no par value. In the preceding quarter the total amount was \$1,078,300, or \$1.67 per share on the same basis, and in the corresponding quarter of 1924, \$1,137,323, or \$1.77 a share on the 591,000 shares outstanding.

In the first nine months of 1925, net income was \$3,040,173, equal to \$4.68 a share on the common, compared with \$2,972,645, or \$4.58, for the same period of 1924.

### Howe Sound Co.

The report of the Howe Sound Co. for the quarter ended Sept. 30 shows the results of the operation of the company's two properties—the Britannia mine, in British Columbia, and the Calera and El Potosi mines, in Mexico.

	Gold, Ounces	Silver, Ounces	Copper, Pounds	Lead, Pounds	Zinc, Pounds
Production					
Third quarter.....	2,891	594,615	7,583,675	6,735,038	5,888,439
First half year.....	2,829	906,035	13,372,641	9,039,220	730,476
Financial					
			T third Quarter		First Half Year
Value of metals produced.....			\$2,513,606.86		\$3,172,854.49
Operating costs.....			1,844,648.89		2,562,433.23
Operating income.....			\$668,957.97		\$610,421.26
Miscellaneous income.....			92,650.18		94,451.77
Total income.....			\$761,608.15		\$704,873.03
Less depreciation and bond interest.....			227,993.84		335,474.40
Net income.....			\$533,614.31		\$369,398.63

A quarterly distribution to stockholders of 50c. per share was made on Oct. 15, 1925, and amounted to \$198,215.

The company has authorized the issuance of 99,208 additional shares of the capital stock. The proceeds of this issue, together with surplus earnings, will be used to relieve the company of its entire bonded indebtedness on Jan. 1, 1926. Pursuant to a resolution of the board of directors, the stockholders of record at the close of business on Nov. 14, 1925, will be entitled to subscribe to such additional stock at the price of \$12 per share on the basis of one share of such additional stock for each four shares of stock held by them on that date.

### New Jersey Zinc Co.

The statement of the New Jersey Zinc Co. for the quarter ended Sept. 30, 1925, was as follows:

Income (including dividends from subsidiary companies after deductions for expenses, taxes, maintenance, repairs, depreciation, depletion, and contingencies).....	\$1,798,426.27
Deduct interest on first mortgage bonds.....	40,000.00
Net income.....	\$1,758,426.27
Deduct dividend of 2 per cent payable Nov. 10, 1925.....	981,632.00
Surplus for the quarter.....	\$776,794.27

An extra dividend of 2 per cent was declared on Oct. 28 and will be payable Dec. 10 to stockholders of record at 3 p.m. on Nov. 20.





Mining Stocks—Week Ended November 7, 1925

Table listing mining stocks with columns for Stock, Exch., High, Low, Last, and Last Div. Includes sections for COPPER, NICKEL-COPPER, LEAD, ZINC, GOLD, and GOLD AND SILVER.

Table listing mining stocks with columns for Stock, Exch., High, Low, Last, and Last Div. Includes sections for SILVER, SILVER-LEAD, IRON, VANADIUM, ASBESTOS, SULPHUR, DIAMONDS, PLATINUM, and MINING, SMELTING AND GENERAL.

\* Cents per share. † Bid or asked. Q, Quarterly. SA, Semi-annually. M, Monthly. K, Irregular. I, Initial. X, Includes extra. The first date given is that of the closing of the books; the second that of the payment of the dividend.

LONDON QUOTATIONS, WEEK ENDED OCT. 31, 1925. Table listing international mining stocks with columns for High, Low, Last, Date, and Per Cent.