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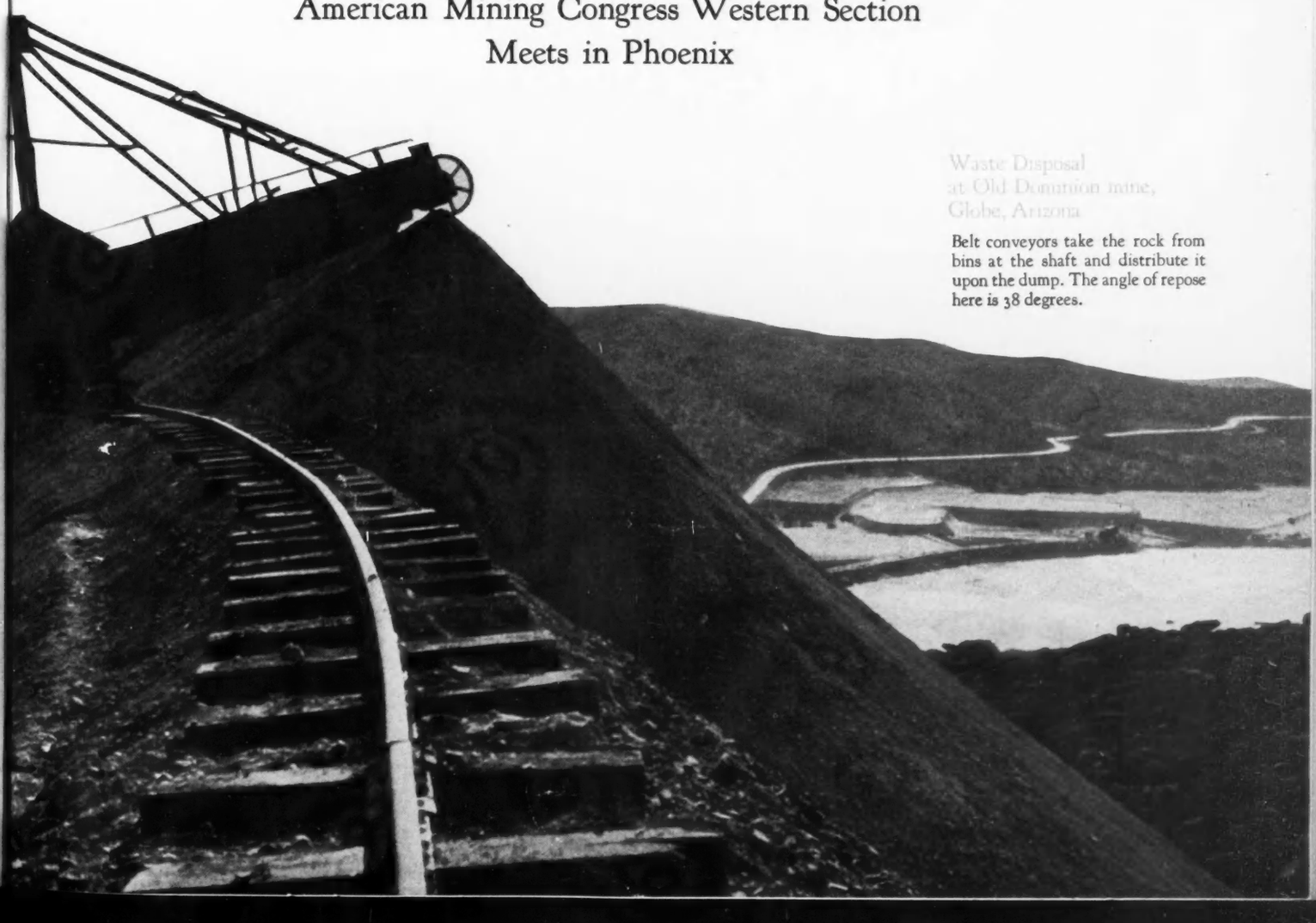
A Journey to South Africa-V

By T. A. Rickard

German Fuller's Earth — Deposits, Preparation and Marketing

By R. Deckert

American Mining Congress Western Section Meets in Phoenix



Waste Disposal at Old Dominion mine, Globe, Arizona

Belt conveyors take the rock from bins at the shaft and distribute it upon the dump. The angle of repose here is 38 degrees.

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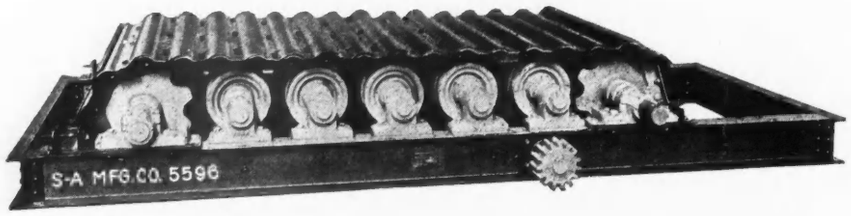
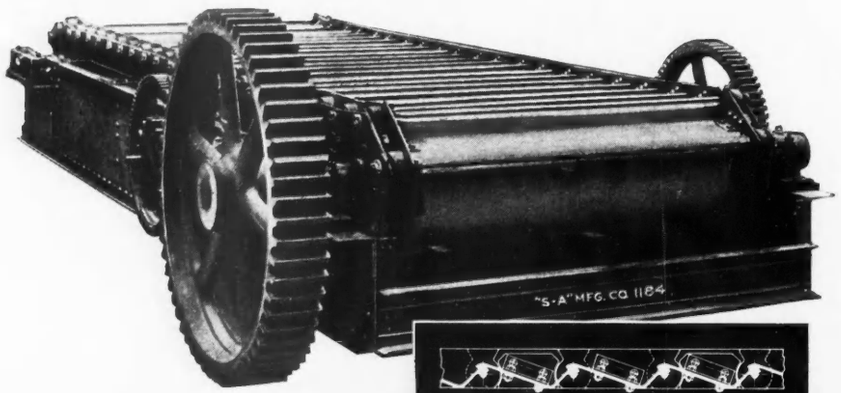
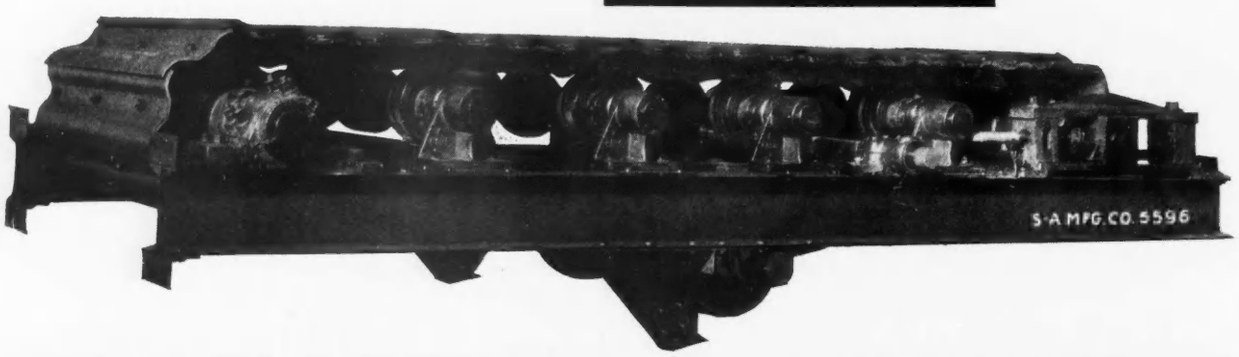




STYLE "D" SINGLE BEADED PAN CONVEYOR



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S-A BELT CONVEYORS

ENGINEERING AND
MINING JOURNAL-PRESS

JOSIAH EDWARD SPURR, Editor

Volume 120 New York, November 28, 1925 *Number* 22

Anaconda's Expansion in Germany

THE NEWS that the Anaconda Copper Mining Co. has entered the German zinc and coal industry through the acquisition of a substantial interest in the mining properties of the Georg von Giesche's Erben is of interest from two points of view: it is an indication of the desire of the Anaconda management to continue its expansion program, even into foreign fields outside of the Americas; and from the standpoint of the economist it shows one of the ways that European financial reconstruction may be brought about and European debts to America paid.

The von Giesche company is typical of many others in Germany and on the Continent generally. It has a long and honorable record, but was a victim of overexpansion during the World War and the excessive interest rates that have prevailed in the succeeding years. Not only were its mining, smelting, and rolling activities enlarged to meet the war demand, but the company was a large producer of artificial silk and several other unrelated commodities. Recently the company's financial affairs became so strained that reorganization became imperative, and in the end two choices were offered: either the Prussian Government would secure control, or American financial aid from Harriman and Anaconda would be accepted. The American proposition was the more attractive, and the zinc and coal mines and zinc rolling mills were accordingly placed under option for what amounts to a twenty-five-year lease, Harriman to float a loan in America for the rehabilitation of the properties, and Anaconda to supervise technical operations, rebuilding of the plants, and selling of the products. The zinc smelter of the company is across the line in Upper Silesia, in the territory ceded to Poland, and title to this part of the property passes outright to the Anaconda-Harriman consortium.

Thus does Anaconda become involved in European zinc smelting and marketing without apparently having gone out of its way to enter this field. It is the first experience that the Anaconda officials have had in the intricacies of Old World commercial pursuits, with the exception of their European agencies for selling metal, and they will no doubt find that all things are not done there as here. Capably managed, however, here is an excellent chance to show European metallurgists what their American brothers can do, and we on this side have every confidence that those who are selected to go to Germany from Butte, Great Falls, and other points will make a favorable impression. The more interest Americans take in international affairs the better, and it would seem that Anaconda, in consummating the arrangement above recorded, has entered a field of enterprise that will prove of benefit not alone to the company itself but which will be a step in international cooperation.

American financial aid would be welcomed by many of the impoverished European industries, and if the present arrangement is a success, no doubt we shall hear of other similar arrangements. The export of gold to America is undesirable, because America already has more than she needs and Europe has not enough. Export of manufactured goods in excessive quantities would, of course, interfere with the business of American manufacturers, an interference that would be very real in dull times. The third way in which Europe can pay her debts, or secure financial aid, is to mortgage her lands or industries, or, as in the present instance, to lease certain profitable rights. There will be objection to this, of course. In fact, Socialist members of the Prussian Diet have already interposed objections, without much hope of success, it seems. But financial aid cannot be extended without something attractive being offered in return, and in the arrangement now under review it would appear that all parties to the agreement have a good prospect to profit.

All Gold or No Gold

DESPITE all that can be said, the function of gold eludes the grasp of most of those who try to pin it down. On the other hand, there are those who simply cling to the ancient quantity theory, and reason that the less gold, the more it will buy—hence lower prices: the more gold, the less it will buy—hence higher prices. This view was expressed in a recent meeting of mining engineers in New York—that the reason that prices and the general cost of living were higher at present is a direct result of the great production of gold in the year just past. That high prices are due to a surplus of gold is a view that might be hazarded in the United States without much comment; but the prices are equally high or higher in Europe, as travelers and consuls report.

To explain to a Frenchman or a German that prices were high in their countries because there was too much gold might be to court trouble. Indeed, the Frenchman appears at present to be embracing the opposite pole of popular theories—namely, that money remains money with or without gold. Quite regardless, apparently, of the great experiment of Germany along these lines, the volume of francs increases as their current value drops. Possibly, of course, the French Government has been cognizant of the ultimate consequences, and has even perhaps flirted with the idea of letting them come to pass.

There are compensations in being bankrupt. Germany's bankruptcy resulted in a permanent moratorium for internal debts—for all governmental debts, as well as most private debts were discharged in worthless paper, so that when she started anew on the gold standard, she was free from these encumbrances. It would be a great relief for France similarly to go bankrupt, if she dared; and start in again with the same advantages in this respect as Germany.

Utilization of Subterranean Temperatures

A RECENT JOINT MEETING of the National Engineering Societies in New York discussed the question of subterranean heat and its applications. The subject was, as a matter of fact, gingerly approached; and the definite picture consisted chiefly in a description of what had actually been done at one place in Italy—a region of vulcanism, where steam escapes from fissures. This steam has been harnessed and conducted into a power plant of large dimensions. An interesting and novel feature is the practice of boring for more steam, so as to increase the available volume. In some solid portion of the crust in the fumarole field a bore hole is sunk, as if drilling for water or oil. At a certain depth, a steam-carrying fissure may be tapped, and a "gusher" is brought in, which continues spouting pure steam to a great height until piped and harnessed into the central plant.

Evidently, such direct application of the earth's heat to man's needs is possible only in volcanic regions; and in North America and many other parts of the world the heated volcanic centers are not close to industrial centers, as they are in Italy, where, in addition to steam, the ingenuity of Italian engineers has salvaged the sulphur, the boracic acid, the ammonia, and other useful chemicals from the gases exhaled from the lava, cooling not far beneath the surface. Nevertheless, the scientific imagination has traveled out a little along the lines thus suggested; and wondered whether in certain regions other than those of very recent vulcanism, deeper holes or shafts might not penetrate a horizon sufficiently heated to furnish power for industrial purposes. This thought remains in the realm of pure speculation. There is registered in shafts and drill holes actually sunk a gradual increment of temperature with depth; and the increment differs for each locality, being lowest in the United States at Franklin Furnace, N. J., as opposed to those volcanic regions where the increase of heat from the cooled surface down is very rapid. The idea of utilizing this heat, however, remains a fascinating one.

A cognate subject, which was not suggested at the symposium, might well be advanced: the utilization of normal moderate underground temperatures, not to generate power, but to ameliorate living conditions by providing the most healthful and agreeable temperatures for human comfort. The luxury of the underground is well known to the miner, who appreciates the fact that the rock temperature immediately below the surface is constant throughout the year—that it is a cool refuge from the heat in summer and a cozy place in winter. The miner

> "Fears no more the heat of the sun
> Nor the furious winter's rages,"

any more than those disembodied spirits of Shakespeare.

This trick was well known to the cave dwellers of ancient Europe. They were mighty men, capable of slaying the saber-toothed tiger and the mammoth; and of them the Cro-Magnons at least developed high intelligence and a not inconsiderable culture, as is shown by their paintings on the walls of their caverns. Their heating problem was practically solved by the generous warmth of the earth, while their lighting problem must have represented a real hardship and been the subject for much debate over the dying embers. Nowadays modern science has solved the lighting problem also; and many of the brilliantly lighted dining rooms in the hotels and restaurants are really underground, but with the darkness banished by electricity.

Modern man, removed by many generations from his cave-dwelling ancestor, clings obstinately to the exact surface of the earth, and views the subsurface with a sort of claustrophobia, to avoid which he is willing to work. How easy this is to overcome the miner knows.

It is, at any rate, worthy of consideration why it is necessary for people to suffer from the heat in summer, when a cool zone lies just beneath them—far more accessible than mountains or the seashore; or why people suffer with the heating problem and the anthracite strike, when their own house lot not so deep down might be made snug with little or no heating in winter.

Why Not a New Copper-Export Association?

REPORTS FROM ABROAD indicate that close observers of the copper market in Europe cannot understand the lack of a united front on the part of sellers of American copper. Since the virtual collapse of the Copper Export Association, which occurred two years ago, competition between the representatives of the various American groups—including Anaconda, Guggenheim, Phelps Dodge, Nichols, American Metal, and American Smelting & Refining—has been particularly keen at times, though at other times, when business on this side was good, prices in Europe have been well maintained. Furthermore, much American copper has been freely sold to dealers who have no hesitation in cutting prices when demand is quiet. Observers feel that for these reasons American copper is poorly handled, and that the European market is acting as a drag on the American market; that if prices were better maintained abroad, a steadier and higher market would result on this side.

All of which has many elements of truth which are fully apparent to the officials of some of the large copper companies in New York and Boston. The break-up of the Copper Export Association, which made it virtually an Anaconda organization, was caused primarily by the desire of the custom smelters to have an unrestricted foreign market. Their reasons were good, and there would seem little hope of getting them to re-enter the fold. But the tonnage which they have available for export sale is small compared with the total of the other groups. An organization composed of Anaconda, Calumet & Hecla, the Guggenheims, and Phelps Dodge could certainly dominate the European market.

Another factor is now present which changes conditions from those that obtained at the end of 1923. The immense production of Katanga, close to 10,000 tons a month, is now marketed almost entirely by that organization in Europe, competition from this source also being keen and important. Possibly Katanga might be induced to join an association of American producers, thus greatly increasing the dominance of such a body in the European copper market; it would certainly not seem to be to Katanga's disadvantage to do so.

American copper producers should consider carefully any plan that will aid in keeping prices at least at the present level. It is perhaps overly optimistic to expect the record domestic consumption of copper to continue, or to increase, over the next two or three years. The consumption of copper depends upon general business

conditions, and booms do not continue forever. Furthermore, world production is increasing—the rate of production in October was 7 per cent greater than in September, according to the best reports and estimates. There is, therefore, a prospect that careful handling of the copper market and the copper industry will be necessary in 1926 to maintain even present prices, which are recognized by every one as being low. No opportunities for co-operation should be overlooked, especially in Europe, where facilities for such co-operation are freer than here, and where the greatest increase in copper consumption is to be expected.

The Trend Toward Salesmanship

ECONOMISTS have pointed out that distribution problems are among the most important which the producer of the future must solve. Competition has reduced the profits from the producer to the ultimate consumer, so that no longer can the former rely upon the jobber, the jobber on the wholesaler, and the wholesaler on the retailer, for the distribution of the product to the consumer. Those who are relying upon these time-honored but wasteful methods are finding their business taken away by the mail-order houses, by the manufacturers who run retail stores, and by the newly sprung up practice of individual salesmen selling direct from the manufacturer to the consumer. It is not casual, therefore, that the study and practice of salesmanship in all its branches is to the front in every field of industry. The metal-producing industries have experienced this situation, and to meet it are developing their selling along modern lines. The old feeling of aloofness of the manufacturer to the ultimate consumer is gone; and the greatest of producing companies bend their attention to details of ultimate production which will please the housewife and the householder, and induce them to buy this special product instead of any other. The so-called vertical trust—a most logical and beneficent arrangement—is thus originating. The Anaconda Copper Mining Co. mines the ore, smelts it, sells the copper to its subsidiary, the American Brass Co., which manufactures it into the finished article and sells it. The Aluminum Company of America has long done the same, following all the steps from bauxite to ash trays. The Johns-Manville Co. does the same for asbestos. Significant in this respect is the development of the Henry Ford enterprise, which, beginning as a manufacturer and distributor of automobiles, has been securing control, little by little, at their source, of most of the raw materials which go into the making of these cars—thus going into the same vertical chain of complete business as the Anaconda, though starting at the opposite pole.

Marketing—selling—salesmanship—is therefore essential to an unprecedented degree in the mining and metal industries as elsewhere. In the mining and metal industries much of this need of organization is as yet unfulfilled, though the trend is strongly toward fulfillment. The mine or prospect must be properly sold in order to advantage the original owner; but the selling methods are not yet sufficiently developed. The engineer must consider his services in terms of value to his employer and sell himself on that basis: at the moment he is usually unable to do this properly—he is a poor salesman, whether of himself or of a mine. Yet competition demands that he take a hand in the study of marketing, or selling; of ultimate profits; and of the methods by which he can sell himself, his mine, and his metal, in competition with others, and to advantage.

Men Who Cancel Their Subscription

ONCE IN A WHILE we receive a letter like that which lies before us, where the writer takes exception to an editorial, and proceeds to cancel his subscription with an air of having really done something good and dirty to us. All of us are inclined to classify men by types. "You know—the kind of man who, etc." E.g., "the kind of man whose wife buys his neckties"—but on this type we will not enlarge, because some wives are hard to break of bad habits like these—no more, perhaps, then, on this subject. But "the man who cancels his subscription because he disagrees with an editorial," although acknowledging that the journal otherwise is worthy and useful to him, falls into a definite editorial category.

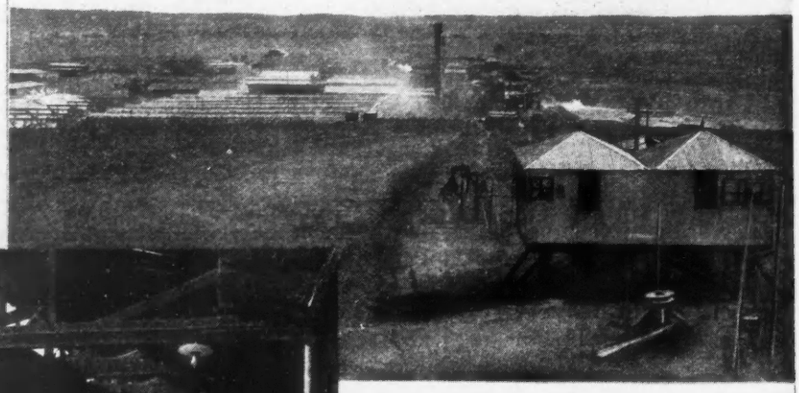
This type almost invariably resubscribes. The representative is a keen, somewhat eccentric, impulsive, and imaginative individual, who cannot bear not to be up to what is going on. Some of our best supporters repeatedly cancel their subscription: their impetus, however, waning, as they get more and more languid reactions from the editor.

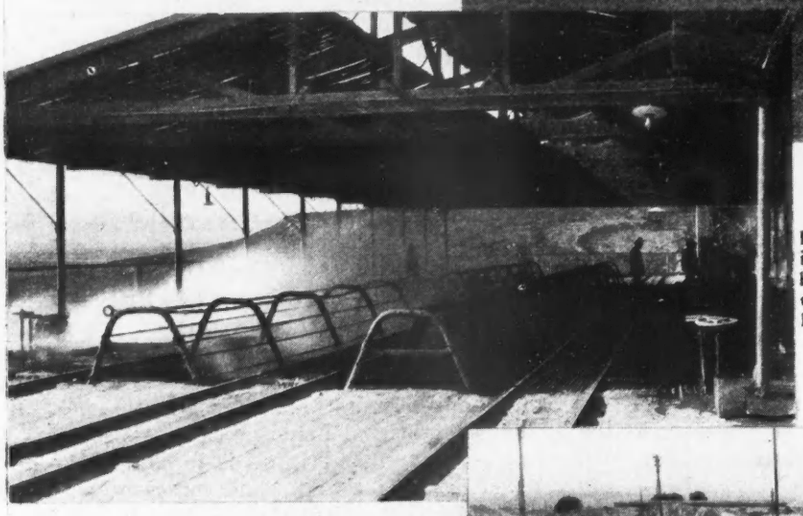
The last case came from England, and he cancels his subscription because he does not like British policies to be referred to in any but terms of praise. We regret this, and apologize, because due to our geographical position we would rather wound American feelings —which we do—any day than transatlantic ones. But the Briton's traditional privilege is to abuse his government, just as the American's is to abuse his. *Mining Journal-Press* is actually and consciously international, which carries with it the privilege of abusing all governments when they are open to criticism: and it avails itself of this privilege. For this the penalty is a certain amount of abuse from our subscribers to the editor, all of which of course is according to the rules of the game. Editorially we have discussed critically international mineral problems of the United States, Mexico, Canada, Germany, France, and Australia. A French subscriber recently cancelled his subscription because we were, he said, anti-French: but in the same breath withdrew it, saying he read the German periodicals, so why not *Mining Journal-Press?* Why not, indeed?

Between the calling-downs we get from British and American subscribers there is, as a rule, a curious difference, the distinction of which may or may not be due to custom on our part. The American gets after us with a rapier, and leaves us in admiration as well as slightly touché; the Englishman (not the Canadian or the Australian or the South African) comes along with a club, and makes heavy work of it. We hope to live to see the time when our English subscribers—we want more of them—will abuse us in a more refined manner. And as we are out for more British subscribers, we protest that we are not anti-anything; that as a matter of fact, the whole editorial staff, without exception, sprung at a period of varying remoteness from England. But the only thing we are consistently pro is the square deal.

Producing Nitrate in Chile

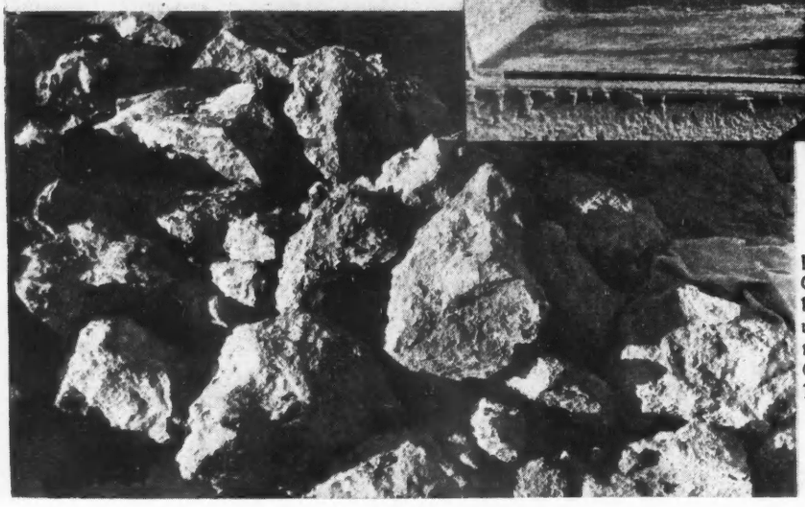
Right: General view of nitrate plant of Oficina Maria, with the pampa beyond. The leached caliche is hauled in cars to the dump by winches housed in small buildings to right





Left: Floor over boiling tanks where nitrate is leached from caliche with steam from boilers fired with crude oil. After the solution is drained off, the residue is removed by hand

Right: Crystallizing tanks with crystallized nitrate removed to shelves where it is allowed to drain, after which it is moved in a small car to storage piles. Tanks are ready for another charge of 60 per cent nitrate solution



Left: Lumps of caliche as mined. At the Oficina Maria it is taken out only 2 or 3 ft. below the surface, averaging 20 to 30 per cent nitrate. In Northern Chile the nitrate content runs as high as 60 per cent, and in Southern Chile about 15 per cent. Photographs by Photoworld Service

Water Handling and Control at the Calumet & Cochise Shaft

Details of Construction of Concrete Bulkhead and Steel Pressure Door Designed to Withstand an Ultimate Strain of 800 Tons—Other Precautions Against Drowning the Pump Station

By James S. Maffeo
Assistant Master Mechanic, Copper Queen Branch,
Phelps Dodge Corporation, Bisbee, Ariz.

OPERATIONS at the Calumet & Cochise shaft of the Phelps Dodge Corporation's Copper Queen Branch at Bisbee, Ariz., serve to supply water for milling and power-plant use and to provide a prospecting base for a large area of the district which the company will want to develop at some future time. To this end the old C. & C. shaft, which bottomed at water level on the 1,000-ft. level, was re-timbered and sunk to the 1,800-ft. level. Two pump stations, one on the 800 and one on the 1,800-ft. level, were cut. These are large enough to accommodate four pumping units, so as to allow for future expansion when more development work is under way, but at present only three are installed. Each of these units consists of a 7x12-in. Aldrich vertical quintuplex pump, with a capacity of 500 gal. per minute against a 1,000-ft. head, driven by a 150-hp. induction motor. The pump and motor foundations are raised 5 ft. above the level of the station floor to give even more leeway than that offered by the 128,400-gal. sumps in case of a breakdown or a sudden inflow of water. On several occasions the wisdom of this arrangement has been vindicated. The sumps are arranged in two compartments, so that one side may be cleaned while the other is in service.

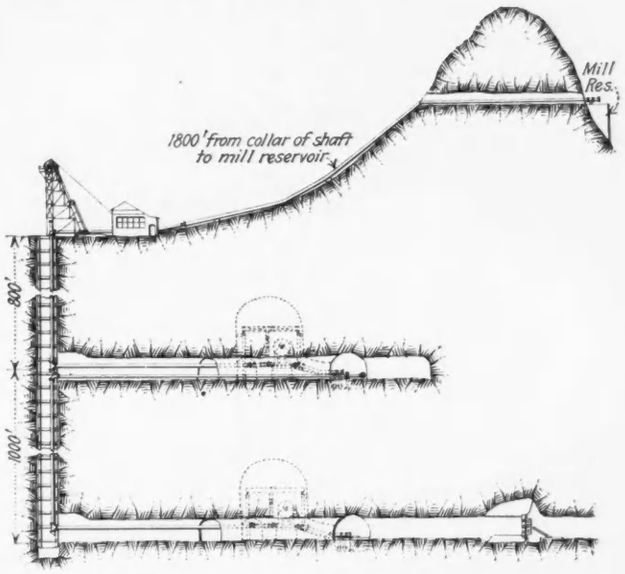


Fig. 1—Calumet & Cochise shaft in elevation, showing the 800-ft. and 1,800-ft. pump stations

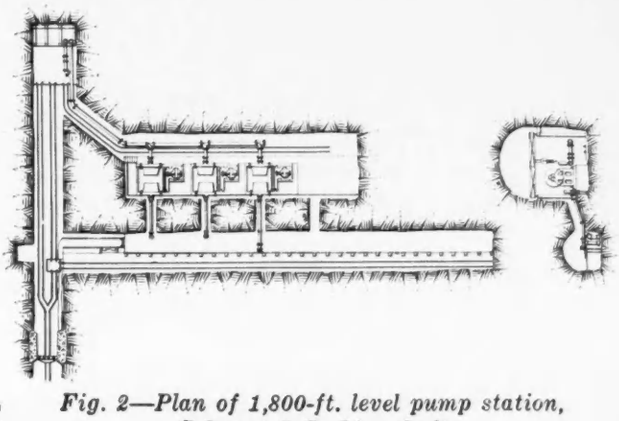


Fig. 2—Plan of 1,800-ft. level pump station, Calumet & Cochise shaft

Fig. 3—Bulkhead and door, 1,800-ft. level, Calumet & Cochise shaft

The 1,800-ft. level pumps deliver water to the 800-ft. level sump and the pumps on the latter level relay it to the surface, the shaft column being of 10-in. pipe in both cases. From the collar of the shaft the water may go direct to the million-gallon concentrator reservoir through a 12-in. line 1,800 ft. long, or be relayed by surface pumps to the "upper camp" for power-plant

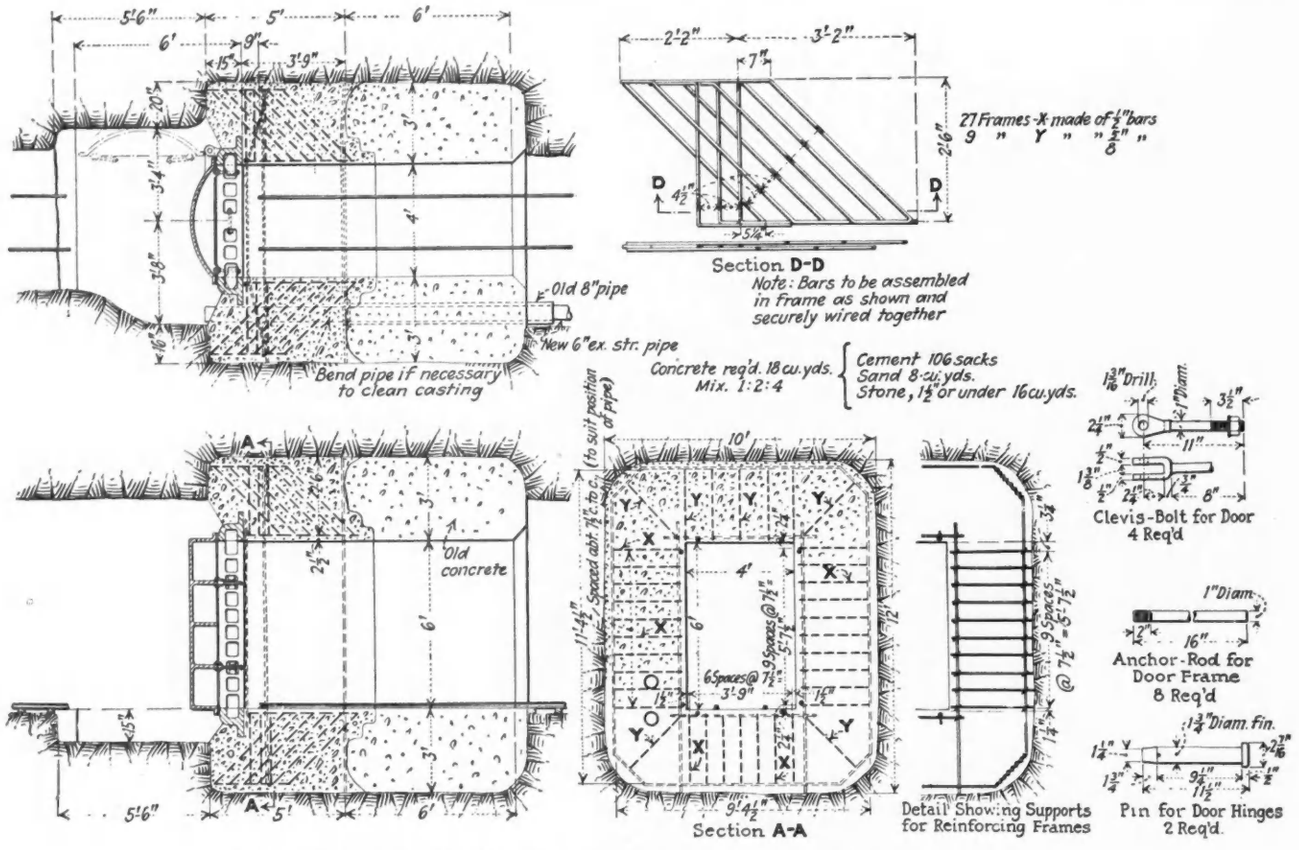


Fig. 4—Details of bulkhead for Calumet & Cochise shaft on 1,800-ft. level

and steam-shovel use; or, when an excess is being pumped during underground development, it may be allowed to run to waste in the gulch.

An interesting safety feature of the installation is the concrete bulkhead and steel pressure door on the 1,800-ft. level. This was constructed and put in place before development work at any distance from the shaft was attempted. The only other deep shaft in the district equipped for handling any substantial flow of water is the Junction shaft of the Calumet & Arizona Mining Co., about two miles away. Heavy flows of water having at various times been unexpectedly encountered in the course of development from the Junction shaft at elevations considerably above the Calumet & Cochise development base, it was considered wise to provide for similar contingencies before much ground was opened. Further, without some such provision the margin of safety during development, if a flow greater

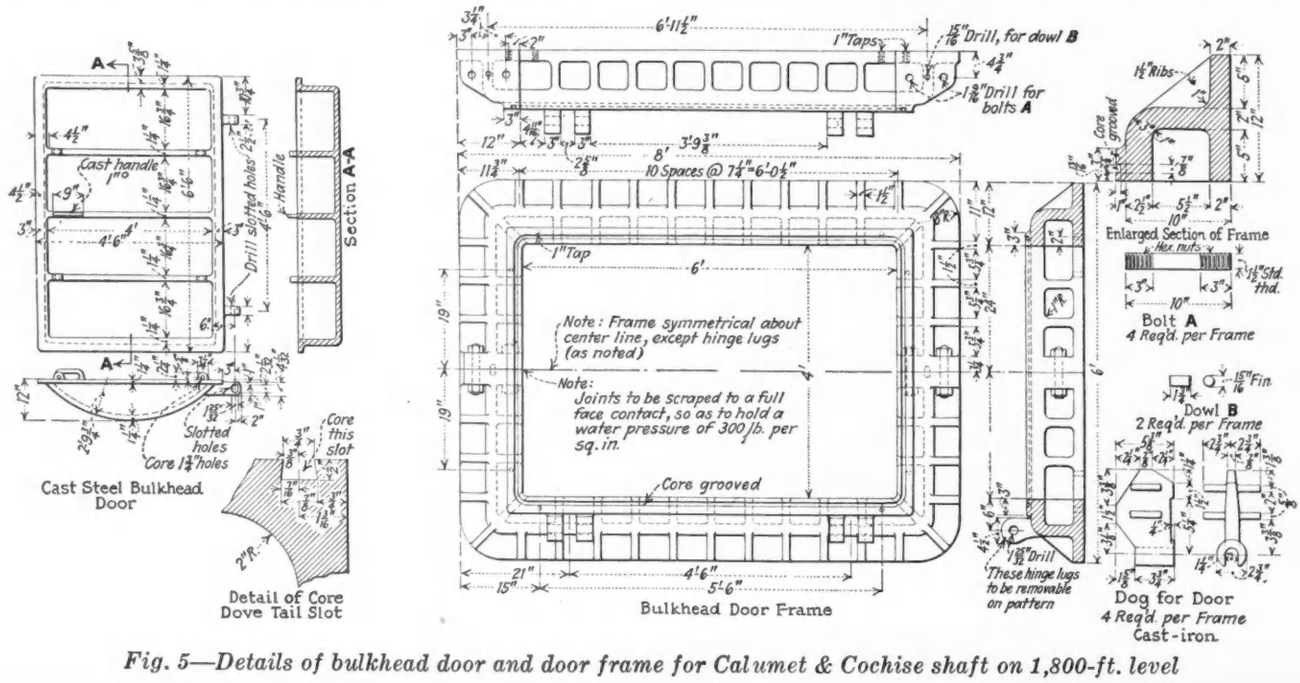


Fig. 5—Details of bulkhead door and door frame for Calumet & Cochise shaft on 1,800-ft. level

than two pumps could handle were encountered, would be uncomfortably small. Should one pump go down, there would be perhaps six hours' leeway in which to make repairs before water would reach the motors and drown the plant.

Cast Steel Frame and Pipes Anchored in Concrete

The concrete bulkhead for holding the steel control door was placed in the main drift on the 1,800-ft. level about 100 ft. beyond the sump. (See Fig. 4.) At the point where it was placed the drift was carefully enlarged to remove any cracks in the ground that might have been made while driving the drift, and also to "hitch" the bulkhead firmly into the rock, as it would ultimately have to withstand a tremendous thrust outward. The roof of the drift on the water side of the bulkhead was cut up and back at an angle, so that in concreting the pressure of the green concrete would always be against the roof, making sure of a tight seal against the rock. A heavy cast-steel frame and two 10-in. pipes, for controlling the flow of water when the door should be closed, were securely anchored in the concrete.

The concrete was mixed on the surface, lowered to the 1,800-level station in 12-cu.ft. mine cars, and trammed to the bulkhead forms. The pouring was made continuous, and with the careful tamping and sealing required four eight-hour shifts to complete. The concrete was allowed to set twenty-one days before the door was swung on the frame. A section of mine track passing through the door was made so that it could be easily and quickly removed to allow the door to close. A dovetail groove runs around the frame where the door makes contact with it. In this groove is inserted a strip of 1-in. square flax braided packing to make a water-tight joint.

At present the water pressure behind the door is 145 lb. to the square inch, equivalent to a hydrostatic head of 335 ft. above the 1,800 level, although two pumps are in operation most of the time to supply the demands of the concentrator, power plants, and other buildings. The flow through the bulkhead to the pump sumps is, of course, regulated to meet requirements by means of valves on the 10-in. pipes. The door is designed to stand an ultimate strain of 800 tons, and with the present head against it it is withstanding an outward thrust of approximately 250 tons. There is no leakage around the joint between the frame and the door, and the seepage through and around the bulkhead has been reduced to practically nil.

The accompanying sketches and photos show clearly the general layout of pumps, sump, bulkhead, and other appurtenances, and also the details of the construction of the door.

A Woman Mining Engineer for Russia

Helen Antonova, the only woman in the School of Mines at the State University, Olympia, Wash., according to a special dispatch to the New York *World*, says she is taking the engineering course because Russia needs experts who can set free her mineral wealth. So apt is Miss Antonova in knowledge of minerals and mining machinery, says the *World*, that instructors who are familiar with her work and qualifications predict for her a brilliant future in Russia.

Why the Technical Man Should Write

In the Nov. 17 issue of *Power*, F. R. Low has the following message for all technical men:

"One of the large industrial establishments has an official or department the function of which is to browse through the current literature of its subject in a search for talent.

"Genius, interest, ingenuity, resourcefulness, straight thinking, facility of expression are as essential to the successful conduct of a great manufacturing concern as machinery and mechanical skill. It is no small part of the work of the executive to keep up his organization; to surround himself with the best in brains and knowledge and ability. The discovery of a man may be as important to the progress of an enterprise as the discovery of a process or the invention of a machine. And the company that finds the best men and fits them into its personnel and develops their possibilities is bound to be the leader unless it is carrying a heavy handicap in other respects. And so the company referred to has all the books and papers in its field, all the proceedings of related societies, all the reports of lectures and meetings and discussions examined to see who is saying things and what they are saying and how they are saying them. And in this way they are brought into contact with men who are actively interested in at least contiguous lines and through their writings, the things that they say and the way that they say them, get a cue to their potentialities as possible units in the organization.

"Many a man has written himself to the fore out of nonentity and obscure surroundings. The best way to perfect and organize one's own knowledge of a thing is to tell it to others, and to tell it with the definiteness and precision of the written word requires self-questioning and analysis that often leads to a more profound insight into the subject on the part of the author himself. Many a gem of useful knowledge is interred with the bones of its possessor. Many a man who has the know-how misses his chance because those who could use his knowledge do not know him. Get out your pad and pencil and write yourself to the fore."

Clays for Petroleum Refining

Fuller's earth includes many kinds of unctuous clays. It is usually soft, friable, earthy, non-plastic, white and gray to dark green in color, and some varieties disintegrate in water. It has been used in California in clarifying both refined mineral and vegetable oils. Clays of the montmorillonite and halloysite group are being utilized by some of the oil refineries in lieu of true fuller's earth in the refining of petroleum products, according to the report of the California state mineralogist.

Montmorillonite (hydrous aluminum silicate) is a colloidal clay, locally called "otaylite" in San Diego County, Calif. Deposits of montmorillonite occur on the mesas on both sides of the Otay River valley. It forms a layer from 2 to 6 ft. thick a few feet below the surface of the mesa, and underlying several hundred acres. Two companies are operating the deposits, the California Clay Refining Co., of Los Angeles, and the General Petroleum Co., also of Los Angeles. The montmorillonite is white, brown, and pink in color, and disintegrates readily when exposed to the air.

German Fuller's Earth—Deposits, Preparation, and Marketing

By R. Deckert
Munich, Germany

GERMAN fuller's earth, being of a high grade, is a rival of the American and English products, although it has some disadvantages, as described in the following notes:

The geology and the origin of the German fuller's earth agree closely with those of the American deposits, and the earth itself is not much unlike that found in America. The areas where it is found are limited and comparatively small and are confined to Lower Bavaria, near Mossburg, Landslout, Achdorf, and Landau. Therefore, German fuller's earth ought really to be called Bavarian fuller's earth. The mining is done—as in America—by hand or with a dredging machine.

Chemical analysis is not actual proof of the worth of the earth, which is essentially an aluminum-hydrosilicate. German earth contains iron, lime, and magnesia as constant companions. Potash and sodium have not yet been found in the German product, as in the American earth. The following comparative analyses are given.

	German Earth from Landau	Earth from Florida
SiO_2	59.00	56.53
Al_2O_3	22.90	11.57
Fe_2O_3	3.40	3.32
CaO	0.90	3.06
MgO	1.20	6.29
K_2O and Na_2O	.....	1.28
Water	12.60	17.95

Physically, as well as chemically, the two earths seem to be identical. Nevertheless, there is one important difference in the chemical reaction, which is the reaction upon hydrochloric acid. American fuller's earth does not change its bleaching power during treatment with hydrochloric acid, but the German earth reacts in an absolutely different way. It does not essentially change its chemical constitution, but its physical condition is extremely altered during treatment with hydrochloric acid. The bleaching power of the German fuller's earth, as it comes out of the mine, is much smaller than that of the American earth. If the German earth, however, is treated with hydrochloric acid, its bleaching power increases and surpasses that of the American fuller's earth; hence the so-called German high-active fuller's earth.

The raw earth, as it comes from the mine to the factory, is washed with water to free it from mud. In the meantime, all dirt, stones, and organic admixtures are removed by screening. The earth, after having been washed until there is only a thin pulp left, is mixed with a certain quantity of hydrochloric acid in an acid-proof tank and heated to the boiling point for several hours by introduction of steam. The stirring machine prevents the fuller's earth from settling, so that it is always in contact with the hot hydrochloric acid. This operation having been completed, the mixture is placed in a large storage reservoir, where the greater part of the hydrochloric acid is removed. From the reservoirs, the earth is pumped into filters, where it is finally freed from the remaining acid and liquid. By washing with water in the filter, any residual acid is removed. The fuller's earth, as removed from the filters, contains about 60 per cent of water. To eliminate this water, the earth is put into a kiln, where the moisture is reduced to about 10 per cent. It is not necessary to remove all water, as the German fuller's earth absorbs water to the extent of about 10 per cent. The earth comes out of the kiln in pieces from 1 to 2 in. in diameter.

Different systems of grinding are used, each factory having a method of its own. As contrasted with the American bleaching earth the German earth is ground very fine, as the bleaching power is improved by fine grinding. The products of the different firms, however, show a great variation in fineness of grinding. The disadvantage of too fine a grinding lies in slower filtering, so that more oil is retained and it is difficult at first to obtain a clear filtrate. The most important firms engaged in the preparation of German fuller's earth are A. and M. Osteurieder, Wildhagen and Falk, Kitzingen o/ Main; Sirius Works, and A. G. Deggendorf, all of Mossburg.

It is essential that bleaching earth, which is treated with hydrochloric acid, be so prepared that it does not contain a trace of acid.

The total production of German fuller's earth in 1924 was 48,000 short tons, including both the high-active earth, prepared with acid, and the raw earth which was sold without treatment. Some firms produce not only the pure high-active earth, but also mixtures of raw earth and earth treated with acid, which are cheaper, but do not bleach so well.

Some grades of earth are offered for sale which contain a small amount of discoloring matter (carbon). This is preferred for oils that are very hard to bleach. Exact production of German fuller's earth is difficult to ascertain, because fuller's earth is not listed in the German statistical price list and it is not mentioned in the cargo tariff of the German railways.

German fuller's earth is packed in bags containing about 80 kg. Barrels are not used. If for export overseas, the earth is put in bags. Freight by rail to Hamburg is about 250 marks for every fifteen tons of high-active German bleaching earth and 200 marks for raw earth f.o.b. the South-German railway station.

The selling price of German fuller's earth has been very low, the high-grade earth selling at 28 marks early in this year. This price is now reduced to 18 marks f.o.b factory. The selling price for raw earth amounts to 6 or 7 marks f.o.b. factory. The chief seaport towns for the export of German fuller's earth are Hamburg, Rotterdam and Geneva. German purchasers are mostly in Hamburg and its surroundings, though a few are on the lower Rhine, near Neuss. A considerable part of the German bleaching earth is consumed by Dutch oil concerns. The olive oil refineries of Italy and Spain import larger quantities of German bleaching earth than of American fuller's earth, because of the great saving in the freight charges. Jobbers do not handle German bleaching earth, as it is usually sold by the producer to the consumer. German oil refineries have not been much interested in the production of the bleaching earth, although it would be to their advantage to control its production in order to secure a supply of cheaper and equally good earth.

Inflation in Germany has retarded the development of the bleaching earth industry, and the producers as well as the consumers suffer from want of capital. For that reason the machinery is often old-fashioned and the industry does not yield the profit that could be gained with modern equipment.

There are sufficient quantities of raw earth for many decades, and new deposits are discovered frequently.

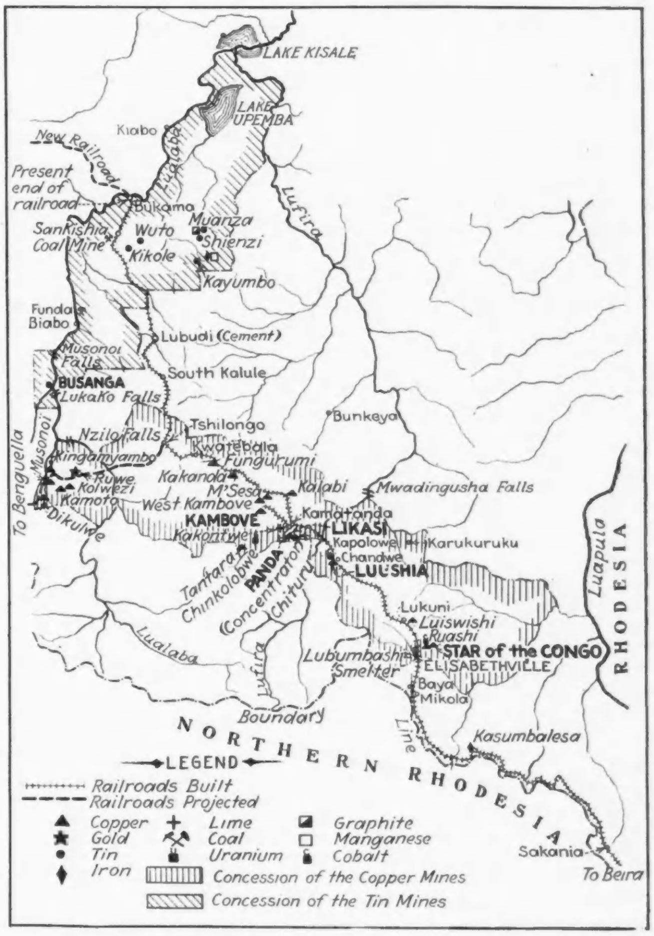
A Journey to South Africa—V

Train Service, Bulawayo, the Tomb of Rhodes, the Falls of the Zambesi, Livingstone and the Slave Trade, the Tse-Tse Fly, the Copper Mines of Northern Rhodesia

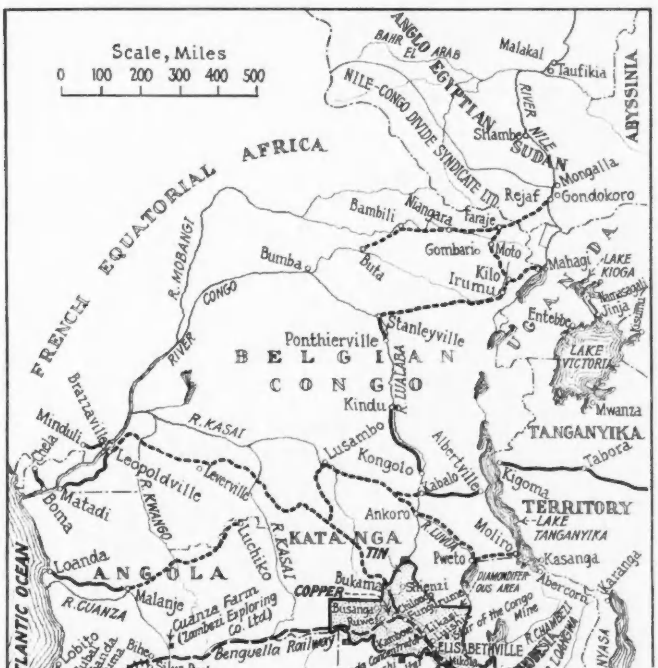
By T. A. Rickard

WE LEFT Johannesburg on April 12 on our way to Bulawayo, in Southern Rhodesia, a distance of 681 miles, and consuming two nights and one day. The trains, on a 3½-ft. track, are slow, as might be expected in a country sparsely populated, but they are comfortable. We traveled in compartment cars, provided with excellent beds. The food is good; the prices of meals are reasonable, and they are served *table d'hote,* which is a system our Pullman service might adopt with advantage because it avoids much waste, in carrying an excessive variety of supplies, with a concomitant unnecessary cost to the passenger.

The first morning we found ourselves at Mafeking, on the main line from Kimberley to the north. The name of Mafeking has become a synonym for hysteric jubilation ever since its heroic defence under Baden-Powell during the Boer war, and its relief on May 17, 1900, which was celebrated all over the British dominions, from Toronto to Melbourne, in scenes of reckless jollification, such, for example, as take place recurrently in San Francisco on New Year's eve. The country



Mining concessions of Union Minière du Haut-Katanga, Belgian Congo, as mapped in 1923



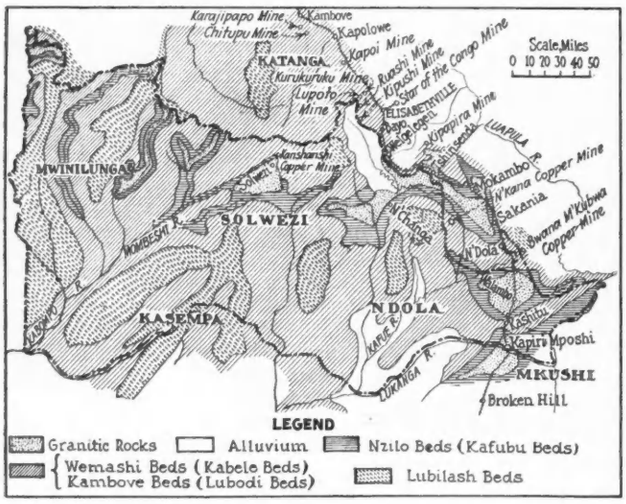
Central Africa, showing the concessions of Union Minière du Haut-Katanga, as mapped in 1924. The stippled area near the center is the concession

through which we passed going north from Mafeking reminded me of Western Australia; it was a grassy veldt with a scattering of thorn trees of the acacia species. However, thanks to the recent rains, the grass was much thicker than is usual on the goldfields of Western Australia; indeed, all the country through which we passed from Cape Town to Bulawayo was greener and gayer than we had any right to expect, and pleasantly free from dust, on account of our journey being made at the end of the rainy season.

Bulawayo has a population of 7,000 whites and about 12,000 natives. The morning after our arrival we went to see the tomb of Rhodes, 30 miles distant, southward, in the Matoppo hills. We went thither in a Willys-Knight car, and saw natives cutting the grass alongside the road with a McCormick mower. We saw numerous antelopes and baboons; also a leopard. One of my friends was inclined to wave his hands to the natives in cheerful greeting, but the driver told us that "it was not done," it being deemed desirable that the white man should preserve his dignity before the natives.

Even if a native steps aside, hat in hand, it is customary to ignore his courtesy. This, it seems to me, is carrying the idea a little too far; an acknowledgment of politeness does not detract from one's dignity.

The tomb of Rhodes is approached by an easy climb of less than a mile along a path that leads to the top of a granite tor, a bare hilltop, smoothed by erosion and weathering so as to present a nearly level rock floor, on which rest four big boulders, eroded in place, not of glacial origin. Encircled by these, and in the solid granite underfoot, lies the grave of the great adventurer.



Map of holdings of Rhodesian Congo Border Concession, Ltd. Geology from F. E. Studt's map

The inscription reads: "Here lie the remains of Cecil John Rhodes." Near by, but outside the circle of granite boulders, sleeps his comrade Jameson. His grave is inscribed: "Here lies Leander Starr Jameson." I liked the absence of titles, and even of dates; in the presence of death all prefixes and suffixes seem pathetic. Every person who comes thither is supposed to know when these great men lived and died. Rhodes died prematurely, when only forty-nine years of age, in 1902. Jameson died in England in 1917, and his body was taken to Africa, after the war, to be laid beside his chief on the View of the World, as Rhodes named the spot at the time of his first visit, when the remains of a celebrated Matabele chief, Moselikatze, were found there, sitting erect, under a boulder. Rhodes determined there and then to make it the Valhalla of Rhodesia. The altitude is not great and the view is neither extensive nor imposing, but, standing by the grave of Rhodes, the eye of the imagination gains a wide perspective of the romantic drama of African development, and of the work done by its great pioneer, the empire builder who had been an Oxford student when yet a diamond digger. In Bulawayo one finds a handsome monument to Rhodes. Indeed, the Rhodes tradition is strong in South Africa; no orator can speak effectively without referring to him and to his work. As Kipling has said: "Living he was the land, and dead his soul shall be her soul."

At Bulawayo was the kraal of Lobengula, the great chief of the Matabele, from whom this mining region was wrested by the British after several bloody fights. Jameson's last visit to the town was made in 1913, when he had succeeded Rhodes as chairman of the Chartered Company. On the spot where he had wrestled with Lobengula in debate for many days, and had held his own in perilous rivalry with savage indunas and hostile concessionaires, there stood a pretty garden, with English flowers, and the white walls of the Governor's residence. In the tawny plains where he and his servant, twenty-five years earlier, had fought wild dogs, and made fires to protect themselves against lions, there rose now the smoke of English homesteads and the lowing of Hereford cattle. These are his enduring memorial. One is glad to doff the hat to the men that broke the trail for civilization.

We left Bulawayo after a stay of two days, and proceeded to the Victoria Falls of the Zambesi, 280 miles northwestward, at an altitude of 3,000 ft. above sea level. The great leap of the Zambesi is one of the wonders of the world. The edge of the Falls is 6,000 ft. long, and the drop is 400 ft. Niagara has an edge 2,500 ft. long and a height of only 160 ft. The Zambesi falls into a chasm, or rift, in basaltic rock; this rift is only 150 yards wide, and has only one outlet, which narrows to 80 yards, so that the depth of water must be fully 200 ft. We were there at the close of an unusually wet season; therefore the volume of water pouring over the brink was stupendous—about 120,000,000 gallons per minute! Owing to the warmth of the tropical climate the spray does not condense quickly; therefore a huge cloud rises from the Falls, to be seen at a distance of 28 miles. The roar of waters can be heard 15 miles away; hence the native name, Mosi-oa-tunya—"the smoke that sounds." The railroad crosses the gorge below the Falls over a cantilever bridge, and from there usually one can obtain a good view of the rushing waters, but when the river is in flood the Falls can be seen best by going into the so-called rain forest, on the near side of the deep rift into which the water tumbles. This has to be done in bathing costume. When the wind blows aside the sheets of rain one obtains a fleeting glimpse of the stupendous cataract, as of ten thousand horses with white manes and white tails plunging headlong into the seething abyss. To an engineer the waste of this natural energy makes an instant appeal. We could not see the whole face of the Falls, nor any large part of them, from any one place, but by moving from one point of vantage to another, on the edge of the chasm, we obtained successive glimpses of different parts, and so gained a proper impression of the immensity of the phenomenon, the beauty of which is enhanced by the fact that its natural setting, in the tropical jungle, remains as yet unspoiled. Next day we went up the Zambesi in a motor boat and saw something of the river scenery.

To the engineer, of course, the non-use of the tremendous natural power of the Victoria Falls is a matter for questioning. A company owns the concession, and plans were afoot many years ago for the electric transmission of the power to the mines of the Rand, but Johannesburg is nearly 1,000 miles distant, by way of Bulawayo, and transmission of a 220,000-volt current is unusual beyond 500 miles, but in a short time the use of a current of higher potential may render practicable transmission of double this distance, provided suitably large units are employed. Two other obstacles to the industrial use of the Falls may be mentioned, one of which is the white ant, which destroys all soft woods, and the electric storms, which are frequent in this part of Africa. The present concessionaire company, I must add, has adopted a dog-in-the-manger policy, for, not content with its own lack of initiative, it excludes others

from using the Falls as a source of energy. The company operating the Broken Hill zinc mine, 375 miles north, desired to obtain power from the Zambesi, and was refused access, so that it had to construct a dam at Mulungushi, much nearer the site of its operations.

While at the Victoria Falls we stayed at an excellent hotel, built to accommodate tourists. Natives, wearing white smocks, but with bare legs and feet, are the servitors. They are decorated with a red ribbon, across the chest, by way of uniform. The only objection that I had to them was one that my nose detected; some are more unpleasant than others, but all the natives are open to this objection, although, it is fair to add, they say that the whites, some more than others, are similarly unpleasant to them. In the grounds of the hotel, and around the neighboring bungalows, one sees a profusion of tropical flowers in luxuriant growth, such as bougainvillea, poinsettia, and the golden shower, a creeper somewhat like a glorified honeysuckle.

The Falls of the Zambesi were discovered by David Livingstone in 1855. From here to Zanzibar, a distance of 2,500 miles, we crossed the trail of the heroic missionary repeatedly, for he spent many years in this central part of Africa, bringing the kindly light of his winning personality into the darkness and dirt of savagery. He tried hard, in the course of his long years of exploration, to solve the riddle of the Nile's sources, and at the last was misled into believing that some of the upper tributaries of the Congo were those of the river of Egypt. Another subject that engaged his earnest attention was the slave trade, the horrible evidence of which pained his gentle heart, and caused him, strenuously and successfully, to use his pen in an attempt to bestir England, and Europe generally, to make a determined effort to end the horrible traffic. He exposed the villainies of the Arab and Portuguese traders, and it was fitting therefore that his epitaph in Westminster Abbey should quote his eloquent appeal to heal "the open sore of the world." Not more than twenty years ago mining explorers in these parts, on the Zambesi-Congo divide, came in contact with both slavery and cannibalism. I have talked with men who broke into a native village and released slaves that were in chains, expecting not only to be killed but to be ingested by their captors, black men like themselves. A red trail of human blood crossed Africa from Zanzibar to Benguella, and over that bloody trail came many of the forefathers of our own negroid population. The ivory trade was the incentive to traffic in human stock; when the supply of ivory ran short, the natives, not the Arabs and Portuguese only, used captives for barter, to buy foreign goods. Four yards of cotton cloth was the price of a man. Legitimate commerce proved the cure for the inhuman trade—that and the ideas of compassion implicit in Christianity.

From the Victoria Falls we went to Bwana M'Kubwa, which means "big chief." On our way thither we stopped one evening at the station, 374 miles from the Falls, that serves the Broken Hill mine, rendered celebrated recently by the discovery of the skeletal remains of prehistoric man. Formerly this mine yielded lead, but its resources are now in ores of zinc and vanadium. The digging of the lead ore has removed a kopje, or hillock, and left an excavation 225 ft. deep, from which six to eight million gallons is pumped daily. The dam just completed at Mulungushi, 35 miles westward, was visited recently by the Prince of Wales, this being his farthest north in Africa; it provides the electric power to perform the pumping cheaply, for 2,400 hp. will be available forthwith, out of the 10,000 hp. eventually to be developed. While taking supper at the station we had the pleasure of meeting Mr. Ross K. Macartney, the manager of this mine. Here I may note the fact that in our journey from Johannesburg to Bulawayo we were fortunate in traveling with Mr. L. B. Woodworth, another distinguished mining engineer, whose acquaintance I made in an amusing manner. As I was leaning out of the window of the train, just before our departure from Johannesburg, I overheard two men in conversation on the platform close by. One said: "I hear that Rickard, of the *Engineering and Mining Journal*, is in town." The other said: "I would like to meet him"; whereupon I touched him on the shoulder and said, "He also would like to meet you." We traveled together for three days, most enjoyably.

Our journey from the Falls northward was delayed by the derailment of a freight train; the coupling of our dining car broke, and that caused further delay. It was noteworthy how the punctuality of the train service suffered progressively as we went north. The recent heavy rains were the chief cause, although the railroad follows the crest of the watershed and is in the bush therefore all the way, save for an occasional glade through which the plains can be seen. In the clearing one sees the native kraals and near them patches of mealie. In approaching the Kafue River, an important tributary of the Zambesi, the railroad crosses a wide lagoon full of pink and white lilies. That is the place for mosquitoes. We went through Lusaka, where I had been told my friend W. E. Thorne, formerly of California, was engaged in examining an alleged gold placer. I sent a boy with a note to the hotel, near the railroad station, but unfortunately the train pulled out too soon for me to shake hands with Mr. Thorne. This part of the country is covered by tall brush, or small trees, 50 to 60 ft. high, with long grass, 8 to 10 ft. high, between them. One can see little except the ant hills, which are numerous and large, 20 to 25 ft. high, veritable

Victoria Falls of the Zambesi as seen from the railroad bridge

In the Bwana M'Kubwa workings

hillocks, mantled with grass and scrub. The mornings and evenings were cool, and even the heat of the day was mitigated by the absence of dust. The twilight is brief, the brilliant sunlight giving way suddenly to a velvet blackness, glorified by a vision of stars, including an unfamiliar Milky Way, brighter and bigger than we see it in the North.

The independent prospector is a rare bird in this part of the world, and for a good reason: the country is plastered with big concessions, some of them not even surveyed, so that if he discovers an outcrop of mineral he is only too likely to learn that he is merely a trespasser. If he discovers ore on ground not claimed by others, he may find himself mining a product, such as chrome, that brings him in competition with a company already operating in the region; whereupon he is ruined by high railroad freight rates. Indeed, in a locality so remote an individual can do but little unless backed by considerable capital—and influence in high quarters.

Bwana M'Kubwa is on the Zambesi slope of the divide that forms the boundary between Northern Rhodesia and the Belgian Congo. A big outcrop of copper ore forms a rocky ridge close to the railroad; this is the top of a mine in which it is estimated, by competent engineers, led by Mr. Carl R. Davis, there are 4,500,000 tons of ore averaging 3.65 per cent copper. The country is quartzite, and the ore follows the bedding, which is at a high angle. The outcrop was discovered in 1902, and a little exploratory work was done soon afterward, while awaiting the railroad, which was extended to the mine in 1909. Three years later a concentrator, with Wilfley tables, was erected, but it proved unsuitable for treating the ore. However, this mill was operated until September, 1914, and was then shut down on account of the war. Until 1910 the property belonged to the Rhodesia Copper & General Exploration Co., Ltd., and in that year ownership was transferred to the Bwana M'Kubwa Copper Mining Co. In 1916 operations were re-started, to continue in a desultory manner for two years. In 1922 work was resumed on a program of development, and in 1923 a pilot plant of 100 tons' capacity was erected, in preparation for a reduction works capable of treating 1,000 tons per diem. About £500,000 had been spent on this mine before the present owners acquired it for a relatively small sum, namely £50,000; and they are now proceeding to make good use of their opportunity.

The chairman of the company and managing director is Mr. Edmund Davis, a gentleman of long experience in such affairs; he has the assistance of an able mining engineer in the person of Mr. A. Chester Beatty, whose name bears the suffix U.S.A. on the company's stationery. It is interesting to note that two other directors, besides an alternate, are labeled "British, German origin." I do not know whether such information is required by law, or whether it be done to disarm criticism. The consulting engineers are Minerals Separation, Ltd., which means, specifically, Messrs. P. K. Horner and Walter G. Perkins, of that company.

The outcrop is 2,600 ft. long and stands 70 ft. above the plain. The richer ore, 8 to 10 ft. wide, in the middle of the lode, which is 65 to 70 ft. wide, was extracted down to the 200-ft. level by the former owners. One shaft has been sunk to 500 ft., and crosscuts have been extended through the lode at successive levels, a hundred feet apart, so as to permit of a trustworthy estimation of the reserves. A heavy inflow of water was struck at 500 ft., at which level also sulphide mineral appears. It is proposed to exploit the orebody by means of a terraced open-cut to a depth of 250 ft., stepping down in benches 300 ft. wide. Two Bucyrus steam shovels with dippers of 3½ cu.ft. capacity will do the digging, the removal of the material being effected by three Hunslet locomotives and fifteen Western Wheel scraper-cars provided with an air-dumping equipment. The ore, thus mined by steam shovel, will be delivered in due course to a No. 15 McCully gyratory crusher, which will reduce it to 4 in.; thence it will be conveyed on a 36-in. Robins belt to a bin; from the bin the ore will be passed to two 48-in. disk-crushers of the Hadfield type, and reduced by them to 2 in. The sizing will be done by Hum-mer rotary screens, the undersize to ¾ in. will be separated, the remainder going to two 54-in. Hadfield rolls. These crushed products will be gathered onto a conveyor that will take them to a series of cylindrical steel bins of 3,000 tons' aggregate capacity. From these bins the ore, now crushed to ⅛ in., will be conveyed to the pre-heating furnaces, each 60 ft. long and 8 ft. in diameter. In them the ore is to be heated to 540 deg. C. before passing direct through gas-tight valves to the reducing furnace, also 60 by 8 ft. Here the ore will be met by a counter-current of producer gas, not ignited, but

Excavating the site for the Bwana M'Kubwa plant

acting merely as a reducing agent, the purpose being to reduce the copper oxide, carbonate, and silicate to sponge metal. The product of this furnace will be conveyed to a bin of 500 tons' capacity, from which it will be fed to 42-in. rolls, and thence to a steel bin, which will supply the charges required for ten vats, each of 54-ft. diameter and 14 ft. high, equivalent to a capacity of 1,000 tons apiece. In these vats the ore will be leached with a solution of ammonium carbonate —that is, 5 per cent NH_3 and about 5 per cent CO_2. The copper will be dissolved until the solution is saturated, to 5 per cent of copper. One vat will be charged while another is being discharged, seven days sufficing for a complete circuit in ten vats. Then the coppery solution will be pumped into another series of vertical cylindrical vats, with conical bottoms. These are the "evaporators." Steam will be admitted to expel the ammonia, leaving a residue of cuprous oxide, CuO, which will be mixed with tar and charged into a reverberatory furnace. There it will be refined to metal of 99.95 per cent fineness. It is a remarkable fact that the first slag from the pilot plant contains from 30 to 35 per cent of phosphoric acid, P_2O_5, from the phosphate of copper in the ore; this phosphate goes through the entire process and is precipitated with the cuprous oxide.

Throughout the foregoing sketchy description I have used the future tense, because the plant was in process of building at the time of our visit. One steam shovel had just begun to break ground, and the various buildings, together with some of the apparatus, were being erected. The copper produced from the pilot plant at Bwana M'Kubwa is said to rank on the London market as "superior best selected"; the chairman stated at a recent meeting of the company that it would be delivered, when treating 300,000 tons per annum, for less than £45 per ton, which is equivalent to 10c. per pound. He anticipated a profit of £175,000 per annum. The output is expected to be about 300,000 tons of ore per annum, to yield 22,000,000 pounds of copper per annum.

A few notes on the ammonia process may be welcomed. The chemistry of the process, as has been elucidated by C. Harry Benedict, is based upon the fact that both the oxide of copper and the metal itself, in the presence of free air, are dissolved in ammonium carbonate, forming cupric ammonium carbonate, according to the reactions:

$$Cu + O = CuO$$

$$CuO + (NH_4)_2CO_3 = CuCO_3.2NH_3 + H_2O$$

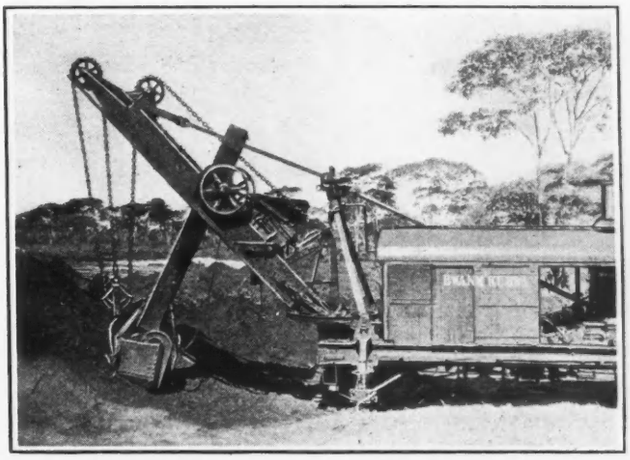
The cupric ammonium carbonate, in the presence of native copper, but without free access of air, is reduced to the cuprous state.

$$CuCO_3.2NH_3 + Cu = Cu_2CO_3.2NH_3$$

Mr. Benedict proceeds to state:[1] "The cuprous ammonium carbonate in the presence of air oxidizes rapidly to the cupric state, and as such is capable of dissolving a further amount of copper. Now either the cuprous or cupric ammonium carbonate, when subjected to boiling or distillation with steam, loses its ammonia and carbonic-acid gas, both of which can be absorbed in water and recovered, and as these are driven off, the cuprous or cupric oxide is thrown out of solution either as a heavy powder or as a scale, according to this reaction:

$$CuCO_3.2NH_3 + H_2O + Heat = CuO + (NH_4)_2CO_3$$

[1] *E. & M. J.*, July 14, 1917. "Ammonia Leaching of Calumet Tailings."



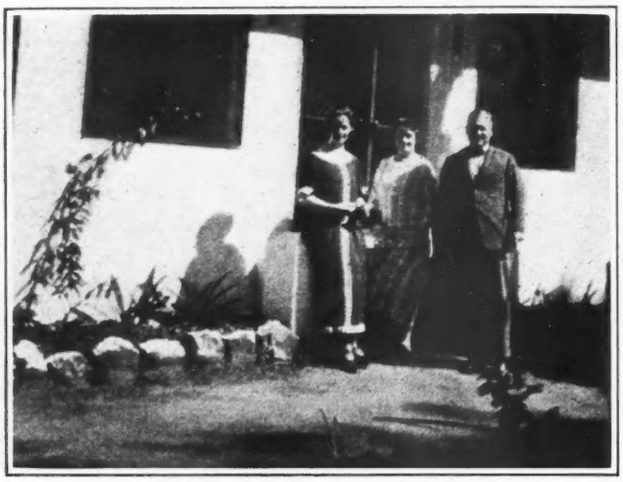
Steam shovel at work at Bwana M'Kubwa

If these reactions are followed through, it will be found that the solvents are quantitatively regenerated and that the only consumption of a chemical is that of oxygen from the air.

This process has been developed by Walter G. Perkins on the basis of the work done by Mr. Benedict at Torch Lake on the Calumet & Hecla tailing, containing native copper, and by W. J. Cayzer at the Kennecott mine on straight carbonate ore. Mr. Perkins ascertained that the silicate is not attacked by ammonium carbonate, but that in the pre-heating stage, at 550 deg. to 600 deg. C., he can break up the silicate, producing copper oxide, which is converted into metallic copper in the reducing furnace. Thus when the leaching starts the conditions are those obtaining at Torch Lake—namely, a product containing native copper, except that the Lake Superior copper is lumpy, whereas that of the Bwana M'Kubwa plant is spongy, and therefore more amenable to leaching. At Torch Lake a pulp pulverized to 40 mesh is required, whereas at Bwana M'Kubwa a comminution to only 3 mesh suffices. Moreover, the preheating and reducing yields a material fitted for leaching on account of the beneficial effects of dehydration and decolloidization. The copper phosphate in the ore becomes cuprous ammonium phosphate, but returns to the state of copper phosphate before the refining stage is reached. Then it serves to clean the copper by combining with the iron, bismuth, and minute traces of other metals. That is one reason why the final metallic product is of such purity—namely, 99.85 to 99.91 per cent.

At the start it will be necessary to use imported ammonia, but shortly afterward it is expected to make ammonia out of Wankie (Rhodesia) coal, which contains twice as much as is required. The carbonic acid gas, CO_2, will be obtained from the producer, by use of charcoal. The ore contains no precious metals; if any existed they would remain, insoluble, in the residue.

While at Bwana M'Kubwa we were accorded the utmost hospitality by Mr. Harold T. Dickinson, the manager. We slept in the guest house, and sat at the table of Mrs. Dickinson. After dark, our hosts never allowed us to walk from one house to the other, a distance of a few hundred yards, without a lantern, to keep clear of snakes. Every house has several "boys," or natives, usually six, one of whom acts as messenger in default of a telephone service. At sundown daily we met at the quarters of one or other of our friends, and then took our quinine pills, together with a whiskey



Mr. and Mrs. Dickinson and Miss Dickinson at Bwana M'Kubwa

and soda or a Tom Collins, the chief ingredient of which is gin. Everybody takes quinine regularly as soon as the sun is low on the horizon. With the alkaloid goes a "drink." One suffices, but more than one is not uncommon. We started to take five grains of quinine, in the soluble form, as chloride, the day before we reached Bulawayo, and we continued the daily dose for two months. Quinine affects one's digestion, and sometimes one's hearing; it is unpleasant, as most antitoxins are; but it is absolutely necessary in a region infested with malaria and its carrier, the anopheles mosquito. Not one of our party of three suffered even a touch of fever during the journey, or since.

From Bwana M'Kubwa we went to N'Changa, on the invitation of the manager, Mr. Raymond Brooks, to see the exploratory operations he is directing for the Rhodesia Congo Border Concessions, a company that owns prospecting rights over 50,000 square miles, for six years. In this venture also Mr. Beatty is heavily interested, as well as the Minerals Separation Co. We went with Mr. Brooks in an automobile 93 miles along a road cut through the tropical bush. Our luncheon consisted of sardines from France, Apollinaris from Bavaria, white wine from Cape Town, cake from London, sandwiches made with flour from Australia; the only American things were the consumers and the automobile. The road was excellent and well shaded by trees, so the journey was comfortable. We saw some large baboons. The Kafue River was crossed on a ferry made out of four dugout canoes. Bathing in this river is said to be good, but it is advisable to fire some dynamite cartridges in the water before taking a dive—otherwise the crocodiles may prove inconvenient. Another desirable result will be capture of some fish, resembling bream, and, like the fish of other tropical rivers, tasteless.

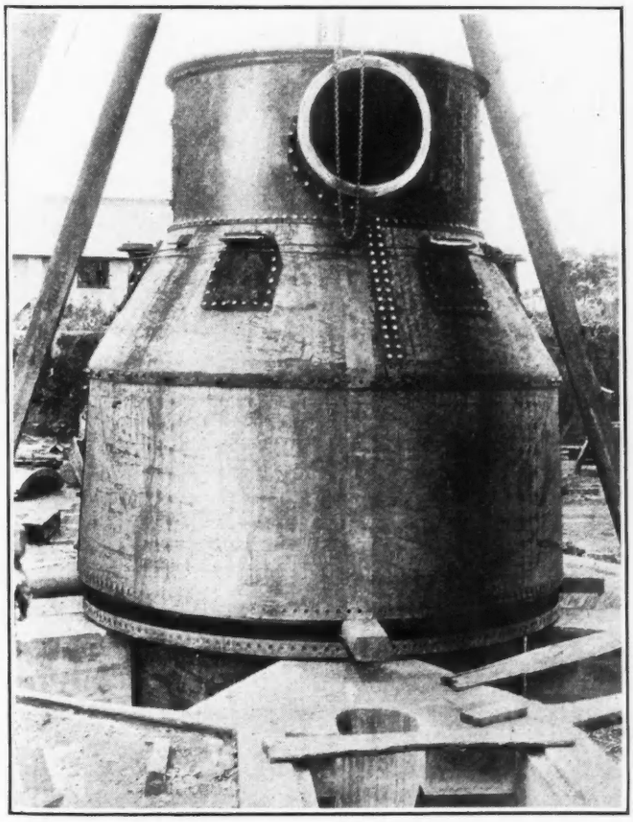
Near the river I noticed some natives engaged in repairing the road; they were carrying loose dirt in a piece of bark, a portion of the round section, so that it had roughly the shape of a bowl. This is an interesting example of a most primitive container. Note may also be made of the fact that next day in strolling to one of the workings we passed three women sitting in the grass; as we passed they clapped their hands gently by way of salutation. The natives in this region pay hut-tax of 10s. per annum, this being equivalent to a month's wages. This tax seems a fair return for the administration of justice and the protection they receive from predatory tribes. Undoubtedly the natives are benefiting from the European régime, in that they are now free from slave raids, witchcraft, and inter-tribal fighting.

In the valley of the Kafue we made our first acquaintance with tse-tse. These flies flew about the automobile, and inside, where we defended ourselves with switches made of the hair of the zebra's tail. Over my hat I wore a net that I owed to the kindness of Mrs. Dickinson; the others though it unnecessary to wear theirs. The flies pursue anything in motion in preference to stationary victims. Their range was limited to a belt about five miles each side of the river; and it is remarkable how clearly defined this belt was. Apparently the pest favors the moist warm bottomlands, probably because it prefers, or requires, the damp vegetal debris as a depository for its larva. The tse-tse is a blood-sucking fly, like the horsefly, which it resembles in appearance, except that it is brown. Several kinds of tse-tse are known, the most important being that which transfers a protozoön parasite to the blood of domesticated animals, killing them, and the other the fly that injects this poisonous protozoön into the blood of human beings, causing *trapano-somiasis*, or sleeping sickness, which must not be confused with the so-called "sleepy sickness," *encephalitis lethargica*, of which, for example, Mrs. J. P. Morgan died recently. This latter is a germ disease of unknown origin. The true sleeping sickness, caused by the African tse-tse, runs a course of one to five years, starting with intermittent fever, and ending with drowsiness and coma. The poison is injected into the blood of the victim with the saliva of the insect during the act of biting. The bite is sharp, but not painful, and the subsequent irritation is less than that caused by a mosquito. The tse-tse has long been recognized as the scourge of tropical Africa; Livingstone's first book has a picture of this insect on the title page; it has killed a million people in the last twenty years; it has done much to delay the exploration and development of Central Africa, by killing all domestic cattle, which do not become immune to it, as the game animals do. Indeed, the coincidence of big game and tse-tse flies has prompted the suggestion that all the big game be exterminated; but this would be ineffective, because the fly would continue to be parasitic to the smaller animals, such as the rodents. After biting an infected animal, usually the big game, and more particularly those with a thin skin, such as the antelopes, the fly becomes infective only to the extent of 1 to 5 per cent. Immediately after biting the fly can inoculate another animal with the smear of blood on her bill, but after that the poison goes into her gut, and ceases to be effective for sixteen days. The fly, herself, after feasting on blood, extrudes not an egg but a larva, which is ready to pupate. Evidently the female of the species is more deadly than the male, for it is the female that causes the infection, as in the case of the anopheles mosquito.

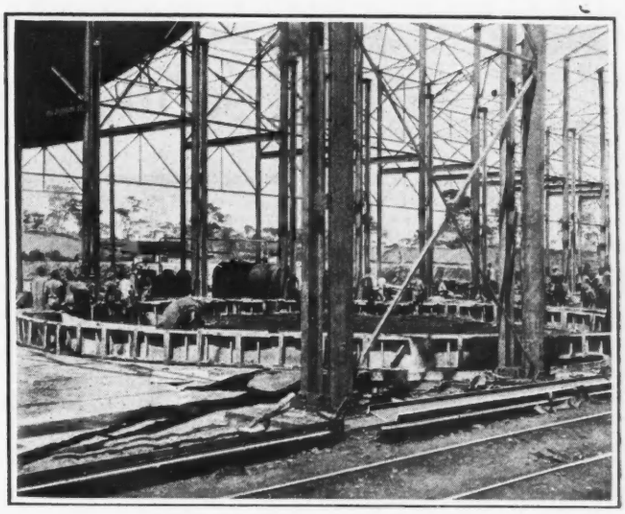
Emin Pasha's expedition, thirty-seven years ago, brought the sleeping sickness, by means of infected native porters, from the Congo to Uganda, where it caused dreadful ravages; and since then every exploring party and caravan has helped to carry it far and wide; so that it continues to spread, creeping northward into the Sudan and the Sahara. Among its bale-

ful economic effects I may mention the increased cost of gathering rubber in the lower Congo region; and since it spread southward from there all forms of mining in the Upper Congo and in Northern Rhodesia have been handicapped, because the tse-tse precludes the use of horses, mules, or donkeys for transport, and of oxen or cows, for transport and food. A mining region in which the prospector cannot be accompanied by his faithful burro, or one in which vehicular transport by means of horses is impossible, is in a bad way, according to our American ideas. One has to go afoot, or be carried in a litter by natives, or, later, make roads for automobiles—itself a costly preparation for a campaign of exploration. The tse-tse is a real menace to life and industry throughout Central Africa; it is still spreading in places, and no method is known to check its widening area of infection. Much scientific research, however, is being directed upon the subject today, and there is hope that this pest may be checked, or even eradicated, in the near future.

We remained at N'Changa overnight, each of us being quartered in a *kiyah*, or round hut, such as the natives build, with a grass roof, a wattled wall, and a stamped mud floor. Mr. and Mrs. Brooks made us most comfortable the while we saw something of the prospecting operations. It was on April 23, in the evening, when we arrived, and the scene remains memorable. The huts were grouped on the edge of a tropical forest of hardwood trees 60 to 80 ft. high; outside the sun glinted upon an open glade of long grass, 5 to 8 ft. high. The quiet was that of the primeval wilderness, until, unexpectedly, a steamwhistle blew, betokening the irruption of modern industry. The signal to stop work came from the engine of a shot-drill. The



A gas producer under construction at Bwana M'Kubwa



Concrete forms for leaching vat at Bwana M'Kubwa

cost of drilling ranges from 18s. per foot in soft rock to 32s. in hard formation. A considerable amount of drilling, and trenching, has been done, with results that are encouraging.

If my notes are scattered and somewhat inconclusive, they reflect the nature of the evidence as yet available. Many shallow trenches have exposed considerable widths of 2 to 3 per cent oxidized stuff. Several orebodies have been disclosed. One of these has been traced for a distance of 800 ft., but an apparent extension of it has been cut a mile away, so that the possibilities are large. One drill hole has gone down 520 ft., and has bottomed in malachite a foot thick. Several shafts are being sunk. The best discovery as yet is 60 ft. wide of 5 per cent ore in a synclinal bed of shale, but the length of this body of high-grade material has yet to be proved. There is plenty of 3 to 4 per cent stuff. In the eastern part of the concession, 130 miles southeast of N'Changa, numerous stains of copper have been found in a granite formation that extends for 15 miles along the Lunsemfwa River. At 43 ft. deep, 25 ft. of 4 per cent sulphide ore has been cut; and at 50 ft., widths of 6 per cent and 15 ft. of 3 per cent sulphide ore, as chalcopyrite, have been disclosed. This is encouraging. In another locality, 225 miles southwest from N'Changa, near the Angola border, at Mufumbwe, carbonate ore, as much as 27 ft. wide of 4 per cent stuff, has been discovered. All this is extremely promising. Moreover, the much richer deposits of the Belgian Congo, on the other side of the boundary near Tshinsenda, only 25 miles from N'Changa, have been proved close to the northern limit of the concession, and therefore hold out hopes of an extension into the concession itself. The prospecting is in good hands; and whereas the Union Minière in the Belgian Congo is discarding 5 per cent copper ore at this time, it may be mentioned pertinently that the Utah Copper Co. is making money on 1 per cent ore. The economic limit, of course, depends upon local conditions, more particularly the cost of labor and of transportation. The operations of the Union Minière, as we shall see, almost eclipse those of the Border Concessions, but the prospecting being done by Messrs. Beatty and Horner is of great interest, because it may bring into the market another large supply of copper.

Useful Operating Ideas

Cyanide Plant Details

Devices That Have Succeeded in Saving Power and Labor, Thereby Reducing Costs Developed at Mill of West End Consolidated

By F. C. Ninnis

Mill Superintendent, West End Consolidated Mining Co., Tonopah, Nev.

At the West End cyanide plant at Tonopah, a number of interesting details have been worked out with the objective of saving labor and power wherever possible.

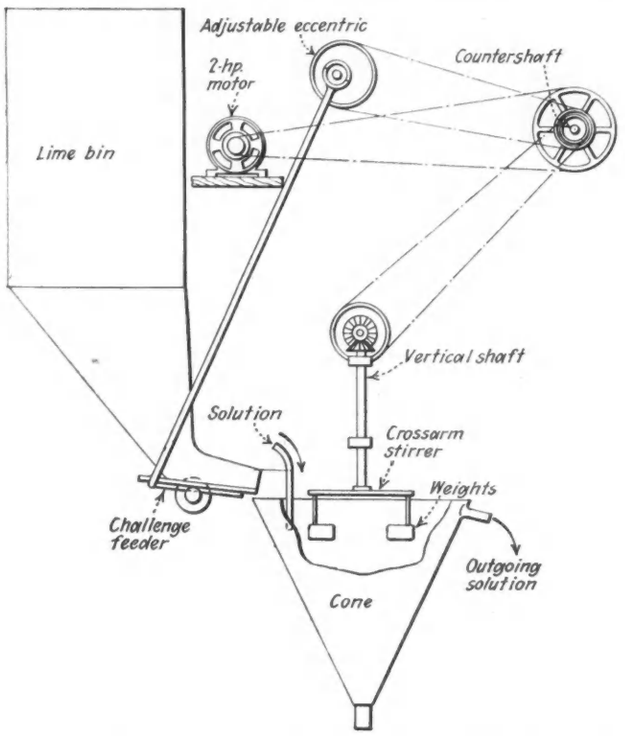


Fig. 1—Method of adding lime to cyanide solutions

The combined effect of these has resulted in a saving in power and also labor which has amounted to an appreciable total in mill operation. It is not claimed that the devices are entirely original, but they have been constructed and installed by the mill force.

For adding lime to the mill solution the arrangement is as shown in Fig. 1. The lime bin is placed at a convenient point that admits of unloading from railroad cars directly into the bin. A Challenge feeder is placed at the bottom of the bin and discharges into a cone, which was used simply because it was available. From a vertical shaft two weights are suspended from a crossarm and hang in the solution. These serve as stirrers. The solution is allowed to run into the cone and overflows into a launder leading to the batteries. A 2-hp. motor drives the feeder and stirrer. When crushing starts, the battery man turns on the solution into the cone and throws the switch.

Fig. 2 illustrates the coarse-crushing arrangement. The receiving bin discharges upon a disk grizzly, the undersize being delivered to the mill conveyor and the oversize into a 10x20-in. Blake crusher which delivers to the hopper of a 6-in. Superior McCully reduction crusher which crushes to 1-in. size. White iron, locally cast, has been used for the disks of the grizzly. The McCully crusher is provided with a reversible concave section, the "concaves" being placed vertically and the entire section being reversed, top to bottom, when worn. A decided saving in metal has resulted from this arrangement. One man can handle 50 tons per hour.

Sampling is automatic. A mechanical sampler, illustrated in Fig. 3, is placed between the discharge of the inclined conveyor and the horizontal conveyor above the mill bin. This sampler consists of a small bucket placed on the end of an arm rotated by a horizontal shaft. When in operation, the bucket swings across the ore stream and is discharged by a tripper which opens a gate on the side of the bucket, discharging the sample into a chute which feeds directly into a small

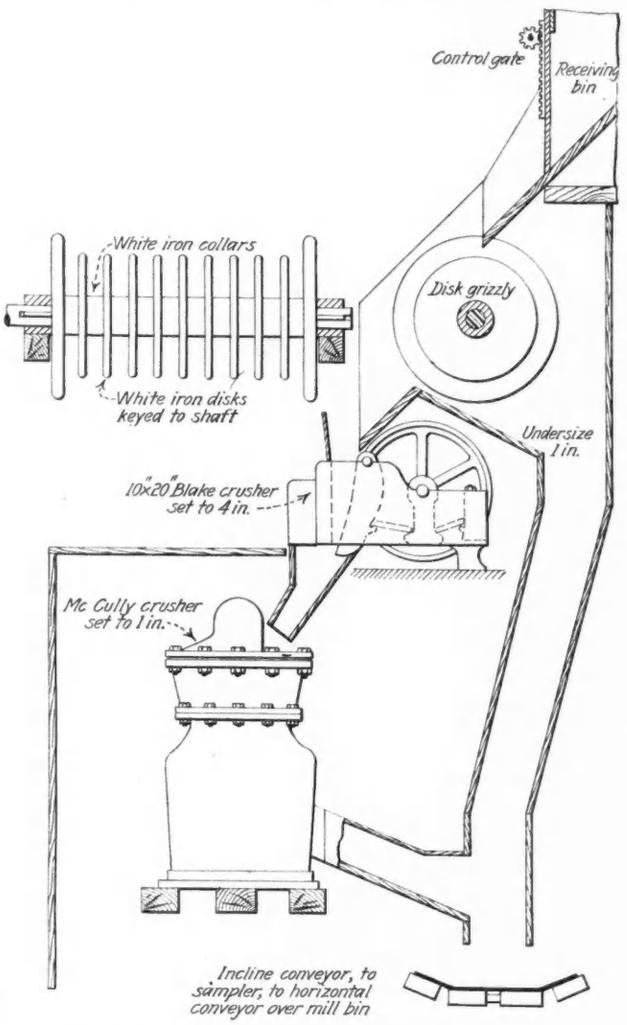


Fig. 2—Sketch showing crushing unit

sample grinder of the gyratory type. The discharge of this crusher falls through a pipe sampler, the sample being cut down to as great a degree as necessary and the reject being received into a bin. The horizontal shaft carrying the sampling bucket is rotated by an

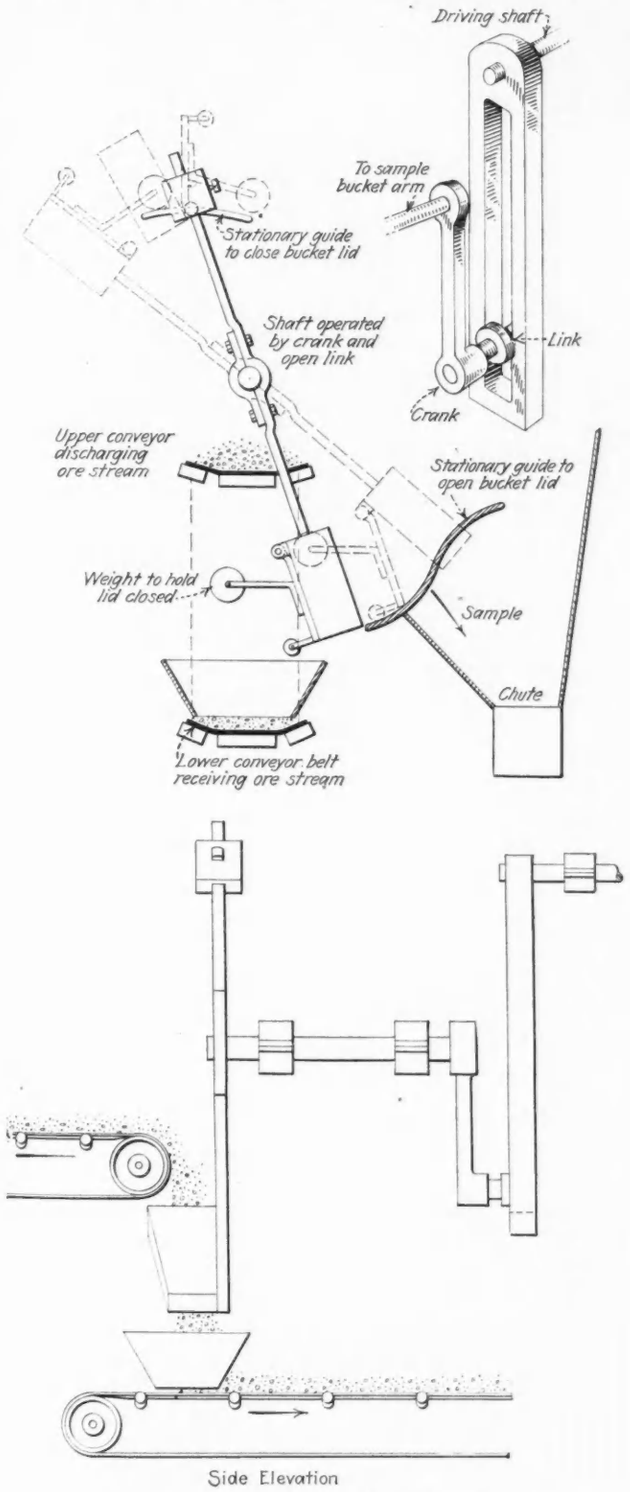


Fig. 3—Automatic mechanical sampler

eccentric crank which gives a faster motion as the bucket traverses the ore stream. This arrangement requires no attention once it has been set in operation.

Fig. 4 shows the type of agitator used in the cyanide vats. A central shaft supported by a thrust box carries a crossarm to which are attached heavy weights.

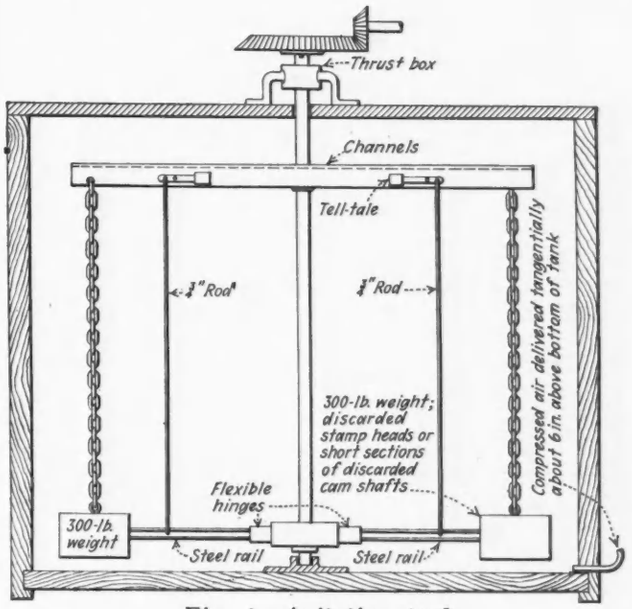


Fig. 4—Agitating tank

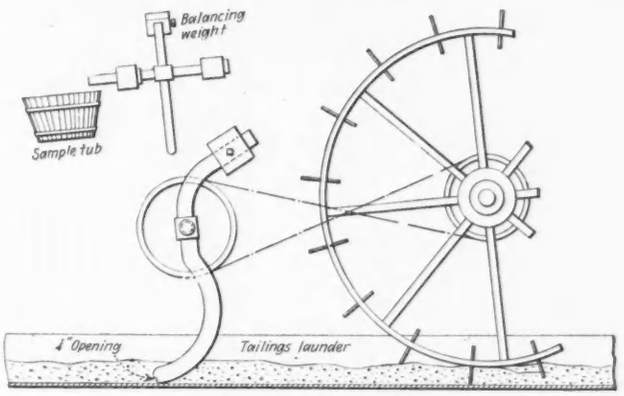


Fig. 5—Pulp sampler

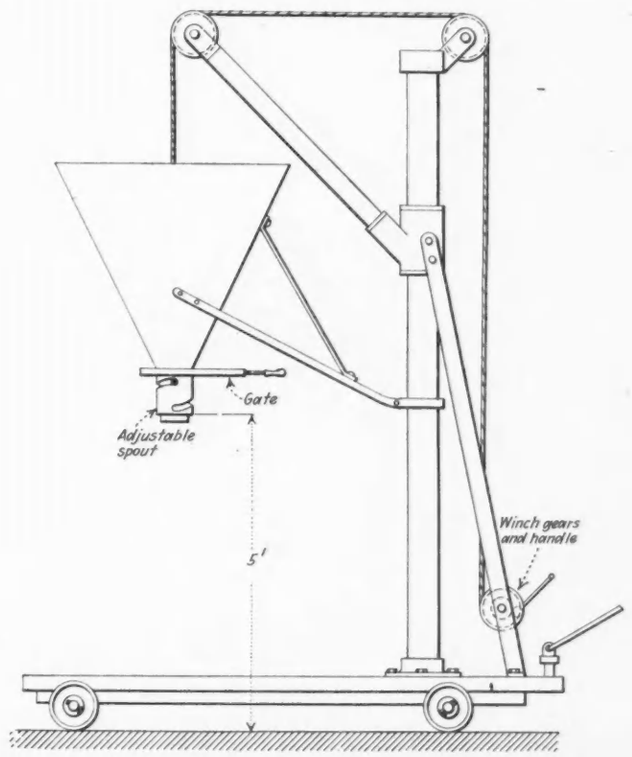


Fig. 6—Carriage and furnace charging hopper

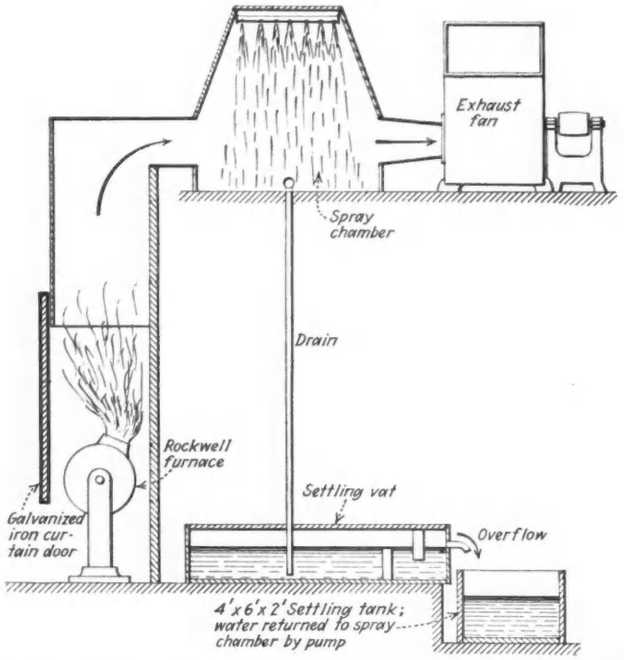


Fig. 7—Arrangement for handling waste furnace gases

The weight is also attached to a short length of steel rail, which is in turn hinged to brackets on the shaft by several pieces of rubber belt. A ¾-in. rod is attached to each rail near the weight, the other end being hooked over a lever attached to the channel irons. When a chain breaks the lever is pulled down, raising the weight on the other end and indicating the broken weight. This telltale device has been found necessary. The rig is efficient as an agitator and only requires a 2-hp. motor for its operation. The vats are 24 ft. in diameter and 18 ft. deep.

The tailing sampler is shown in Fig. 5. This is operated by a current wheel. The sample pipe cuts through the stream of pulp discharged from the Butters filters and delivers the pulp through the hollow shaft into a tub at its side. The device is automatic. A sample is dipped from the tub each morning, and the tub is then emptied and washed out with a hose and replaced. No attention other than removing the final sample is necessary. The composite sample, ore and solution, is checked against samples of each charge.

The charging hopper used in melting down precipitate is shown in Fig. 6. Precipitate is mixed with fluxes and shoveled into the hopper. The carriage is drawn over to the scales and the hopper lowered down upon the platform for weighing, and then raised and the carriage drawn to the furnace. The adjustable spout is lowered, and the contents of the hopper are discharged into the furnace. One man does the trick.

Fig. 7 illustrates a method of washing the furnace gases and of recovering dust. The furnace is placed in a fireproof cell closed by a galvanized iron curtain, and the cell is connected with a spray chamber, which is also connected with an exhaust fan. Water used in spraying the gases is received in a shallow vat and overflows to waste. The arrangement has proved efficient in retrieving small losses resulting from melting. About 25 oz. of silver is recovered per month. The best feature of the arrangement is that it protects the melters from the furnace gases and keeps the melting room cool.

No Satisfactory Method for Treating Black Sand of Pacific Coast

Investigations of the black-sand deposits of the Pacific Coast, including those in Del Norte County, Calif., have been carried on at intervals by the U. S. Geological Survey,[1] the U. S. Bureau of Mines,[2] the State Mining Bureau, and other agencies, and much has been written concerning them, according to a brief summary prepared by the California State Mining Bureau. They also have been the subject of hundreds of attempts on the part of individuals and companies to exploit them for their gold and platinum content.

The gold-bearing gravels of the Smith River basin contain black sand, which usually carries some platinum, and a small annual recovery of platinum metals is common in cleaning up. The beach sands in Del Norte County also carry finely comminuted gold and platinum, but although the latter metal has commanded a very high price during and since the World War, no method yet has been developed for working the sands which has proved commercially successful on anything larger than a hand scale. Probably the simplest type of machine used on beach sands is one described by Haley.[3] It consists of a plain duck broad riffle, fastened to a plank bottom, which is set out near the edge of the sea as the tide is coming in, and is kept constantly in such a position that the outgoing waves would wash the gold-bearing black sands over it. This machine has been used near Crescent City, and has paid day wages to the men operating it.

The beach two miles south of Crescent City was also the site of one of the most elaborate plants ever erected for working the sands on a large scale. This plant was erected in 1913 by the Oro Del Norte Co., which owned 255 acres along the beach. It was designed to handle 800 yd. of sand per twenty-four hours and cost $125,000. Metallurgically and financially, however, it proved a total failure, and only a few ruins still standing upon the beach now mark the location.

The beach near Crescent City has been a favorite place for trying out black-sand machines and processes, but operations are usually short-lived. No beach mining operations are now, so far as known, being carried on in the county.

In Humboldt County, the California-Oregon Metals Co., 1014 Santa Fe Building, 605 Market St., San Francisco, installed one of its machines embodying the McBride process on the beach at Gold Bluff north of Orick during 1924, principally for the purpose of perfecting the machine and process and for experimental research. The black sand at this point was said to carry 40c. per ton in gold and platinum. The results of the test were reported as showing that a satisfactory recovery could be made, but the general tenor of the sands was too low for profitable operations.

Bibliography: State Mineralogist's Report XIV, pp. 375-379. State Min. Bur.: Bull, 45, Bull. 85, Bull. 92. U. S. Geological Survey: Bull. 260, Bull. 285, Bull. 315. Min. Res. 1905. Geologic Folios: 89, 73; U. S. Bureau of Mines Technical Paper 196.

[1]Day, David T., and Richards, R. H.: "Useful Minerals in the Black Sands of the Pacific Slope," U. S. Geological Survey, Mineral Resources of the United States, 1905.

[2]Horner, R. R., "Notes on the Black Sand Deposits of Southern Oregon and Northern California," U. S. Bureau of Mines, Technical Paper 196.

[3]Haley, Charles S., "Gold Placers of California," State Mining Bureau Bull. 92, p. 69.

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.

Engineering and Leadership

THE EDITOR:

Sir—Mr. Brinsmade's interesting communication in your issue of Nov. 7 impels me to comment further on this highly important topic. In discussing the question of leadership, it might be well to first consider certain fundamentals.

Gravity is the most stupendous thing in the material universe, and yet the knowledge of the law of gravity will not assuage the pangs of hunger nor dry a single tear from the eyes of the discouraged, the distressed, or the disconsolate. Inventions, industries, and scientific discoveries are of little avail unless they relieve human burdens and give people more time for culture and development. The scientist who can look into the infinity of space and see only oxygen, nitrogen, hydrogen, carbon, and the rest of the chemical elements may add to the sum total of human knowledge, but not necessarily to the sum total of human hope and happiness.

The object of these preliminary remarks is to state a very simple truth: that the great study of mankind is man, and all leadership, all great humanitarian movements have revolved around this simple theme. As long as engineers will confine their energies to atoms, molecules, industries, inventions, iron, copper, dollars, and dirt, they cannot hope to become leaders, although they may become prominent in their profession. Prominence is not leadership. A prominent lawyer may be no more a leader than a prominent engineer. Both may be rank reactionaries. Washington was an engineer, and a good one, but no one today thinks of Washington as an engineer. Jefferson—the greatest figure in American political history—was educated as a lawyer and prided himself on being a farmer, yet no one today thinks of Jefferson as either a lawyer or a farmer. Lincoln was a lawyer and achieved prominence in his profession, yet no one today cares anything about his pleas before judges or juries.

Always and ever, leadership has been determined by humanitarian motives. That is the reason why those who have broken down the barriers of religious bigotry and political despotism have been honored more than those who simply achieved prominence, fame, or wealth. Scientific discoveries, inventions, institutions, or wealth are of little importance unless they lead to greater freedom of thought and action. The fact that science has demonstrated that Arcturus, although inconceivably distant, is composed of the same elements as the earth, is awe-inspiring, but it adds little comfort to the man who has to struggle hard to make a decent living.

Engineering has two aspects: engineering, and engineers. All the energies of the profession have been directed toward engineering, and apparently, none toward the engineers. As quoted from the New York *World* by the *Mining Journal-Press* of Aug. 19, "statistics show that 76½ per cent of the engineers get less than city mechanics; that 88 per cent receive less than the foreman of a street-cleaning crew; and 10 per cent receive less than a common laborer." This condition is probably general, and not exceptional. Would it not be better for the engineering societies to discuss engineering a little less and engineers a little more? Could not the engineer with more dignity and profit belong to a labor organization than to an engineering society, if he cannot belong to both? Is not the engineer greater than the engineering projects he creates? Is not the creator greater than his creations? The engineering societies, in effect, say that he is not.

COLLEGE EDUCATION NOT ALL-SUFFICIENT

It is true that something more is needed than any particular college education to attain leadership in the more important things of life. Nevertheless, birth and education are powerful, if not the most powerful, factors in the progress of humanity. It is probably a fact that fully 90 per cent of the people of the United States who are Republicans were born and educated Republicans; and that 90 per cent of the Democrats were born and educated Democrats. Most of the people who belong to any particular political party or religious denomination do not belong to them because they think, but because they do not think. If they did think, there would be more difference of opinion. They are what they are because they were born and educated that way. The individual who can rise above the influences of birth, early environment, and early education is the exception and not the rule. No stimulus has yet been found that will inject new life into a mummy or a corpse, and only the strongest elixir will inject new ideas into men or institutions which have reached or passed the zenith of life. That elixir will usually be recognized under the trade name of "Necessity."

The research or scientific method of procedure has been responsible for practically all of the world's scientific and technical progress, and, indirectly, also largely contributed to religious and political progress, but the advance in political and religious progress can better be attributed to the growth of political and religious freedom, as represented by the Magna Charter, the Declaration of Independence, the Bill of Rights, and a greater freedom of speech and press, the rifle, and the Reformation.

It is true that laws are negative rather than positive, and necessarily so. No law can be made which will compel a man to make a scientific discovery, a meritorious invention, or have humanitarian or religious aspirations; and only through slavery could it compel a man to engage in imports and exports, dig a mine, or till the soil; nevertheless, if the laws are such that there is no profit in importing and exporting, there will be no foreign trade, and if some can reap where others have

sown, there will be no sowing and no reaping, beyond the bare necessities of life. The law cannot compel a man to think, but if thinking leads him to a discovery or a conclusion which will benefit mankind, he is not likely to impart the information if he is to be martyred for it, and the world will not progress.

One strong reason why lawyers are more prominent than engineers in the bigger things of life is because they take a broad view of their profession. Within the past month the Colorado Bar Association had a convention, and the most prominent speaker was a bishop who spoke on the broad question of "fundamentalism and modernism." It is hardly conceivable that any engineering society would take such a broad view of their profession as to encourage any one to address them on topics such as those pertaining to industry, capital and labor, etc. If an engineer has any ideas along those lines, he might present them at a bar association, or the open forum of some progressive church, but not before an engineering society. That is the reason why engineers are followers and not leaders. Lawyers have no gifts which engineers cannot as well cultivate, even the gift of gab, but it takes something more than effective public speaking to be a leader.

Future Position of Engineer Forecast

With the greater and greater consolidation of industries, what will be the relation of the engineer to these large consolidations? It would seem certain that he will be placed on the same footing as skilled labor. The tendency is decidedly in that direction, and apparently engineers have given little heed as to what their status will be when the movement is fairly well advanced. Will their interest be with capital, or will it be with labor, or will they allow themselves to be the victims of both?

Mr. Eyoub can see in the problem of capital and labor only the greed of capital and the greed of labor. I can see in it the tremendous struggle of titans for mastery, and the struggle will be fraught with great happiness or misery, according to whether it is wisely directed or left to the mob.

Perhaps if the matter is stated in one of its more concrete forms, it might be more evident what the problem really is. In stating it there is no prejudice, and most engineers are too broad-minded to consider differences of opinion on any subject as a basis of personal animosity.

According to statistics which appear to be reliable there are several men in the United States who have more wealth than that of 2,500,000 of those classed as poor, who own about $400 each. There is now before Congress the consideration of repealing the inheritance tax. What are the rights of those who have accumulated wealth? What are the rights of the poor? What is their relation to each other in view of the greater and greater consolidation of industries? What are the rights of the posterity of the rich? What are the rights of the posterity of the poor? There are those who think that the vast fortunes of the rich should pass, unimpeded and unimpaired, from generation to generation; that the rich and their posterity should stay rich; and that the poor and their posterity should stay poor. There are others, like Jefferson, Lincoln, Roosevelt, and Carnegie, who believed that inheritance should be abolished or drastically restricted; that one generation of men cannot foreclose or burden the use of the earth to another generation; and that it is through the abolition or drastic restriction of inheritance that the road leads to economic equality, and not through either capitalism or socialism. Would it not be better to discuss these problems than let them be adjusted by the mob, through ages of strikes, riot, and revolution? If the engineers are too proud or too indifferent to discuss these matters, and leave them to the mob, they must abide by the mob's decision.

There is no problem, if properly approached, but that can be properly solved. No harm has yet come from the full and free discussion of any topic under the sun. It is the running and agitated stream that purifies and clarifies itself; it is only the stagnant pool that has a green scum on top and a layer of slime at the bottom, and those who float on that stagnant pool will never reach the broad expanse of the ocean.

Denver, Col. William E. Greenawalt.

Riffs and Iron

The Editor:

Sir—I suppose you have noted that certain well-known bankers in New York, with close relationships with Hamburg, have undertaken to create a so-called Anglo-American Syndicate for taking over the Mannesmann interests in Morocco—to wit, the iron claims in the Territory of the Beni Urriaguel, to which tribe Adb-el-Krim belongs. I'm sure that when Shakespeare wrote "What fools these mortals be" he had in mind to write, "What fools these Germans be." Had Germany not sicked the Moorish dogs upon the Spaniard they could still go head and develop the iron mines behind Axdir in the lands of the Beni Urriaguel under full protection of the internationalized status quo of the Riff coast, and thereby have been able to sneer at Gibraltar, but having used Abd-el-Krim as their tool, and having brought things to such a pass that the entire question of Morocco may have to be reviewed by a fresh conference of the powers, the status of the iron claims is doubtful, and Germany has to seek a strong power, with which she is officially at peace, to take them under its wing. If you chance to have at hand the treaty of Algeciras, and will see what fools our Senators made of themselves in a desire to keep out of embarrassing foreign entanglements, by reservations, you will see why Germany desired to transfer those Moorish claims to a conveniently arranged Anglo-American Syndicate.

The history of how and why we allowed Roosevelt to drag us into that Conference of Algeciras, where we had no defensible right, in the light of our political traditions, is lengthy, and I dare not try to make a magmatic ore-injection of it into this letter.

University, Ala. Courtenay De Kalb.

The World Record for Shaft Sinking

The Editor:

Sir—In your issue of Nov. 7, on page 731, you published an item from the *Mining and Industrial Magazine*, of South Africa, claiming a new shaft-sinking record for the world in South Africa.

My company still holds this record of 427½ ft., made in the Tintic district, Utah, in 1921. We were awarded the *Engineering and Mining Journal's* medal at that time for breaking the world shaft-sinking record.

Coronado, Calif. Walter Fitch, Jr.

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

CALUMET & HECLA is completing installation of electrical equipment on 81st level to continue mine operations to an additional depth of 3,000 ft.

Bureau of Mines reorganization provides for two major branches—viz., technologic and economic, each under an assistant director.

Ore discovered in Quebec by magnetic surveys; mining active in Porcupine district; new mines opened; old mines refinanced.

American Metal Company acquires control of large areas in Summit County, Colo., and plans extensive operations.

Columbia Steel Corporation of California reports sales for six months as $5,513,250.

Barnes-King asks for dissolution decree—Metals Recovery Company files suit against Anaconda, alleging infringement of flotation patents.

Rhodesian Copper deposits attracting attention in London and South Africa—Keen interest in gold deposits of Korea.

Bingham mines earn $9 per share first ten months—Development work begun at Godiva mine by U. S. S. R. & M. Co.

Golding Sons Company acquires holdings of Erwin Feldspar Company involving 12,000 acres of mineral land.

Regular shipments from Gilbert, Nev.—White Caps encounters good ore on deep level.

Metals Exploration Co. Disposes of All of Its Property

The Metals Exploration Co. of New York and San Francisco has disposed of all its assets, including the Anna Beaver mine, in Oklahoma; Cache Creek dredging interests in Alaska; California dredging properties; the Yuba Power Co.; Complex Ores Recovery Co. holdings in the Rawley and Black Bear mines, in Colorado, and a number of smaller interests. The purchaser is Harry Payne Whitney, of New York City, whose mining interests are in charge of R. H. Channing, Jr., with headquarters in San Francisco. Mr. Channing recently closed an option on the Flin Flon property, in Manitoba. J. R. Watson, president of the Mining Corporation of Canada, Ltd., states that "in conjunction with the owners of the Flin Flon property, in Manitoba, it has given a working option to interests in New York represented by R. H. Channing, Jr., upon terms considered satisfactory by the vendors. For some time Mr. Channing's organization has been conducting laboratory experiments with the Flin Flon ores, and it will now begin to carry on metallurgical tests on a larger scale, involving the expenditure of a large sum of money, to determine the most economical and satisfactory method of treating the ores. The Mining Corporation is retaining an interest in the property."

The Flin Flon property consists of 130 claims near the Manitoba-Saskatchewan boundary. The ore is a low-grade copper containing substantial amounts of gold and silver, and some sphalerite.

President Coolidge Advises the Use of All Resources

IN HIS address before the New York Chamber of Commerce on Nov. 19, President Coolidge said:

"We have grown exceedingly great in population and in riches. This power and prosperity we can continue for ourselves if we will but proceed with moderation. If our people will but use those resources which have been intrusted to them, whether of command over large numbers of men or of command over large investments of capital, not selfishly but generously, not to exploit others, but to serve others, there will be no doubt of an increasing production and distribution of wealth."

United Eastern Developing Recently Acquired Mines at Jarbidge

Forty men are employed at the Bluster Consolidated, Pick and Shovel, and Success mines, at Jarbidge, Nev., taken over by the United Eastern Mining Company on July 1. The Bluster cyanide mill should be ready to operate by Dec. 1. Additions are being made to the fine-grinding department of the ten-stamp mill and a filter is being installed. Roy W. Moore is manager.

The Elkoro Mining Company has started a new crosscut from the mill to the Long Hike vein, which, when completed, will eliminate the operation of a 1,200-ft. bucket tramway.

Golding Sons Co. Acquires Holdings of Erwin Feldspar Co.

Through a transaction involving more than $2,500,000, the Golding Sons Co., of Trenton, N. J., acquires all the holdings of the Erwin Feldspar Co. The Erwin property is located in and around Erwin, Tenn., about 60 miles from Knoxville, and includes 13 miles of railroads, 10,000 to 12,000 acres of feldspar mining field and several mines in that territory and North Carolina.

The transfer of the property will take place on Dec. 1, when the executive offices will be located in Trenton, with a local office at Erwin.

The Erwin company is incorporated for $1,500,000. It includes the Crabtree property, which it purchased for $327,000 several years ago. The old firm name will remain, and it will continue as a subsidiary to the Golding company in supplying the needs of the pottery manufacturers.

Golding Now Largest Feldspar Producer

The acquisition of this property by Golding Sons Co. makes them by far the dominant firm in the feldspar industry and gives Trenton firms control of 90 per cent of the feldspar industry and a large part of the pottery and tile works.

The Golding Sons Co. now has plants in North Carolina, East Liverpool, Ohio; Erwin, Tenn.; Wilmington, Del.; Georgetown, Me.; Haddon, Conn., and Glastonbury, Conn. The Golding company has been in the pottery business at Trenton about seventy-five years, during which time the organization has remained in the Golding family.

Supreme Court Holds Depletion Dividends Subject to Income Tax

In a five-to-four decision, the U. S. Supreme Court on Nov. 23 held that dividends paid by the Phelps Dodge Corporation to James Douglas in 1917 were subject to taxation at the income tax rates of the revenue act of 1917. The corporation paid Douglas $328,000 as "depletion dividends" in 1917. Executors of Douglas' estate resisted efforts by Collector William H. Edwards, of New York, to collect taxes on the dividends, on the ground they were from capital account. The Commissioner of Internal Revenue overruled this plea. When the case was taken in court, the executors put up the same plea, but added that, if taxable, the tax should be at the rate of the 1916 act, which was considerably lower than the rate carried in the 1917 act. The district court held for the government, the Court of Appeals reversed this ruling, and the Supreme Court, closely divided, has now ruled in favor of the government, the amount of tax due being declared to be $173,000.

American Metal Co. Secures Control of Large Area in Summit County, Colo.

The American Metal Co., which a few years ago was active in matters of ore marketing and in mining in Colorado, has secured control of the mining district in Summit County of which the towns of Kokomo and Robinson are the centers. This district was one of immense production during the '80s and '90s, the ores being similar in character and grade to those of Leadville's early-day development. As the underlying sulphides were reached, complex zinc-bearing ore was encountered to a discouraging extent, and it was here that A. R. Wilfley, in attempt to separate the camp ores, developed the concentrating table which bears his name.

The American Metal Co. sees in this large district warrant for intensive development in which are large productive possibilities. The area acquired covers several miles in extent, including all of the old productive claims; hence, the undertaking is of a scope unusual in this region of individual mining and grubstake tradition.

California Miners Seek to Obtain Relief From Taxation

Removal of the federal income tax on gold bullion is sought by the Department of Mines and Mining of the Sacramento Chamber of Commerce in resolutions addressed to Andrew W. Mellon, Secretary of the Treasury, and to Senator Reed Smoot and the chairman of the House Ways and Means Committee.

Adoption and forwarding of the resolutions followed a meeting with Congressman Charles F. Curry, of California, who strongly advocated making gold bullion tax free, to stimulate its production. The resolutions point out that the present cost of producing gold is 160 per cent of the pre-war costs, whereas the selling price of gold remains the same, $20.67 an ounce. Attention is also called to the heavy taxation upon gold miners, and the closing down of many California gold mines because they could not be operated profitably. The need of increasing the nation's output of gold is also pointed out, as the annual production now is only about 60 per cent of what is used annually in the commercial arts and industries.

Removal of the income tax on gold was strongly endorsed at recent regional mining conferences held at Stockton and Redding. The 1923 internal revenue bureau report shows that eighty-two producers of precious metals reported a net income of $5,533,110, on which an income tax of $626,387 was paid, while 382 producers reported a deficit aggregating $9,923,262.

Anaconda Engineers to Make Examination of Giesche Erben Mines

In the agreement whereby the Anaconda Copper Mining Co. and W. A. Harriman & Co. expect to purchase control of the Giesche Erben zinc works in Silesia and Poland, the purchasing group is entitled to make thorough examination of the properties before giving final answer. The Anaconda company examination party, which left Butte on Nov. 17 for the mines at Kattowitz, consisted of Chauncey L. Berrien, general superintendent of mines; Murl H. Gidel, Frederick Gaethke and George C. Heikes, geologists; and Ernest Klepetko, M. C. Messner, and G. W. Wegner, metallurgists. It is believed the examination will be finished before three months.

North Butte and Tuolumne Merger Under Consideration

Interests familiar with negotiations looking toward the merger of North Butte Mining Co. and Tuolumne Copper state that Tuolumne will enter the merger on a basis of one share of its stock for one share of North Butte. It also is reported that the merged company will take over the Bluebird group in the west Butte district. Tuolumne recently levied assessment No. 7 for 10c. per share. The first six assessments were at the rate of 30c. per share each.

A 49-oz. Nugget Found on Spruce Creek, B. C.

One of the largest gold nuggets ever found in British Columbia was recovered recently in hydraulic mining at Spruce Creek, in the Atlin division. It weighed 49 oz. and is estimated to contain about 60 per cent of gold. It had passed over the riffles and was seen shining in the tailing dump by the owner of the lease. Judging from this incident it would appear that the tailing dumps from some of the leases in the district might be worth working over. The nugget is being exhibited in Prince Rupert and later will be on display in Vancouver.

United Mines, Ltd., Acquires Claims Near Ainsworth, B. C.

The United Mines, Ltd., a newly organized company, has acquired the United Mines, Banker, and several other zinc-lead properties near Ainsworth, B. C. Two shipments of ore from the United Mines to the Trail smelter were made last month. The company is financed in Spokane and Yakima, Wash. I. O. Proctor, superintendent, was formerly in charge of the Timber Butte mill, at Butte, Mont.

Manhattan Mine (Joplin) Ready for Operation

The L. & G. Mining Co., principals in which are T. F. Lennan, of Joplin, and John B. Green, of Chicago, has obtained a lease on the twenty-acre tract of the Manhattan mine of the United Zinc Smelting Corporation. The property adjoins the H. & M. lease, which was recently taken over by Lennan and Green with Malcolm Green, of Boston, Mass. The mill has been overhauled, and operation will start soon.

Ophir Hill Mine Suspends—Camp That Has Produced Millions Practically Abandoned

Operations at the Ophir Hill mine, situated at Ophir, Utah, and operated by the late Senator W. A. Clark, of Montana, since 1900, have been suspended. This will doubtless mark the close of activity in the historic district, since with the exception of leasers' sporadic work in various mines of the district, the Ophir Hill mine has sustained the camp during the last decade.

The Ophir district was discovered in 1865. Treasure Hill had long been a sacred spot, whither the Indians repaired each year to hold councils and to obtain metal for bullets. Soldiers of General Connor's command, attracted by these legends, located an outcrop of lead ore at the St. Louis lode, now known as the Hidden Treasure.

Little work was done on the locations until 1870, when the town of Ophir was laid out. Production of the Ophir Hill is estimated to have been $20,000,000 during its forty years of activity.

Ozark Chemical Co. Builds Sulphuric Acid Plant

It is estimated that nearly half a million dollars will have been invested by the close of the year in the plant of the Ozark Chemical Co., of Tulsa, Okla. The concern is headed by W. N. Smith, of Wisconsin, general manager of the Vinegar Hill Zinc Co., and was erected for the purpose of manufacturing sulphuric acid. The output will be about thirty tons of acid per day.

Pulaski Blast Furnace Shuts Down for Repairs

The furnace of the Pulaski Iron Co. went out of blast recently so that it can be relined and other necessary repairs made to it. It is thought it will require six weeks to complete the work.

Utah Premier Sinks 200-Ft. Shaft

A contract has been awarded to sink a 200-ft. shaft in the Maud S. claim of the Utah Premier Mining Co. at Milford, Utah, and work has been started. Two 40-ton carloads of ore have been shipped. This ore will assay about 45 per cent lead and 50 oz. of silver to the ton. The Maud S. orebody is one of the most unusual deposits opened up in the state in recent years.

Discovered last summer by a miner who pulled up a sagebrush to start a fire, the orebody has produced, from grassroots to a depth of 80 ft. with only 70 ft. of drifting, about $15,000. The ore is in a porphyry-limestone contact.

Iron Mountain Mill Completed and Ore Shipments Begun

The Iron Mountain Mining Co., operating near Superior, Mont., is now milling 100 tons of ore per day, and in the last ten days shipped four cars of lead concentrates to East Helena and three cars of zinc concentrates to Seattle for foreign markets. Glen Anderson, manager, expects to increase tonnage to over 150 tons per day. The mill, under the supervision of Raymond E. Tower, is recovering better than 90 per cent of the lead and zinc contents of the ore. Contract for complete mine and mill equipment was given to the Butte Machinery Co. on July 15, this year, and material was received at Superior before Sept. 15. The mine was equipped and the mill completed and in operation by Oct. 15.

Bingham Mines Earning $9 per Share

The net profit of the Bingham Mines company for October, according to official report, will equal $43,200 after taxes but before depletion and depreciation, compared with $51,300 in September, 1925, and $32,428 in October, 1924. Earnings for the first ten months amounted to approximately $452,000, or over $9 a share on the 50,000 shares outstanding as compared with $163,900 during the corresponding period of 1924.

Information from Eureka, Utah, where the company operates the Eagle and Blue Bell and the Victoria mines, states that in the latter property a high-grade body of silver-lead ore has been discovered on the 1,350 level, and drifting has been started to tap the vein on the 1,550 level.

Directors of the Bingham Mines company have increased the dividend rate from 50c. to $1 quarterly. Disbursement of $1 per share will be made on Dec. 30 to stock of record on Dec. 19. Four dividends of 50c. each have been paid during the current year on Jan. 2, March 2, June 30 and Sept. 30. Total disbursements including the Dec. 30 dividend will be $850,000. In addition to making regular dividend payments, the company has reduced the number of outstanding shares to approximately 50,000 and increased its acreage of mineral land, both in Bingham and Tintic, Utah, by the acquisition of several promising groups of claims.

White Caps Mine Finds Good Ore on 1,220 Level

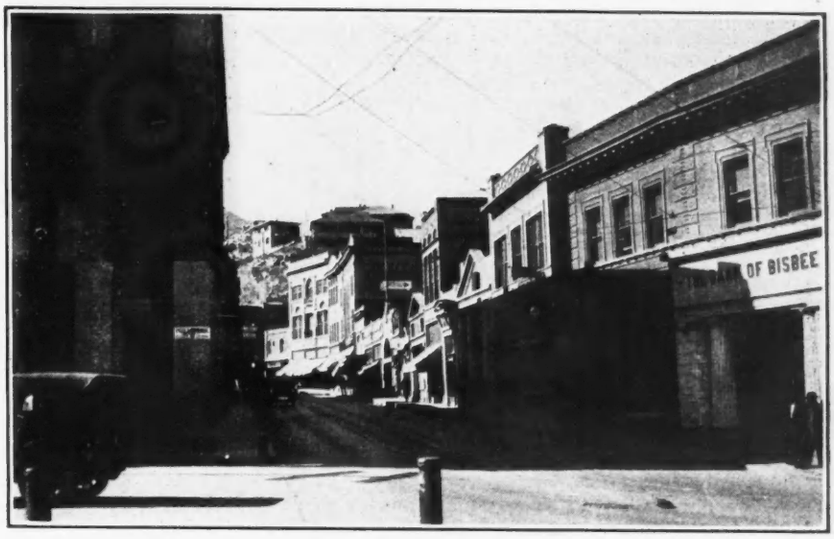
What is believed to be the downward extension of the rich east orebody has been cut on the 1,220 level of the White Caps mine, at Manhattan, Nev. A south crosscut has entered the footwall of the vein and shows 5 ft. of ore which is reported to assay about $70 per ton in gold. This is richer than on the 1,120, the next level above, where the ore averaged $30 per ton across 15 ft. of vein. This is regarded as the most important development in the White Caps mine.

A flow of water was opened in the north crosscut on the 1,220, making it necessary to cease development work temporarily on this level. The water flow is under control, so that work will be resumed soon.

Ore Shiments from Gilbert, Nev.

Four carloads of ore, approximately 200 tons, was shipped from the Gilbert, Nev., district during the first half of November. The Mammoth Last Hope Mining Co. shipped two cars of ore, no figures being published, and the Tom Crown and Monte Cristo leases, on Homestake ground, each shipped one car. The lease ore is reported to have averaged about $30 per ton.

The Mammoth Last Hope continues to report high-grade ore in the shaft, now down over 250 ft., and, consequently, more regular shipments should be made. The Gilbert-Goldenberg has cut a vein showing values in silver and lead, the first of the latter metal to be found in that particular vicinity. Gilbert as a whole is quiet; considerable small-scale development work is being done, with encouraging results.



Main Street, Bisbee, Ariz.

Development on Godiva Mine Begun

Operations by the United States Smelting, Refining & Mining Co. in the Godiva mine, in the Eureka, Utah, district, taken over on option from Jackson McChrystal, have started under the direction of John Enlund. During the early days the Godiva was one of the heavy producers of the camp. Most of Godiva development work has been on the upper levels, although the shaft extends to a depth of 1,200 ft. with a winze 150 ft. below that point. The shaft is in a dilapidated condition between the 900 and the 1,200 level.

New Milling Facilities at Tombstone Point to Increase in Mining

The addition of three modern milling units to the Tombstone district of Arizona, with two mills already in operation, is taken as indication of a gradual increase in the mining of low-grade ores on a conservative basis.

Reports are to the effect that underground conditions are making a better showing than for some time, and mining men seem to be of the opinion that there is no reason why Tombstone's mining and milling operations should not show a gradual and stable increase.

Tar Sands of Athabasca for Road Building

Serious consideration should be given the development of the tar sands of the Athabasca district, in north Alberta, according to Dr. S. C. Ells, of the federal Department of Mines, to the Calgary Board of Trade. As a supplementary source of petroleum production, Dr. Ells said that the oil sands of the McMurray area were second only to those of Colorado. The tar sands are also valuable for road building. Dr. Ells has been making investigations in the tar sands fields for several years.

Noranda Mines, Ltd., to Increase Number of Shares

At a special meeting of stockholders held at the office of the company, 120 Broadway, New York City, the plan to change the capital of Noranda Mines, Ltd., from 20,000 shares of $100 par value to 2,000,000 shares of no par value was approved. Application will be made immediately to the Lieutenant-Governor of the Province of Ontario for sanction of this change, and if approval is secured stockholders will be given 100 of the new shares for each share now held.

A Mine Within and Below a Mine

A mine within a mine—this sums up Calumet & Hecla Consolidated's plan for the recovery of copper at great depth in its Calumet conglomerate vein. This has been made possible by the completion of a tramway 8,000 ft. long on the 81st level. This tramway, which required several years to drive and equip, will be the "surface" of the new mine, permitting the opening of the lode at greater depth. Two electric hoists, especially designed for the purpose, will be installed on this level to lift the rock to the tramway, where electric trains will transport it to the Red Jacket shaft for hoisting. The plan, which solves the problem of deeper mining in the formation, will add many years of life to the conglomerate branches, as sinking can be carried down approximately 3,000 ft. below the 81st. level. One hoist will be established for the continuation of No. 7 shaft, Hecla branch, and one for No. 4, Calumet branch.

No. 7 now is several levels below the haulage drift. Laterals will stretch north and south from both these units. The vein above the haulageway will continue to supply ore for twelve to fifteen years more, and when mined out only two of the present shafts will be maintained to serve the conglomerate, the Red Jacket for the hoisting of rock mined from below the haulageway and No. 12, which will be used as a supply shaft. No. 12 shafthouse is being reconstructed for this purpose.

The equipment of No. 5 shaft, Tamarack, as a drainage unit also is part of the project. It is unlikely that mining below the tunnel will get under way before the midsummer of 1926, as considerable equipment remains to be installed. The use of electric hoists, electric haulage, electric pumps, and one hoisting shaft will make costs for such deep mining comparatively low, and the richness of the conglomerate lode assures a high yield.

Metals Recovery Co. Vs. Anaconda, Involving Flotation Patents

Metals Recovery Co., a Maine corporation, has filed a claim in the Federal Court at Butte, Mont., against the Anaconda Copper Mining Co., alleging infringement of patent rights to a flotation process. The plaintiff alleges that in 1921 it bought from Clement L. Perkins, inventor, his letters patent No. 1,364,304, covering a flotation process, and that defendant has made widespread use of said process. Plaintiff asks for a temporary injunction against defendant pending hearing of the suit and a permanent injunction and an accounting of profits and damages.

Barnes-King Asks for Dissolution

Notice of application for a decree of dissolution has been filed in the District Court at Butte, Mont., by directors of the Barnes-King Development Co., and on Dec. 15, Judge William E. Carroll will hear objections, if any are presented.

Idaho-Premier Places Order for Machinery

The property of the Idaho-Premier is at the head of Burnt Cabin creek, about eleven miles from Coeur d'Alene, Idaho, and consists of a group of ten claims. Development comprises a series of prospect shafts sunk on the vein and two crosscut tunnels which have opened the vein to a depth of 300 ft. C. A. Hayes, manager, says the plans are to sink on the ore, and with that in view all necessary machinery and equipment has been ordered. This includes a Diesel engine of 60 hp., an Ingersoll-Rand compressor, a Lidgerwood hoist and 1,000 ft. of cable, a sinking pump, pipe, rails, and other necessary equipment. It is expected that this will be delivered in time for installation this fall and that sinking will proceed during the winter, and ore shipments follow in early spring.

Mohawk Mill Now Operating at Capacity—Seneca Making Good Progress

Mohawk, in the Michigan copper district, is obtaining the highest yield and tonnage in months, amounting to 1,500,000 lb. of refined copper per month. Rock production is within a few tons of the capacity of the Mohawk mill, which is 2,640 tons daily, but should there be an overproduction the coming winter the Wolverine mill, with two stamp heads, is available.

At the Seneca property, forces will be added to as rapidly as is consistent with existing conditions at the mine, and mining operations will be well under way soon. The addition to the compressor house at the Gratiot branch is well along. Hoists at both shafts have ample capacity to carry the shafts down a considerable distance and will not have to be replaced for several years.

Mayflower's crosscut west of the shaft has passed through an amygdaloid vein, the identity of which has not yet been established, and is again in trap rock, headed toward the New Arcadian lode, about 400 ft. distant. The Mayflower is engaged in one of the most important pioneering projects ever undertaken along the eastern horizon. Other than the openings at Arcadian Consolidated, little is known of the New Arcadian lode.

Minor installations made in the wash department of the Quincy stamp mill are expected to result in an increased production of silver this year. Quincy copper rock carries some silver, but not all of it is recovered. The company last year recovered 118,478 oz., which netted a profit of $43,074.

New Cornelia Output Increases

The October production of copper at the New Cornelia Copper Co. mines at Ajo, Ariz., showed a gain of more than 645,000 lb. over September, according to figures announced recently. The October production was 5,465,943 lb.; during September the production amounted to 4,820,120 lb.

Sierra Buttes Builds Power Plant

The Sierra Buttes mine and mills at Sierra City, Calif., will be operated during the winter. A 7-mile flume has been constructed and a power plant is to be installed at once to supply power for mine operation. Repairs to existing equipment are being made, and it is expected that with the new power available a profitable enterprise can be established. At the Bigelow mine, near Sierra City, a ten-stamp mill is being built and is expected to be ready for operation by the first of the year.

The Royal Drift mine, 25 miles northeast of Chico, Calif., has completed an adit 3,200 ft. long to tap the Dix channel. Raises are being extended to tap the channel above the adit, and it is expected that this will be accomplished within a few months. The work is in charge of J. A. Veatch.

Keswick, Calif., a Ghost City

A final cleanup of the Mountain Copper Co., in the town of Keswick, Shasta County, Calif., is now being made. A San Francisco junk firm has bought all that is left—about 300 tons of scrap iron and discarded machinery.

In 1900 Keswick had a population of 2,221. Now the town is deserted, there being no post office nor is there any longer a Keswick station on the Southern Pacific Railroad.

J. B. Ferris Completes Flotation Plant

J. B. Ferris of Caliente, Calif., is erecting a 100-ton flotation mill, which will be ready for operation in about five weeks. The ore to be treated has a molybdenite value of about $15 per ton, with a small amount of gold. A large tonnage is available.

Columbia Steel Corporation Semiannual Report

The Columbia Steel Corporation of California reports net sales for the first six months of 1925 as $5,513,259 and cost of sales $4,574,140, leaving an operating profit of $717,968 after deducting reserves for depreciation and depletion. Net income for the period was $406,277. Additional ore holdings have been acquired by the company in Utah and plans are being made to install another blast furnace at the plant near Provo, Utah.

Rico Mining & Reduction Co. Builds Flotation Plant

Construction of a 150-ton flotation unit and 300-hp. steam-driven electric plant has been begun at Rico, Colo., by the Rico Mining & Reduction Co. The mill will be designed to handle all of the lead-zinc ores of the camp.

Engineers estimate that enough ore is available in properties held by the corporation to run the mill without accepting any custom ore. Power will be sold to other companies operating in the district. A complete geological survey of all the properties held by the company is being made by H. L. Pasco, of Salt Lake City.

News From Washington

By PAUL WOOTON
Special Correspondent

Scott Turner Takes Oath of Office as Director of Bureau of Mines

Two Assistants Appointed—Ceramic Research Goes to Standards; Safety Work to Be a Feature—Public Wants Dependable Fuel Supply

Scott Turner, the recently appointed director of the U. S. Bureau of Mines, was sworn in Nov. 16. He will not take over the duties of the office, however, until Jan. 1. Mr. Turner accepted the position on the understanding that he would be allowed time to conclude private work in which is is engaged.

During his brief stay in Washington Mr. Turner declined to comment on any phases of the Bureau's work or on its reorganization. This latter matter, he said, is being looked after by a highly competent committee representative of the industry.

Effective Dec. 1, the work of the Bureau of Mines will be divided into two major branches, each to be presided over by an assistant director. One will be known as the technologic branch, with Dorsey A. Lyon, assistant director, in charge. The other will be known as the economics branch, with C. P. White, as assistant director.

Under the technologic branch will be grouped the following divisions: mining experiment stations; safety service; miners' health and sanitation; mechanical engineering; metallurgy and mineral technology; petroleum engineering; explosives engineering, and mining research. The Mine Safety Board and the experimental mine are included.

The economic branch is new, and will deal with the statistical, industrial, and commercial phases of coal, metals, oil, and gas. The branch is subdivided into divisions as follows: coal; petroleum; helium production; minerals and metals, and statistics. The government fuel yard will be administered by the coal division. The minerals and metals division is divided into sections as follows: iron ores; copper, lead and zinc; precious and rare metals; clays and other ceramic material; non-metallics.

Mr. White, the new assistant director, has been the chief of the commodity division in the Bureau of Foreign and Domestic Commerce devoted to coal. The work of this division has been transferred to the Bureau of Mines.

Consideration also is being given the transfer to the Bureau of Mines of certain work in minerals statistics now being conducted by the Bureau of the Census. The matter of concentrating the ceramic work in the Bureau of Standards has been determined finally. All of that work which has been done by the Bureau of Mines will be handled after Dec. 1 by the Bureau of Standards. This includes the experiment station at Columbus, Ohio. The work will be under the guidance of an advisory committee from the industries concerned, and a man taken from the industry to take immediate charge.

One of the important questions which will be discussed by the advisory committee at its next meeting, probably during the first week of December, will be the matter of safety work. This is one of the fundamental activities of the Bureau of Mines, and some changes probably will be made to give added emphasis to its importance.

Public Desires Continuous Fuel Supply

Observers in Washington are convinced that the country is experiencing the most extraordinary economic development since the buyers' strike of 1921 in the public's resort to the use of anthracite substitutes. The movement has spread from New England throughout the whole anthracite-consuming territory. Its ominous possibilities to the industry are thought to be responsible for the signs of weakening which are coming from the camp of the United Mine Workers. Apparently the users of anthracite have come to the conclusion that they must get along this winter without that fuel if they do not want this trouble to recur every two years. Despite the fact that the swing to substitutes is assuming the proportions of a boycott, there is strong conviction that the anthracite operators should refuse to open their mines until the United Mine Workers agree to some plan which will insure the public a continuous supply of the product. The country gradually is learning that this principle of continuous production is of greater importance than are the more talked of issues.

Photo by Henry Miller

Scott Turner taking oath of office as director, U. S. Bureau of Mines

Bureau of Standards to Measure High Voltage Power Currents

In order to keep pace with the demands of the electrical industry, the Bureau of Standards is extending its facilities to measure potentials as high as 350,000 volts, an undreamed of voltage only a few years ago. Long-distance transmission power projects are now planning the use of very high voltages, and it has, therefore, become necessary for the bureau to equip itself for tests in the new voltage range.

Other work in the field of electricity comprises a considerable number of tests on various types of electric batteries, especially primary batteries for operating railway signals, storage batteries for automobiles, and dry batteries. The circulation of a warning concerning the use of so-called "patent electrolytes" in storage batteries is another important service on the bureau's part to safeguard the public's interests.

Burma Corporation, Ltd., Produces 4,000 Tons Lead per Month

The Burma Corporation mined during the month of October 27,086 tons of ore. The blast furnaces produced 4,079 tons of hard lead for treatment in the refinery. Refinery products were 4,001 tons of refined lead and 410,832 oz. of refined silver. The experimental zinc plant produced 1,557 tons of zinc concentrates, assaying 15.5 oz. of silver, 7.8 per cent lead, and 45 per cent zinc. In addition to the above, 750 tons of copper matte was produced from the treatment of accumulated smelter by-products and 3,962 tons of copper ore.

Toronto Letter

By Our Special Correspondent for Northern Ontario

Ore Discovered on Amulet Property by Magnetic Surveys

Paymaster, Vipond, McIntyre, and Others Increase Mill Capacity —Larger Lake Shore Earnings

A new surface discovery has been made on the Amulet property, in northwestern Quebec, which appears to be the most important yet made in the history of the company. In the new area three distinct outcrops have been found, and preliminary assays indicate zinc up to 30 per cent, copper 4 to 7 per cent, and silver 5 to 20 oz., with small values in gold. These assays are remarkable for the high zinc and silver contents, which are greater than any yet found in the district. Though it is impossible to say as yet what this discovery will develop into, the history of the district gives ground for the belief that this is an extremely important orebody. The new find was made by magnetic surveys in what is known as Group A, the main holdings of the Amulet company. The work done to date consists chiefly of surface trenching and diamond drilling, but a shaft is being sunk on the No. 3 area.

Good progress is being made with mill construction on different properties throughout the Porcupine district. The Ankerite will soon have its mill foundations in, and is also sinking the new four compartment shaft. The mill building for the Paymaster will soon be completed. This plant will have a capacity of 150 tons a day.

The McIntyre Mine is making an addition to its mill building to house American filters, which it is expected will give an increased extraction. Vipond is also adding to its mill building to accommodate another tube mill and a battery of concentrating tables. While these will permit of increased tonnage, this will not be done immediately, but the new machinery will give a better extraction. A new mill is also contemplated in the Cobalt silver area, where the Cobalt Contact has been meeting with such favorable results as to justify milling facilities.

It is understood that the affairs of the Argonaut mine, in the Larder Lake district, are in a more satisfactory condition and that the new financing is being arranged. Shareholders were given the opportunity to subscribe for new Argonaut Consolidated shares at 40c., but as the results were not up to expectations, the company accepted an offer from two brokerage houses, to buy 200,000 shares at 30c. a share. Argonaut shareholders are now being advised that their subscriptions are being allotted at 30c. a share. This new money will enable the company to pay off its outstanding liabilities and to carry on further development.

It is also understood that plans for financing the Crown Reserve, in the same district, may soon be consummated. Negotiations are under way with a large mining organization involving about 51 per cent of the company's securities. It is proposed to form a new corporation, and give shares for money expended, which will eventually result in the new interests obtaining control.

The Teck-Hughes Co., in Kirkland, will, it is believed initiate the payment of dividends about the first of the year, and it is expected that a start will be made at the rate of at least 10 per cent a year.

The annual report of the Lake Shore Mines, of Kirkland, for the year ended June 30, shows that a total of 107,000 tons was mined and hoisted and 97,000 tons milled. The bullion recovery was $1,812,000, an average of $18.72 a ton. The tonnage milled showed an increase of 300 per cent over that of the previous year, and recovery compared with $578,000 in 1924. Operating and administrative expenses amounted to $715,000, which included a heavy construction program. After making provision for depreciation, exhaustion, and taxes, a balance of $859,000 was carried forward as profit and loss, compared with $106,000 in the previous year. This represents a little over 40 per cent on the outstanding capital.

Aside from the large increases in production and profits, the most interesting statement in the report is that of the president, to the effect that the total production of the company to date is almost $5,000,000 and that this represents a reduction of not more than 20 per cent of the ore discovered between the 200 and 1,000 levels.

London Letter

By W. A. Doman

Special Correspondent

Trade Revival a Boon to Base Metals

Copper Receives Special Attention in Rhodesia—Electrical Prospecting Being Utilized

London, Nov. 10—Attention is still being focused on base-metal mines, copper, tin, lead, and zinc all being favored. This is due largely to the signs of trade revival and to the knowledge that when business is brisk metals must play their part. Copper is perhaps more favored than anything else owing to the powerful interests behind it and to the fact that such interests do not hide their light under a bushel. P. K. Horner, who visited Rhodesia for the Edmund Davis group, is quite enthusiastic as to the prospects of copper in that country, and so far as I can gather he is right, though production on anything like a large scale cannot be expected for some time. The main thing is that copper ore is there, and though the deposits are not of high grade they will well repay working. The hope of the position lies in the fact that the copper belt embraces such a vast area, and it would appear that Rhodesia and Katanga will largely supply the world's requirements in the not distant future. Although the Union Minière can produce at the rate of over 100,000 tons of copper annually, its output has recently been considerably under that figure, say about 92,000 tons. The other copper companies have yet to make their way, but they have the experience of the Union Minière to work upon.

P. K. Horner was at one time in the service of the Katanga company, and his knowledge is useful to the Edmund Davis group. This group has just formed the Loangwa Concessions, in Northern Rhodesia, with a capital of £200,000 in 5s. shares. The Gold Fields Rhodesian Development Co. and the Rhodesian Broken Hill Development Co. are interested in this promotion, and the British South Africa Co. is also represented. As the concession covers about 13,000 square miles, and as metals are proved to exist, there are distinct possibilities.

On the Rhodesian Congo Border Concession in which A. Chester Beatty is largely interested, electrical prospecting is in progress in the porphyry. A. Broughton Edge, who is in charge of the work, is satisfied that this method of prospecting will prove highly efficient in examining the area. Three new orebodies have been indicated to date.

While it was expected that at the Gaika Gold Mining Co.'s meeting some statement would be made as to a fusion of interests with the Rhodesian Exploration Co., shareholders were disappointed at the silence of the chairman on the subject. Presumably, therefore, rumored negotiations have so far proved fruitless. The Gaika contains a very irregular orebody, and no one can yet say what the mine will produce.

Interest at the moment is keen in the possibilities of the Chosen Syndicate, which owns a large gold-bearing area in Korea. Work, however, at present is confined to the Great Nurupi Mine, where a new plant is in course of erection. The improvements will, it is expected, attain an extraction of about 90 per cent of the gold content of the ore, compared with about 69 per cent under the old method. The present management is devoting its efforts toward increasing the ore reserves. When the company took over the property virtually nothing was blocked out, and according to the latest report 198,000 tons is proved, having an average value of 8.96 dwt. This tonnage is on the 10th level, and E. T. McCarthy has expressed the opinion that the orebodies will continue in depth. The concession covers an area of 154 square miles. The deferred shares of 1s. each are being given a value of about £14. The original owner declared he would not part with any under £100, but as he is now dead his interest was acquired at something like the above figure, with the possibilities, of course, yet to be realized.

Allis-Chalmers Opens New Office in Peru

The Allis-Chalmers Manufacturing Co. has opened a new district office in Lima, Peru, in charge of W. G. Bolton. This office, as well as the one at Oruro, Bolivia, is a branch of the company's office at Santiago, Chile, of which W. R. Judson is manager. The Oruro office is in charge of P. G. Gilliard, succeeding Erling Winsnes, who has returned to the United States.

Melbourne Letter

By Peter G. Tait
Special Correspondent

Taranaki Oil Fields to Continue Development

Mount Morgan Gold Mine Devising Means to Resume Operations; Ore Low Grade; Wages High

Melbourne, Oct. 21 — The Taranaki Oil Fields, Ltd., has increased its nominal capital from £500,000 to £800,000 by the creation of 300,000 shares of £1 each, and an issue of 154,750 shares at par is being made. This new issue is explained by the fact that a part of the capital originally subscribed was utilized for the purchase of the shares of the Gisborne Oil Proprietary, Ltd. The further capital is now required to carry out the program recommended by the company's consulting geologist, F. G. Clapp, who has recently returned to the United States. The company has P. Whitney and D. Miller, oil geologists from America, on its staff.

An important development on the Golden Mile, in the Kalgoorlie field, is reported by the manager of the Golden Horseshoe, to the effect that a horizontal diamond drill has penetrated No. 3 lode for a distance of 20 ft. The average assay for a width of 20 ft. is £5 12s. 6d. per ton. The report adds that the drill is not yet through the lode.

The following statement has been issued by the directors of the Mount Morgan Gold Mining Co.:

"In December, 1924, the directors, recognizing the impossibility of carrying on operations at the mine on the basis then existing, without continuing to incur a serious loss, sent J. Horseburgh, assistant general manager, to America, in the hope that close investigation of the most modern methods obtaining in copper smelting and treatment plants would enable him to suggest modifications in the practice at your mine, by which it would once more become profit earning. Unfortunately, since that step was taken the position has altered seriously for the worse. Notwithstanding that in the year ended May last a loss on mining treatment and the realization of metals of £159,098 was sustained, making £310,109 in the last three years, additional burdens have been placed upon the company since July 1 last. The forty-four-hour week has been made compulsory for all surface workers, and the recent decision of the Arbitration Court, fixing the basic wage at £4 per week, has been overridden by an Act of Parliament, raising the rate to £4 5s. The changes, by increasing the costs and reducing the output, have accentuated the already desperate situation, and your directors feel that they can no longer take the responsibility of continuing to work the mine under the system hitherto adopted and under the conditions now imposed. The shareholders will be interested to know that the average earnings of contract miners at Mount Morgan during the twelve months ended May 31 last exceeded an average of 32s. per shift. To all employees, excluding members of the staff, the average rate of wage earned for the six months ended Aug. 31 last was 19s. 4d. per shift.

"However, as a result of Mr. Horseburgh's visit to America, a scheme for the future working of the mine has been outlined, and was discussed at a conference of the directors, A. A. Boyd, general manager, J. Horseburgh, assistant general manager, and the consulting engineer, Mr. Savage, held in Sydney, on Aug. 10, and subsequently approved. Under this plan the present methods of mining will be discarded in favor of the opencut system, the ore being extracted by steam or electric shovels, then concentrated, followed by roasting the concentrates, the calcines smelted in the reverberatory furnaces, and the matte blown to blister copper in the new converter plant. An important feature of this method is that the ore amenable to treatment would be increased from 2,700,000 tons to 8,000,000 and extraction would be at the rate of 800,000 tons per annum.

"Preliminary data collected by Mr. Horseburgh indicate that a capital expenditure of over £1,000,000 will be required, and the plan is based on the amortization of capital involved, and a reasonable return to shareholders when full production is attained. The proposals outlined to the board, and the figures submitted in support, were considered sufficiently encouraging to warrant investigation. Your directors then invited representatives of the employees to meet them either in Sydney or Brisbane, so that the position of the company could be placed before them, and proposals for the future working discussed. The employees, it is regretted, refused the invitation, though the company undertook to pay the expenses of the delegates. Subsequently, at a meeting of the directors on Aug. 24, it was decided to instruct the general manager to endeavor to arrange an interview with the Premier of Queensland for the same purpose. This interview, it was hoped, would have taken place about Sept. 8.

"In the meantime work at the mine continued, notwithstanding the heavy losses involved, until the strike of the Queensland railway employees cut off coal supplies, and mining and treatment operations were perforce suspended. As the appointment with the Premier was then fixed for Sept. 15 in Brisbane, although the railway employees returned to work on Sept. 7, your directors felt it would be inadvisable to reopen the mine, pending the result of this interview. It will be appreciated that the action of the directors was thoroughly justified, as they were not to be expected to go on working indefinitely at a loss. Other mining enterprises throughout Australia have closed down on reaching the unprofitable stage, but unfortunately it seems that the cessation of operations at Mount Morgan caused bitter feeling among a section of the men, who had been foolishly led to believe that the company's accounts had been 'faked' and that the company had not been making the losses shown. When the same argument was used in 1921, the Arbitration Court, at the request of the unions, appointed experts to investigate the company's accounts, with the result that their accuracy was fully established.

"Not until the fire is extinguished will it be possible to ascertain the extent of the damage, and to decide whether the expenditure involved in a thorough investigation of Mr. Horseburgh's proposals will be justified. Should the investigation be proceeded with, the shareholders may rest assured that no scheme will be submitted for their approval unless the directors feel that it has every prospect of success. If the proposals are found impracticable the shareholders will be at once informed, and the necessary steps will be taken to suspend all operations at Mount Morgan. It will remain to be decided whether the plant and equipment at the mine will be realized, and the remaining assets of the company held as investments, or whether all the assets should be disposed of, and the company finally liquidated."

Johannesburg Letter

By John Watson
Special Correspondent

Transvaal Gold Production for September, 797,247 Oz.

Johannesburg, Oct. 21.—The output of gold for September was, according to the Transvaal Chamber of Mines, 797,247 oz., having a value of £3,386,490, compared with £3,433,092 for August.

The first meeting of the Northern Platinum Co. will be held on Dec. 17. Discoverer's rights have just been granted in respect of the Merensky reef on the Zeekoegat farm (41 claims) and on Middlepunt (30 claims). The district is suffering from a shortage of labor, as the natives are well off and not disposed to work. Development is being pushed energetically on Zeekoegat, where a compressor is working two jackhammer drills. On the other farms, development is proceeding by means of hand labor. F. A. Unger, assistant consulting engineer, and A. F. Lyall, one of the joint-managers of the Anglo-American Corporation, have just returned from a few days business visit to the properties.

On the Johannesburg Stock Exchange, during the past week, London has been selling dividend-paying gold shares, which have been bought by local and South African investors. Transvaal Platinum shares fell to 30s. per 5s. share on Oct. 12, but closed the week, on Saturday, at about 41s. Liquidation of shares held by the estate of the former chairman, the late Fritz H. Reiss, may be the cause of the slump in this stock, which has fallen 40s. in about five weeks. However, the trend is again upward.

At the monthly meeting of the Chemical, Metallurgical and Mining Society, held Oct. 17, a laboratory apparatus for cyaniding tests was exhibited by H. R. Adam. A. J. Pelling contributed a paper on "The Hydrolysis of Aluminum Sulphate."

Societies, Addresses, and Reports

American Mining Congress Meets in Arizona

Revaluation of Copper Properties Opposed—Distribution and Transportation of Underground Supplies Discussed—What Are the Proper Functions of the Bureau of Mines?—Plea Made for the Prospector

By GEORGE J. YOUNG
Associate Editor

THE Western Division of the American Mining Congress held its annual meeting at Chandler, a suburb of Phoenix, Ariz., on Nov. 16 to 20. The San Marcos Hotel afforded unique accommodations for the meeting, which, although sparsely attended, some seventy-five delegates being present, was, nevertheless representative of important metal mining interests. W. V. DeCamp presided at most of the sessions and succeeded in making the meeting interesting and valuable. As usual, Secretary James F. Callbreath was present and kept his cautious hands upon the ship's helm.

Bureau of Mines Discussed

The U. S. Bureau of Mines and its activities were discussed at some length. What this bureau is to do appears to be of considerable concern to both its personnel and to its friends. Where to go? What to do? are important questions, answers to which are being sought. Dr. G. M. Butler, of the Arizona School of Mines, which is co-operating with the bureau, said that knowledge of what the mining industry wants the bureau to do is needed as well as effective co-operation with the bureau's experiment stations. Chairman DeCamp read a letter by Sidney Jennings in which he advanced the opinion that research was not a proper function of the bureau, which should rather be a clearing house for information useful to the industry. He advocated reducing the number of experiment stations to two, one at Washington, D. C., and the other at Pittsburgh. Byron O. Pickard pleaded for co-operation on the part of the mine operators. Charles A. Mitke brought out the fact that certain experiments could not be carried out without interference with mine operation, and he suggested that experimental mines be utilized for such work. Research he considered to be an important part of the bureau's functions, and he suggested further work on explosives and the effect of gaseous products from explosives upon workers.

Secretary Callbreath stated that while some of the work of the bureau had been criticized, there was much to be said in commendation. He instanced the sending of two young men into the Joplin district, where their work was first held in low esteem generally, but, he said, when he visited the district six months ago, it was stated at a large meeting that the result of the work of these two men was an increase in the zinc recovery of 5 per cent over the whole district. Mr. Callbreath stated that Joplin now appreciates the value of research. He predicted that in time a practical scheme of co-operation would be worked out.

Effect of Immigration Laws

Ex-Governor J. F. McDonald of Colorado introduced the subject of the effect of immigration laws upon the supply of unskilled labor, which is in danger of being insufficient for industrial needs. Chairman DeCamp stated that the Southwest was not at present concerned with this problem, as there is a sufficient supply of labor available. However, he said that the subject of industrial relations was of fundamental importance. He commented upon the difficulty of imparting the attitude of the mine management to the workmen through the agency of shift bosses, foremen, and employment managers.

Robert I. Kerr stated that reports indicate that Secretary Davis has advanced the idea of selective immigration, pointing out that present laws must be amended, if this is to be accomplished. Labor interests are in general opposed to the plan. Chairman DeCamp stated that the United Verde was co-operating with a vocational board by arranging that classes take a certain number of hours each week in the mechanical departments, so that part of the company's needs could be supplied eventually by men from these classes. P. G. Beckett advised that the American Mining Congress should give close attention to the whole subject. If quota restrictions should be established on Mexican labor, Arizona mines might have some difficulty in filling their labor requirements. Secretary Callbreath also pointed out the need for selective rather than quota control of immigration.

Federal Mine Valuation Changes

The proposal to wipe out discovery valuations and mine depletion entirely, as advanced by certain members of the Congressional Ways and Means Committee, was attacked by A. G. Mackenzie, who pointed out that neither of these provisions of the Federal income tax law was understood by laymen, and that to eliminate them would be an injustice to mining companies. Mr. Mackenzie described the method of mine taxation now in force in Utah. Chairman DeCamp and T. O. McGrath joined in the discussion that ensued. Practically all were of the opinion that discovery valuations and depletion provisions are necessary in any system of income taxation.

Uniform Safety Code to Be Drafted

The way in which the research work of the Bureau of Mines is administered was discussed by E. D. Gardner. Again a plea was made for suggestions. Chairman DeCamp stated that the safety engineers of the state were planning to hold a joint meeting at which an attempt was to be made to systematize methods of imparting safety instructions to workers and at which a safety branch chapter was to be organized. A uniform safety code was also to be drafted, with the purpose of making more effective the instruction of transient labor. He stated that additional effort was necessary to make popular with the men the safety idea. A specific campaign directed to the needs of Mexican labor had yielded good results. At the United Verde the "safety button" plan had also given good results.

Timber Preservation Has Inning

In the evening session, G. M. Hunt, of the Forest Products Laboratory, held a symposium on the subject of mine timber preservation. Mr. Hunt referred to Bulletin 225 of the Bureau of Mines, which covers the subject of mine timber and is an excellent handbook of the subject. Mr. Hunt stated that timber preservation was an old practice and sufficient information was available which rendered unnecessary any prolonged experimentation. J. H. Kensley, Jr., described the operations of the small pressure treatment plant installed at the Miami mine. Zinc chloride is used as a preservative. Port Orford cedar and treated timber of lower first cost were about the same cost in place. Mr. Hunt commended the work at Miami. Gerald Sherman brought out the point that changing conditions in a large mine often render timber preservation work futile. He instanced the case of a shaft timbered with treated timber which had to be enlarged and in which concrete was subsequently used for lining. Thus, he stated that he was not at all convinced that timber preservation will in all cases result in a money-saving. Preservation of timbers by guniting was discussed generally, and the opinion was expressed that gunite did not have any effect in retarding decay except in a few cases. Mr. Hunt brought out the important point that in the use of many timber preservatives, the timber is sterilized and the fungus spores are destroyed. He stated that the objective of the discussion was how to get more service out of timber. Willingness to help mine operators was expressed. He mentioned that experiments are about to be initiated in the use of borax as both a preservative and as a fire retardant. Apparently, there is promise of good results with this reagent. However, he would not recommend it until the outcome of the experiments has made known its possibilities.

At the Tuesday morning session, a resolution protesting against the revaluation of copper-mining properties was read and unanimously passed. The resolution is as follows:

"Resolution No. 1—Whereas, various copper companies have been served by the Revenue Commissioner with so-called sixty-day letters claiming grossly excessive additional taxes based upon revaluation of their properties; and,

"Whereas, the revaluations effective after the year 1918 are based upon entirely inadequate and unfair mine depletion allowances; and,

"Whereas, permission to revalue was the result of investigation by the department in 1922, which is not regarded by copper companies as full and complete an investigation as they are entitled to; and,

"Whereas, in addition investigation was based upon the claims of the department engineers that former valuations had not been intended to be final, but were merely provisional or tentative; and,

"Whereas, the indisputable fact is that these valuations were final and were so intended, by the department; and,

"Whereas, the further fact is that so far as copper producers have been able to learn there is no legal opinion by competent authority either in the Department of the Treasury or the Department of Justice or any court, that the department has power merely because of differences in judgment to upset these former final valuations upon which taxes have been paid as assessed by the department; and,

"Whereas, any disturbance of these final valuations would with certainty bring about disastrous consequences to the copper mining industry and to its stockholders; now therefore be it,

"Resolved, by the Western Division of the American Mining Congress, that the mining industry of the West protests most emphatically against further disturbance of business by constantly shifting orders and policies of the Revenue Department and calls upon the Congressional delegations from Western metal-mining states to protest against this and similar efforts, believing that the time has come when business of all kinds must definitely know its obligations; and be it further

"Resolved, that the Congressional representatives of the metal-mining states be and hereby are called upon to exert every effort to effect withdrawal of the so-called sixty-day letters above referred to, pending complete hearing of copper producers at the earliest possible date."

Freight Rates and Mining

Roland Johnson, traffic manager of the Phoenix Chamber of Commerce, who was then introduced, read a paper on the general subject of freight rates in relation to the Western mining states. This was informative and defended the position of the intermountain states in asking for freight rates consistent with their distances from shipping points.

A communication from R. E. Tally was then read in which he advocated the need for stable conditions in industry. He suggested the advisability of publishing cumulative statements of production and consumption in the important commodities as a means for preventing overproduction.

A Plea for the Prospector

M. E. Dittmar made a plea for greater encouragement of prospecting, particularly on large land areas in the National Forest reservations and in the railroad land grants. He pointed out that in so far as the railroads are concerned it was to their interest to make conditions upon their lands such that the prospector would know the terms upon which he could obtain control of lands already patented upon which he had made important discoveries. Mr. Dittmar suggested that the American Mining Congress could use its influence to create a friendly atmosphere toward the prospector who desires to prospect railroad lands at present under patent. He made an eloquent plea for the prospector, the "pathfinder of the mineral industry."

Technical Papers Important Feature

The meeting was then turned over to G. N. Bjorge, who introduced the technical program. A. C. Stoddard, chief mining engineer of the Inspiration Consolidated Copper Co., discussed at length the material haulage and hoisting practice at the Inspiration mine. Respecting the choice of power agents for underground transportation, he said: "The choice then and now is only between electric trolley-type locomotives and compressed air, and, as the electric power would have necessitated thousands of feet of bare conductor in the main haulageways and in the gathering drifts, which are the only routes available for use by the men in going from the stopes to the shafts, and as this conductor was considered a source of danger, the compressed-air locomotives were chosen. At that time the power cost was taken as about equal. No doubt the question may be raised as to why storage-battery locomotives were not considered. At that time, storage-battery locomotives were in their infancy, and, while at present time they have passed that stage, we have recently found out that at least our service is considered 'very severe' for storage-battery locomotives, so it would be almost if not quite impossible to use a storage-battery locomotive of reasonable cost and size."

Heavy Traffic at Inspiration

Mr. Stoddard pointed out the need for thorough track work. In commenting upon the service, he said: "At the Inspiration division, where exceedingly heavy tonnages for underground mining have been handled in a day, this tonnage has reached 22,400 tons in twenty-four hours, and a large number of trains have been required, this number reaching as high as twelve units on the sixth level. This means a train out or in to one of the tipple terminals about every three minutes. Traffic such as this requires some type of dispatching system in order that either terminal might not be overcrowded. Each terminal has a capacity of five 20-car trains, and it is possible that, with this capacity for each terminal, unless other trains were stopped from entering considerable confusion would result. To avoid this an automatic block signal system was installed. This is an adaptation of standard equipment used for high speed surface railroad traffic.

Mr. Stoddard then commented upon the handling of mine supplies and gave details of the hoisting equipment in use at the "Porphyry" and Inspiration shafts.

In the discussion that followed Mr. DeCamp stated that side-dump cars were better than the tipple-dump cars. He advocated the gable-bottom type. It would appear that automatically side-dumped cars have certain advantages over the tipple-dump system. The use of steel tie plates in track construction appears to be accepted as a necessity where large tonnages are to be transported. P. G. Beckett asked that, if the Inspiration installation had to be repeated, what changes would be considered necessary? T. H. O'Brien stated that, if the same problem were to be reconsidered as in the case of a new installation, compressed-air locomotives would not be installed, as the electric locomotive has a lower maintenance cost and is simpler than that operated by compressed air. He pointed out the fact that there was greater difficulty in securing mechanics for underground service, and this militated against an efficient repair service, as air locomotives are seldom brought to the surface for repairs, this work being done underground.

Underground transportation at the Magma mine was discussed at length by F. W. Snow, superintendent of the Magma mine. He said: "Both storage-battery and trolley locomotives are used in the transportation of ore and waste. A 4-ton Westinghouse-Edison battery locomotive is used, the draw-bar pull rating being 1,000 lb. at 3½ miles per hour. Half size M. C. B. couplings are also used. The trolley locomotives are 3½-ton Baldwin-Westinghouse type, rated draw-bar pull being 1,750 lb. at 4.4 miles per hour. An 18-in. gage track is provided. Gable-bottom cars of two tons' capacity, 40 cu.ft., are used for the transportation of ore both underground and on the surface. The cars are equipped with Hyatt roller-bearing wheels. A train is made up of ten cars. Underground train crews consist of a motorman, a brakeman, and a chute tapper. Two train crews, each working eight hours, handle the mine output with ease."

In conclusion, Mr. Snow said: "Another point of difference with the large mine is the track layout. Curves as short as 25-ft. radius are used successfully in the Magma mine, while in the large mines, with track of broader gage, curves up to 150-ft. radius are not uncommon. Storage raises and shaft pockets are smaller in the small mine. The life of a haulage level is another important difference, lasting in the Magma mine three or four years, and in the larger mines perhaps ten to fifteen years, or in some cases perhaps for the life of the mine. Summed up,

it might be said that in the case of the small mine one unit is provided, while in the large mines several units of the same size, or larger, are used."

Technical Operating Details Compared

In the discussion, Mr. Snow said that it was not possible to give comparative costs of operation of storage-battery and trolley locomotive service, but under the mine conditions the storage-battery locomotives gave a high upkeep cost. DeCamp stated that small end-dump cars were abandoned at the United Verde in favor of a two-ton rocker-dump type of car which admitted of automatic dumping into grizzly pockets. Outside cap roller bearings were found to be troublesome and an improved type is now in use. Respecting transfer raises, Mr. Snow stated that the 52-deg. inclination upon which these raises were driven had proved to be unsatisfactory, as the ore movement wore the bottoms of the raises severely, in some cases to a depth of 10 to 15 ft. in a few years. A steeper angle would have given better service, but cribbed transfers are now used. He pointed out the difficulty of handling moist ore in the 52-deg. transfers, and also stated that it was practically impossible to maintain haulage drifts in the vein, as the settlement of stope fills amounted to 15 to 20 ft. in some cases.

Handling Underground Supplies

Transportation and distribution of underground supplies at the Miami mine was presented by A. J. McDermid in an excellent paper. Mr. McDermid pointed out that the system was designed to minimize loss of the miners' time by having tools and supplies available at points near stopes and undercutting levels. A series of charts was used by the speaker to illustrate the important features of the installation, which reflects great credit upon the engineers and the Miami management. The mine produces 10,000 tons of ore per day and employs an average underground crew of 355 men. Distribution of underground supplies is supervised by a supply engineer. It is his duty to see that all parts of the mine are supplied with sufficient material and equipment. He is informed of the requirements by the foreman, engineers, and bosses and by daily inspections of tool rooms and storage places. He orders steel, timber, powder, and general mine supplies every day for all parts of the mine. All orders are filled and delivered on the day shift. If special tools or timbers are required, the supply engineer is furnished with the necessary information, from which he makes up sketches for the shops or timber framing shed.

Rehandling of supplies is avoided by providing trucks and cages of such size that the supply cars can be delivered to storage points without the necessity of unloading at any intermediate point. An Otis freight elevator is used for lowering the supply trucks from the 570 to the 620 level. This is of the warehouse type. The elevator is 5 ft. by 11 ft. and carries a load of 8,500 lb., the speed being 50 ft. per minute. A smaller elevator gives access to the levels above the 570-ft. level. Both elevators are of the automatic type, and hoisting engineers are therefore unnecessary. The 620 level or stope floor requires 85 per cent of the total supplies, the upper levels 10 per cent, and the lowest or 720 level, 5 per cent. The last named is the ore haulage level to the main shaft. Stub drifts are used for storage depots. On the 620 level a central tool room is provided for small tools of all kinds, which are issued and charged to the miners. When tools are issued to a miner his number and the names of the tools received are entered upon a card. Sets of tools for timbermen are placed in sacks marked with the timberman's number, and this is issued only to the timberman or his helper. Small articles are kept in pigeonholes along one side of the tool room, where they were easily available when needed.

Mr. McDermid said: "The organization of the supply department under one head enables the mine superintendent to delegate the responsibility for the efficient operation of the system. The transportation equipment and the 620 level supply drift system facilitates rapid handling and the use of the central tool room prevents waste and loss of material."

Additional resolutions were presented by the resolutions committee and all were accepted and passed without particular opposition. These are indicated in the following:

No. 2—Advocating the general adoption by Western states of high-grading laws similar to those in force in California and Colorado.

No. 3—Asking for mitigation of the present conditions imposed upon prospectors who enter upon stock-grazing homestead lands.

No. 4—Asking the American Mining Congress to use its best efforts to speed up the completion and publication of geologic folios and reports of mining districts now held up for various reasons in the Federal printing bureau or in the departments.

No. 5—A resolution of commendation of the efforts of the income tax and traffic committees of the American Mining Congress.

No. 6—Endorsing the effort to be made to carry out completely the provisions of the Pittman Act, with respect to government purchases of silver.

No. 7—Expressing confidence in Herbert Hoover and suggesting to him that the present work and the experiment stations of the Bureau of Mines be maintained.

No. 8—Thanking the Arizona chapter for their efforts to make the Western convention a success.

J. M. McDonald Heads Board of Governors

Secretary Callbreath made the announcement that J. M. McDonald, of Colorado, had been elected chairman of the Board of Governors of the Western Division of the American Mining Congress and M. B. Tomblin, secretary. The next meeting is to be held in Denver.

P. G. Beckett criticized the meeting by pointing out that there had evidently been lack of preparation in arranging its details. Important speakers had failed to attend and apparently little effort had been made to secure discussion of vital subjects. This criticism was to the point, for the meeting was poorly attended and not only was it an expensive one to those who came from considerable distances but it was also an uninteresting one in that "old-stuff" brought forth at previous meetings was again presented and apparently little effort made to get new angles of view. No report was made on just what happens to the resolutions which are passed at these various meetings.

Technical Discussions to Feature Future Meetings

Secretary Callbreath stated that the arrangement of the details of the Western Division meetings was the function of the Board of Governors and its committees. His central organization would and did assist. He also stated that he proposed to make the presentation of technical papers and the discussion of operating details a feature of future meetings. As a matter of fact, the most interesting features were the three technical papers presented and the discussions that followed. Messrs. Stoddard, Snow, McDermid and the operating men present gave a certain punch to the meeting, without which it would have been quite uninteresting. However, the worthy secretary's announcement of the developments of increased technical and practical discussion is most important. There is an anomoly here. The function of the American Mining Congress is political. It looks after current legislation and initiates legislation necessary for the welfare of the mining industries. Is it going to enlarge its function by including a choice selection of everything of interest to mining men? It looks as if there is to be direct competition with the American Institute of Mining and Metallurgical Engineers, for this organization furthers the technical interests of the miners and operators and it maintains this work through its local sections. Clearly the secretary's announcement can be taken as an admission of weakness of the American Mining Congress. It no longer finds the political field sufficient for its activities, and instead of restricting expenditures to this important object, it now proposes to duplicate functions that are being and have been well furthered by the Institute.

Nevertheless, some technical discussion is useful, but perhaps a better way would be to enlist the co-operation of the Institute and have the local sections join with the American Mining Congress in conducting the meetings devoted to technical papers and their discussion.

On Wednesday morning, the delegates entered a fleet of autos and were taken to the Miami-Globe district over the Apache Trail. A visit was made to the Mormon Flat and Horse Mesa dams. A banquet was held in the evening at Globe. Thursday was given over to visiting the mining properties at Globe and Miami.

Ontario Engineers Honor Head of Power Commission

C. A. Magrath Makes First Public Utterance Since Taking New Position—Power Shortage Affects Mining Companies

On Nov. 18 the nine engineering societies represented in Ontario gave a dinner to C. A. Magrath, the new chairman of the Hydro-Electric Power Commission. This was not only the largest and best-managed function of its kind ever given to a single individual in Canada, there being 700 present, but marks the first time in which all the engineering societies of the province got together in one undertaking.

Mr. Magrath is a distinguished engineer; he put through a great irrigation undertaking in the Western Provinces; was chairman of the Fuel Board during the war, and later was made Canadian chairman of the International Joint Waterways Commission. In his new position he has charge of the greatest public-ownership undertaking of its kind in the world. The commission has invested $262,000,000, and last year distributed 781,000 hp. to 416,000 customers. This was the equivalent of 7,800,000 tons of coal which would have been required for the generation of the same amount of power.

Mr. Magrath's speech at this dinner was his first public utterance since his accession to the new position and was particularly important on account of the power shortage which threatens the province and the necessity for new development. Supplementary steam plants have been under consideration for some time, but the chairman stated that while he recognized that they had their place in the scheme of things, he did not consider it advisable to proceed with their construction now. He was impressed with the necessity for the immediate development of the power in the St. Lawrence and Ottawa rivers, and made the important announcement that he did not consider it necessary to await the development of the St. Lawrence power until the Dominion and United States governments had agreed upon the requirements for navigation. This was something that could be attended to later. With regard to power development in the Ottawa, which is interprovincial, he considered it only necessary to get together with the Province of Quebec in a spirit of fair play, to solve this problem. He paid a very generous tribute to his colleagues in the United States on the International Joint Waterways Commission, who were represented at the dinner by Senator Clark, of Washington, the United States chairman on the Joint Commission.

The dinner was presided over by H. E. T. Haultain, professor of mining at the University of Toronto, who was chairman of the organization committee and who was largely responsible for the outstanding success of the function. Among many brilliant speeches, that of Dr. Arthur Surveyor, president of the Engineering Institute of Canada, who proposed the toast to the profession, was, it was generally agreed, second to none.

Mine Safety Work Discussed in New York

Eight times as many men are killed by automobiles as by all causes in coal mines, according to J. V. W. Reynders, president of the American Institute of Mining and Metallurgical Engineers, at the mining session of the Joint Safety Conference in New York City, on Nov. 18. This conference was fostered by the American Society of Safety Engineers and the Engineering Section of the National Safety Council, as well as by the four founder societies. Mr. Reynders was discussing the safety work of the U. S. Bureau of Mines. He said that the dangers of coal mining had been greatly overestimated by the public. The public, impressed by disasters that gave opportunity for sensational headlines, had become obsessed with the idea that the hazards of the coal industry are much greater than they really are. The speaker gave a brief review of what the Bureau had been doing and said that one of the chief reasons for creating it was a series of mine disasters. Speaking of training in first-aid work, Mr. Reynders said that the psychological value of such training could be proved. Mine rescue training and not rescue work was the principal function of the mine rescue cars. That the work of the Bureau had a beneficent influence was undoubted, he said.

B. F. Tillson, assistant mine superintendent for the New Jersey Zinc Co., at Franklin Furnace, discussed the application of safety to metal mining, illustrating his remarks with interesting lantern slides, demonstrating certain unsafe practices of which miners who are employed underground are guilty at times.

John W. Leib, vice-president of the New York Edison Co., New York City, then spoke on "Standardization and Safety." He said that standardization was a group process, whereas safety was an individual one, and furthermore that standardization work had for its object a monetary gain, whereas that of safety work was humanitarian in nature.

Prof. Michael I. Pupin, of Columbia University, presided at this joint session.

The Power Show and Progress

The National Exposition of Power and Mechanical Engineering will be held for the fourth time from Nov. 30 to Dec. 5 at the Grand Central Palace, New York City. The number and diversity of exhibits, it is said, will be greater than ever before. The three floors of the building will be filled with displays of 400 exhibitors. The show will demonstrate the strides in the development of power-generating and power-distributing equipment.

An excellent program of fourteen lectures covering the field of power and mechanical engineering will be presented with a view to making public the latest information about new development in the various fields and interpreting the power show to the visitors.

Fairer Taxation Sought in British Columbia

A representative deputation composed of members of the British Columbia branch of the Canadian Institute of Mining and Metallurgy and of the Mining Association of Interior British Columbia waited upon William Sloan, Minister of Mines, on Nov. 6, at Victoria, with a view to obtaining a fairer method of taxation than that now in vogue. It was suggested that, instead of the present tax of 10 per cent of the operating income, with an allowance for depletion, the government should follow the practise in Quebec and Ontario of 3 per cent of the operating profits without allowance for depletion.

The minister promised that the matter should have careful consideration.

Mining and Metallurgical Society Discusses Zinc

Following a discussion of "Lead—the Precious Metal" a month ago, the Mining and Metallurgical Society of America had an evening devoted to zinc at the Harvard Club, New York City, Monday, Nov. 23. The council of the society asked that the proceedings not be published.

Mining Machinery to Be Shown at Philadelphia Exposition

The advance of civilization from the days when many of the necessities and comforts of life were made by hand to the present day when virtually everything is made by machinery will be mirrored in the great number of machinery exhibits which will mark the Sesquicentennial International Exposition, to be held in Philadelphia from June 1 to Dec. 1, 1926, to celebrate the 150th anniversary of the signing of the Declaration of Independence.

The machinery exhibits are to be housed in the Machinery, Engineering, Mines, Metallurgy, and Transportation Palace. The building, which will cost approximately $1,250,000, will be divided into two sections, one devoted to machinery and engineering, the other to mines and metallurgy and transportation on land and air. The dimensions of this building will be 1,888 ft. long, by 400 ft. tapering width.

The exhibits will be distinctly unusual in that they will contain the largest and most comprehensive showing of Diesel engines at one time the world has ever seen. The history of that important factor in power development will be shown from its earliest days.

Short Course for Miners Begins Jan. 4

The State College of Washington at Pullman, Wash., will give a twelve-week course in mining, geology, assaying, ore testing, metallurgy, mineralogy, and mine surveying beginning Jan. 4, 1926.

The object of the college in offering these courses is to assist mature men interested in mining who have not had the time or perhaps the preliminary training necessary to enter the four-year collegiate course in mining and metallurgy.

Men You Should Know About

R. B. Millard, chief engineer of Southwestern Engineering Corporation, is opening an office for the company in Tulsa, Okla.

C. A. Chase, mining engineer, has returned to Denver after three months of mine-examination work in the San Juan region of Colorado.

George H. Garrey, who has been on geological work in Utah, Nevada, Washington, and California for the last six months, has returned to his Philadelphia office.

N. L. Stewart, chief engineer of the Utah division of the American Smelting & Refining Co., has assumed the duties, also, of construction engineer of the same company.

E. L. Bateman has been appointed by the Dorr Company, of New York, as sole agent for their equipment in South Africa. His headquarters are the Corner House, Johannesburg.

C. G. Dodson, a mining engineer from Butte, Mont., has been engaged by the Idaho Metals Co. as mine superintendent of that company's mines. Mr. Dodson succeeds **J. Ray Weber,** who resigned about a month ago.

Ernest Hibbert, formerly with the British America Nickel Corporation, of Sudbury, Ont., has been appointed superintendent of the Horne mine of the Noranda Mines, Ltd., in the Rouyn area of northwestern Quebec.

George H. Horne, operating engineer for the Western Precipitation Co., sailed for Japan on Nov. 10. Mr. Horne will make an inspection of precipitator installations in Japan during his stay there of three or four months.

Fred Ekman, mine superintendent for the New Cornelia Copper Co., who developed the methods used so successfully at Ajo, has resigned his position and has been succeeded by **George Ingham,** for some time an assistant to Mr. Ekman.

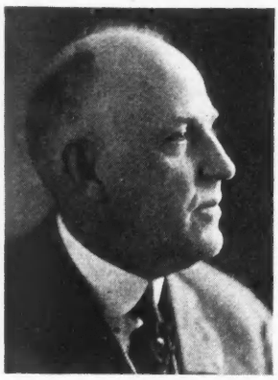
C. P. McCormack, consulting mining engineer with Crowell & Murray, of Cleveland, sailed for Europe on Nov. 18. He is engaged on mine examinations in Russia which will take him over a considerable area and occupy some two months.

C. P. Bowie, petroleum engineer in charge of the San Francisco office of the U. S. Bureau of Mines, made a trip to Colorado during October to inspect the oil-shale plant the Bureau is erecting near Rifle, on the Denver & Rio Grande R.R., in that state.

J. F. Robinson, of Miami, was recently re-elected president of the Tri-State Zinc and Lead Ore Producers' Association. **C. F. Dike,** of Joplin, was elected first vice-president and **S. H. Davis,** second vice-president. **George Pearson** was re-elected treasurer and **J. D. Conover,** secretary.

T. M. Owen, metallurgist, who recently returned to Australia from the United States, has been visiting Mount Isa to consult with **W. H. Corbould** in regard to the treatment of the ores. He was accompanied by **J. B. Miller,** who is associated with the Federal Mining & Smelting Co., which is conducting operations in Idaho.

Dorsey A. Lyon, who has been connected with the U. S. Bureau of Mines since 1913, will become Assistant Director in charge of the Technological Branch in the newly reorganized Bureau, and **C. P. White** will assume charge, also as Assistant Director, of the newly created Economics Branch of the Bureau, which will deal with the statistical, industrial, and commercial phases of the production of coal, metals, oil, and gas. Mr. White has long been prominently identified with the coal industry and rendered conspicuous service during the period of the World War with the war-time Fuel Administration.



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Dorsey A. Lyon

C. P. White

J. A. Bancroft, professor of geology at McGill University, is making a geological examination of the Sullivan mine and surrounding district for the Consolidated Mining & Smelting Co. of Canada. Professor Bancroft spent the early part of his summer vacation at Anyox, where he made geological investigations for the Granby Consolidated Mining, Smelting & Power Co.

Gordon R. Campbell, of Calumet, Mich., president of Calumet & Arizona, and several directors of the company have left on a visit of inspection to properties owned by C. & A. at Lordsburg, N. M., and Warren, Ajo, and Jerome, Ariz. It is the practice of the president and directors to visit the company's mines twice a year to keep in close touch with their development.

Clifton S. Corbett, until last June associate professor of geology at the University of Kansas, left for the Dutch East Indies at the close of the college year to become chief geologist of the Nederlandsche Koloniale Petroleum Maatschappij, the headquarters of which are at Weltevreden, Batavia, Java. The above named company is a subsidiary of the Standard Oil Co. of New Jersey.

C. A. Chandler, assistant secretary of the Oaxaca-Mexico Development Co., operating in the Sierra Juarez, about 35 miles northeast of the town of Oaxaca, Mexico, is in Boston and other United States centers on company business. This company has completed its orders for the machinery and the teamway for its new mill, and Mr. Chandler is in the States arranging for the shipment of the equipment.

Sir Hamilton Grant and **E. Turk,** both of London, England, directors of the Huronian Belt Co., recently visited the mining districts of northern Ontario. Sir Hamilton has a large financial interest in Canadian mining enterprises and is greatly impressed with possibilities offered to investors by the mining industry. He has occupied important positions in connection with the administration of Indian affairs, having been Foreign Secretary to India and Governor of the Indian Northwestern Provinces. The visitors will return to England soon.

C. T. Young, Toronto superintendent of development of the Canadian National Railways, is returning from a visit to England, where he held a number of interviews with leading financiers regarding the opportunities for investment in mining, hydro-electric, and other enterprises along the C. N. R. system in eastern Canada. Much interest has been aroused in British financial circles by a booklet issued by Mr. Young showing the richness and accessibility of the mineral zone of northern Ontario and Quebec, which, according to his view, probably extends through eastern Quebec and the Maritime Provinces.

Dr. Albert Sauveur, who holds the Gordon McKay professorship in metallurgy and metallography at the Harvard Engineering School, has been engaged by Thomas S. Baker, president of Carnegie Institute of Technology, to give a series of three scientific lectures at the Pittsburgh institution Nov. 30, Dec. 1 and Dec. 2. The lectures, it is announced, will be given in the evening for the benefit of Pittsburgh scientists and steel men who may wish to attend. The subjects of Dr. Sauveur's lectures will be "Directional Properties and Dendritic Segregation in Steel," and "Hardening of Steel." Two lectures will be given covering the latter subject.

Recent Technical Publications

Reviews, Abstracts, and References

Interpreting Maps

Interpretation of Topographic and Geologic Maps. By C. L. Dake and J. S. Brown. McGraw-Hill Book Co., New York. Price $3.

This is a book on the interpretation of maps, without presenting any maps to interpret. To do so would, of course, have made the work more costly than it is, and fortunately it has not really been necessary, for the study is confined largely to the excellent maps of the U. S. Geological Survey, which may be obtained for 10c. apiece. Part 1, of about 200 pages, is devoted to topographic maps, pointing out special features, the development and recognition of land forms, and the relation of land forms to structure. Part 2, of about 150 pages, discusses geologic maps, horizontal beds, dipping beds, folds, faults, igneous rocks, unconformities, the drawing of structure sections, and representation of structure by contours.

This is a much more complete work than the U. S. Geological Survey's Professional Paper No. 60 on "The Interpretation of Topographic Maps," and should be a useful aid to the student and teacher, and to the mining engineer inexperienced in getting all there is out of the oftentimes somewhat complicated looking colored maps of mining districts.

Graphic Logarithms

A Graphic Table Combining Logarithms and Antilogarithms. By Adrien Lacroix and Charles L. Ragot. The Macmillan Co., New York. Price $1.40.

This book is an interesting application of the graphical presentation of data, whereby much space is saved, greater accuracy secured, and troubles are obviated. In one graphic scale are combined all five-place numbers and all five-place logarithms, either one of which can be read directly in terms of the other without interpolation. No tables of proportional parts are necessary. Though the charts occupy only forty pages, the same data in the ordinary form would occupy 380 pages. An aid to the user of logarithms that will make his work more simple and accurate.

Statistical Abstract of the United States, 1924. U. S. Department of Commerce, Washington, D. C. Price $1 from the Superintendent of Documents, Washington, D. C.

This is the customary annual digest of data collected by all statistical agencies of the national government as well as those of a considerable number of private agencies and one of two states. Much of the material has already been issued as separate pamphlets and is here collected for convenient reference.

National Directory of Commodity Specifications. U. S. Bureau of Standards, Department of Commerce, Miscellaneous Publications No. 65. Price $1.25 from the Superintendent of Documents, Washington, D. C.

To those who wish to buy on specifications it is often puzzling to know just what to specify that will assure the grade of commodity desired and at the same time will not be unjust to the seller, and result in his charging a higher price than he would otherwise do. This directory gives a large number of references which may be procured and studied. Many of the commodities mentioned are also of interest to mining men from the sales standpoint: for instance, if a man has ocher to sell he is referred to sixteen different sets of specifications, the study of which will give him a good idea as to just how his product must be prepared to meet the desires of buyers. The first edition of this book was out of print a month after it was issued, but a second edition is now available.

Austrian Mining — The Österreichisches Montan-Handbuch for 1925, containing numerous statistics of the Austrian mining industry, is now available from Fachliteratur G. m. b. H., Vegagasse 4, Vienna XIX, Austria. Price "S 12-, M 8-, Kc 60-."

Tasmania—The report of the Secretary for Mines for the year ended Dec. 31, 1924, giving a résumé of the work done at various mines, and of the mineral production of the province, is now available from the Secretary for Mines, Hobart, Tasmania.

Queensland—The annual report of the Under Secretary for Mines, for 1924, is now available from the Department of Mines, Brisbane, Queensland.

South Africa—The annual report of the Secretary for Mines and Industries, and the Government Mining Engineer, for 1924, has recently been published, price 10s. 6d., by the Government Printing and Stationery Office, Pretoria, South Africa.

A report on the Batavia goldfields takes up 20 pages in the *South African Journal of Industries* for September (price 6d.; the Government Printer, Pretoria). Very little profitable gold ore appears to be available there.

South African Mica—In the magazine just mentioned is also a three-page article on "The Marketing of Mica," containing some useful hints for producers and shippers. All dealings should best be through brokers, the author says, and he gives a short discussion of grading, scrap mica, and splitting.

Canadian Institute Transactions—The *Transactions* of the Canadian Institute of Mining and Metallurgy for 1924 have recently been published in bound form. (603 Drummond Building, Montreal.) Most of the important papers contained in this volume have been chronicled in these columns as they have appeared in the monthly bulletin of the institute.

Underground Transportation — The "Transportation and Distribution of Underground Supplies at Miami Copper Co." is the subject of a four-page article by A. J. McDermid and J. C. Conniff in the *Mining Congress Journal* for November (price 30c.; Munsey Building, Washington, D. C.). Other articles on this same general subject in this issue include: "Handling of Materials in Underground Mining," two pages, by Guy N. Bjorge; "Material Haulage and Hoisting at the Inspiration Consolidated Copper Co.," three pages, by A. C. Stoddard; and "Transportation and Handling of Ore and Waste in the Magma Mine," two pages, by Frederick W. Snow.

Mineral Resources—Recent separate chapters of "Mineral Resources of the United States, 1924," include: "Arsenic," by V. C. Heikes and G. F. Loughlin, nine pages; "Potash," by George Rogers Mansfield and Leona Boardman, 34 pages; and "Clay," by Jefferson Middleton, eight pages. The clay and arsenic papers are 5c. and the potash paper is 10c., from the Superintendent of Documents, Washington, D. C. The potash bulletin is quite complete and contains much of both economic and technical interest.

Patents

Rock Drills—No. 1,559,709 Nov. 3, 1923. M. A. Knapp, Oakland, Calif. Design for a drill rod.

No. 1,560,490. Nov. 3, 1925. M. E. Young, Casper, Wyo. Arrangement of a diamond-drill bit.

Reissue No. 16,210. Nov. 10, 1925. A. E. Williams, Copper Hill, Ariz. A front drill head for a stope hammer machine.

No. 1,561,326. Nov. 10, 1925. L. A. Harrison, Hesperus, Colo. Design of a drill bit.

Amalgamator—No. 1,558,574. Oct. 27, 1925. H. N. Banks and G. E. Banks, Delta, Utah. A centrifugal amalgamator comprising a rotary bowl with vertical lateral grooved sides and unobstructed rim, riffles being placed in the grooves and held there by spring tension.

No. 1,558,993. Oct. 27, 1925. W. C. McLaughlin, Oakland, Calif. An amalgamating and separating machine consisting of a receiving hopper, means to separate iron from the sand, mercury-plated screens below which is a separating table, and riffle bars set in the table, with collecting wells at the bottom.

No. 1,557,877. Oct. 20, 1925. J. H. Rae, Dayton, Nev., assignor of one-third to J. H. Rae, Jr., and one-third to L. M. Rae, both of Dayton, Nev. An amalgamator and concentrating machine comprising a sluice box with a compartment for mercury, and rollers journalled crosswise of the sluice and partially submerged in the mercury, these rollers functioning as both separating and conveying devices.

Ore Reduction—No. 1,558,262. Oct. 20, 1925. G. F. Greenwood, Georgeville, Que., assignor of one-half to R. B. Hutcheson, Montreal. The ore and the reducing agent are brought separately to a temperature above their combining temperature, and are then brought together and maintained at a temperature above their combining temperature until the ore is reduced.

New Machinery and Inventions

Protection against dust that cannot be eliminated is afforded by the mask shown

New Mask Protects Workmen in Dusty Operations

In cleaning boilers, generators, and other apparatus a dust mask can be used to good advantage. Some other operations where protection for the nose, throat, and lungs of the workman is necessary include sand blasting, grinding, blowing, and paint spraying. A mask that has recently been introduced is especially designed for workers in dust-discharging operations. Where dust cannot be eliminated, the men can be thus protected against breathing it.

The new mask is similar in function to a gas mask. It prevents dust in the air from being breathed into the lungs. Eyes, mouth, nose, and ears are protected by an enveloping hood and skirt covering the complete head, back, shoulders, and chest. Breathing is done through a large mouthpiece or respirator guarded by a fine copper screen and fitted with a number of felt filtration pads. Exhalation is easily carried on through a flutter valve.

The mask is made in two types, known as Type A and Type B. Type A is for short-period use under conditions where the dust volume is so great as to make breathing for any length of time impossible without some air-filtering device, such as the cleaning of boilers and other similar applications, and for certain classes of electrical apparatus.

Type B is lighter, of slightly different design, and for use under conditions where a ventilated mask is necessary. It is provided with a ventilating flap and, when necessary, with copper screens over the lenses of eye pieces. It is made to be worn for long periods, as in paint spraying and sand blasting.

The mask, according to the maker, can be donned by the operator without assistance and removed quickly. The vision lenses are non-shatterable, laminated glass, strong enough to withstand the strain of flying particles of stone, metal, or other materials.

The new product is known as the Epco dust mask and is made by the Engineering Products Corporation, 64 Wall St., New York.

Oil Circuit Breakers Housing Framework Simplified

A new "ready-to-use" housing framework for Type FK-54 oil circuit breakers is now being manufactured by the General Electric Co., designed primarily to meet the demand for equipment which can be installed with a minimum of skilled work.

The three runways of the framework are welded in one solid piece, forming a base plate to which is welded an overhead structure of angles and steel straps. Though the design is simplified, there is sufficient strength to hold bushings, contacts, and runways in permanent alignment. To install, it is merely necessary to run the housing into the cell, secure it with grouting through the base plate, and make the usual connections.

Units are securely interlocked against any attempted withdrawal of closed breakers, and there is a positive interlock between tripping coils, so that the opening of one unit opens the entire circuit. A grounding device on each breaker, consisting of a long blade on the housing which engages a spring clip on the unit, gives grounding protection until the main contacts have been separated three inches.

All single-pole units can be assembled one, two, three, or four poles. At 7,500 volts, the ampere capacities are 400, 600, 800, 1,200, 1,600, and 2,000 amp. The interrupting capacity is 10,500 amperes at 7,500 volts for two-, three-, or four-pole operation.

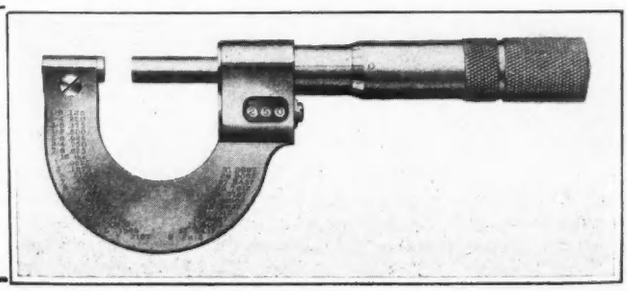
Another advantage of this new housing framework is the simplification in locating the three top bushings, all time-consuming adjusting being eliminated. The bushings are so arranged that contacts are in perfect alignment before the housing leaves the factory.

Although these bushings are removed for shipping and cannot be replaced until the housing is in its cell, a system of numbers and dowels enables the user to replace the bushings in the same alignment obtained at the factory. Mounting plates are not interchangeable.

New Micrometer Easily Read

A new direct-reading micrometer, illustrated in the accompanying cut, has been recently introduced by the Brown & Sharpe Manufacturing Co., Providence, R. I. It is easily held and operated with one hand. The dials are large and can be read at a glance. Adjustment of the measuring screw is simple. When necessary to compensate for wear of the measuring screw a cap on the end of the thimble is removed. Through an opening in the thimble the adjusting nut can be reached. The indexing gears are of steel.

The dials of this direct-reading micrometer are large enough to be read at a glance.



Trade Catalogs

Turbines. — General Electric steam turbines rated at 500, 600, and 750 kw. are described in Bulletin GEA-235, just issued by the General Electric Co., Schenectady, N. Y. The general principles and advantages of steam turbines are discussed, and sections and steam path diagrams are shown.

Transformers.—A new General Electric bulletin, No. GEA-178, entitled "Instrument Transformers," is a 52-page, paper-bound booklet devoted to the theory and engineering characteristics of transformers used to facilitate the measurement of electrical qualities. It is well illustrated with photographs, diagrams, charts, and tables. Among the subjects covered are: Description, Errors and Accuracy, Secondary Burdens, and Tests. An appendix gives burden data, phase-angle correction factors, and characteristic curves.

Bridge Cables.—A book entitled "The Construction of Parallel Wire Cables for Suspension Bridges" has been issued by John A. Roebling Sons Co., Trenton, N. J. It is of much interest in that it is both a scientific and photographic study of the construction of a modern suspension bridge. The photographs, which are in continuity from the building of the piers to the completed structure, are of the recently completed bridge spanning the Hudson River between Bear Mountain and Anthony's Nose, Nek York.

Shovels.—A new bulletin has been prepared by the Osgood Co., Marion, Ohio, on its gas shovel. It is No. 2514 and covers the Osgood heavy duty gas shovel, which was introduced last year. This machine is said to have been very successful. Copies of the bulletin will be sent on request.

Jigging Conveyors. A 24-page illustrated catalog describing so-called jigging conveyors, of both compressed-air and electric drive, for mine use, has been received from the Conveyor Sales Co., 299 Broadway, New York, representing Eickhoff Bros., Bochum, Germany.

Power Transmission—A circular sent out by A. & F. Brown Co., 79 Barclay St., New York, describes its double-braced adjustable hanger, cast-iron split pulleys, turned steel pulleys and F. Brown's friction clutch.

The Market Report

Zinc Prices Advance, but Copper Is Weaker

Lack of Foreign Buying Affects Local Metal Markets, Though Domestic Consumption Continues Good

New York, Nov. 25, 1925—The week has been quite an active one in the metal markets, though the prices realized have not in all cases been satisfactory to sellers. Lack of foreign buying and increased world production have made copper producers less optimistic of being able to maintain recent prices, and selling on the decline has been general. Zinc seems very strong fundamentally, and prices have reacted upward without the help of foreign buying. Lead and silver have been steady.

Copper at 14¼c. Delivered

The highest prices of the week were obtained last Thursday and Friday, when 14⅝c. was obtained on a good tonnage delivered to Middle Western points, and 14½c. Down East. Producers seemed rather anxious to sell and were willing to make concessions to get the business, so the market has been gradually forced down a quarter of a cent, a good tonnage having been sold for 14¼c., delivered, as early as Monday. Sellers do not seem at all inclined to quote below that figure for Valley deliveries, especially in view of the slightly higher quotation in London today, but the market cannot be said to be particularly firm at the current level.

The decline has been brought about by the continued quiet market abroad, only very limited tonnages having been sold in Germany, France, and England for some time. This has made it necessary to sell more in the domestic market, which continues to have a wonderful absorptive power, but cannot take everything that is produced. Both wire and brass mills have bought rather heavily during the week, principally for December-January shipment, the total volume of sales being substantially greater than last week.

No Premium on New York Lead

The contract price of the American Smelting & Refining Co. continues at 9.75c., New York, and lead is freely available at that level from other sellers as well, no premium being obtainable even for prompt shipment. The decline in the London quotation has made the importation of ore lead economically possible for two or three weeks, and this is beginning to be actually done to a small extent. Not a great deal is expected to come in, but January and February lead has been rather freely offered to some of the large buyers at from 9.50@9.65c. in the last two or three days, and a little has been booked.

The premium for prompt deliveries in the St. Louis market continues to decline. In some directions, the effort is still made to get from 9.60@9.70c., St. Louis, but practically all the lead is being sold by the one large producer, who has been endeavoring to hold the market at 9½c. for some time. He is selling more freely than for some weeks. Corroding grades are somewhat scarcer than usual, premiums being from $2@$4 per ton over common lead.

Zinc Again Up

Galvanizers bought substantial quantities of zinc during the week, as a stronger tendency in prices was noted, and the domestic market more than kept pace with the advance in London. Export business continues impossible at current price parity, but the indications seem to be that despite the quietness of the metal trade abroad, prices may be bidden up soon to a sufficiently high level to get American zinc. Domestic producers are, of course, in an excellent position and are not disposed to shade prices. Early shipment is almost impossible to obtain, and some fancy premiums are obtained for small

Daily Prices of Metals

Nov.	Copper N. Y. net refinery*	Tin		Lead		Zinc
	Electrolytic	99 Per Cent	Straits	N.Y.	St. L.	St. L.
19	14.25	62.50	63.50	9.75	9.55	8.50
20	14.25	62.50	63.50	9.75	9.525	8.45@8.60
21	14.25	62.50	63.625	9.75	9.525	8.50@8.65
23	14.10	62.25	63.25	9.75	9.525	8.55@8.75
24	14.025	61.50	62.50	9.725	9.525	8.65
25	14.00	61.875	62.75	9.725	9.525	8.80
Av.	14.146	62.188	63.188	9.742	9.529	8.617

*The prices correspond to the following quotations for copper delivered: Nov. 19th, 20th and 21st, 14.50c.; 23rd, 14.35c.; 24th, 14.275c.; 25th, 14.25c

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
19	60 7/8	61 3/4	67 1/2	285 7/8	282 3/8	36 9/16	35 7/8	38 5/16	37 13/16
20	60 3/4	61 3/4	67 1/4	286	282 3/8	36 11/16	36 1/16	38 3/4	38
23	60 3/8	61 3/8	67	287	281 1/2	36 1/2	35 7/8	39 1/16	38 3/16
24	60	61	66 3/4	282 1/2	278 1/2	36	35 7/16	39 1/2	38 3/8
25	60 1/8	61 1/8	66 3/4	285 1/4	280	35 3/4	35 3/8	39 1/2	38 3/8

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	
19	4.84	69 1/8	32 1/8	84s11½d	23	4.84	69 1/4	32 3/16	84s11½d
20	4.84 1/8	69	32	84s11½d	24	4.84	69 1/4	32 1/8	84s11½d
21	4.84	69 1/4	32 3/16	....	25	4.84 1/8	69 1/4	32 1/8	84s11½d

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.

lots of spot metal, accounting for the high quotations in the trade papers. Most of the zinc sold has been for December or January shipment, though today practically all sales were made for early shipment at the 8.80c. level. Brass Special continues extremely scarce. High-grade is quoted still at 10¼@10½c., delivered.

Tin Buyers Show Interest

Yesterday, Nov. 24, demand for tin from consumers was the best for many days, and a substantial tonnage was sold, principally for forward delivery, prices for futures being about ¼c. less than the 62½c. asked for spot. The increased inquiry was brought about by the sharp drop in prices, in line with the London cables. The 99 per cent grade continues scarce, and English refined tin is also in very limited supply, which has brought its price up to within ¼c. of Straits.

Silver More Firm

Silver continues steady at slightly higher levels, and fluctuations are within narrow limits. Some inquiry for December delivery has appeared recently, which denotes stability, and the attitude of China is a little more favorable, but no pronounced improvement is indicated for the immediate future.

Mexican Dollars—Nov. 19th, 53⅛c.; 20th, 53c.; 21st, 23rd, 24th, and 25th, 53⅛c.

New Lows for Francs

The French political situation continues to upset the exchange market, francs again selling well under 4c. Closing cable quotations on Tuesday, Nov. 24, were: francs, 3.815c.; lire, 4.0525; and marks, 23.81c. Canadian dollars, ⅜ 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. New uses causing increased demand.

Antimony — Per pound, f.o.b. New York: Chinese brands, spot, 20c. December, 19¼@19½c. Cookson's "C" grade, spot, 21¾c. 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. Market firm and orders satisfactory.

Platinum—$120 per oz. refined officially quoted. Sales also at $115@$118. Crude, $113.50@$114.50. London, £24 for refined; crude £22. Market has recently been good, but supplies are adequate.

Quicksilver—Per 75-lb. flask: $90@$92 for spot; forward, $88@$89. San Francisco $91.67. London, £14⅞. Good domestic demand, and Spanish production decreased.

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.

Tungsten Ore—Per unit of WO_3, N.Y.: Wolframite, $11.50@$12; Western scheelite, $12@$12.50.

Chrome Ore, 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 Unchanged

Joplin, Mo., Nov. 21, 1925

Zinc Blende	Per Ton
High	$63.20
Premium, basis 60 per cent zinc	$59.00@$60.00
Prime Western, 60 per cent zinc	$58.00
Fines and slimes, 60 per cent zinc	$56.00@$53.00
Average settling price, all zinc	$56.84
Galena	
High	$129.90
Basis 80 per cent lead	$125.00
Average settling price, all lead	$125.86

Shipments for the week: Blende, 19,499; lead, 3,990 tons. Value, all ores the week, $1,610,620.

Buyers secured 16,800 tons of zinc on purchase this week, on prices quoted above. It is reported they bought all ore offered for sale and sought to contract for some unproduced ore. The output slightly exceeds 17,000 tons for the week.

No sale of any of the reserve tonnage of lead was reported made this week, holders declining to accept offers of $125 basis, the price buyers assert is the best they can pay.

Platteville, Wis., Nov. 21, 1925

Zinc Blende	Per Ton
Blende, basis 60 per cent zinc	$60.50
Lead Ore	
Lead, basis 80 per cent lead	$130.00

Shipments for the week: Blende, 796 tons; lead, 40 tons. Shipments for the year: Blende, 41,928; lead, 2,071 tons. Shipments for the week to separating plants, 1,351 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)—3¼c. per lb. Only an occasional carload sold. Some sellers asking 3½c., but for a good tonnage, 3c. could probably be done. 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 **Ferrovanadium** are unchanged from the prices in the Nov. 7 issue.

Metal Products

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

Nickel Silver—29⅝c. per lb. for 18 per cent nickel Grade A sheets.

Yellow (Muntz) Metal—Sheets, 20⅝c. per lb.; rods, 17⅝c.

Lead Sheets—Full, 13½c. 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 Higher—Pig Iron Quiet —Coke Declines

Pittsburgh, Nov. 24, 1925

The American Sheet & Tin Plate Co. on Nov. 19 advanced all its sheet prices $2 a ton, following similar action on the part of the majority of independents, order books being opened for delivery after Jan. 1. At the same time the company opened the tin plate season, at the price of the last two and a half years, $5.50 per base box, business being for first quarter with jobbers and first half with manufacturing consumers.

Plates are now at 1.90c. minimum, or $2 advance in some three weeks, with small orders commanding 2.00c., and all but the most attractive business in merchant bars is now at 2.10c.

Steel buying in general is heavier this month than last, and is regarded as being particularly healthy in character, the movement having arisen spontaneously among buyers, whereas that of a year ago was fostered by sentiment arising from the election.

Pig Iron—The market is quiet but firm: Bessemer, $21; basic, $20; foundry, $20.50, f.o.b. Valley furnaces.

Connellsville Coke—With light demand from the East and heavy production, the coke market has declined farther, spot furnace coke being $4.50@$5 and spot foundry $6@$6.50.

Company Reports

Tomboy Gold's Profits Exceed Hopes

The annual report of the Tomboy Gold Mines Co., Ltd., for the year ended June 30, 1925, shows a surplus of £38,055, after dividend payments totaling £26,545. This company operates a gold mine and mill at Telluride, Colo., and two or three years ago was supposed to be at about the end of its career. It is under the control of the Exploration Co., Ltd., of London, and most capably managed by N. S. Kelsey.

The report shows a realized profit of £37,044 after writing off £13,050 for depreciation of plant and £3,000 for British income tax. Ore reserves are now carried on the books at £27,693, the original value on March 1, 1913, having been £323,175. The issued capital amounts to 310,000 shares of £1 each. Dividend No. 35, of 9d. per share, totaling £11,625, was paid Nov. 6, 1924; dividend No. 36, of 10d. per share less tax, was paid Feb. 19, 1925, amounting to £12,916; and dividend No. 37, of 1s. per share, was paid on Sept. 12, 1925, in the new fiscal year. Payment of these dividends leaves a balance of £22,555 to be carried forward.

The general manager's report shows that operations at the mine gave a yield, from 211,667 tons of ore treated, of $900,344, or $4.25 a ton, and the costs amounted to $649,941, or $3.07 per ton, a reduction of 12c. from the low figure of the preceding year. The balance of working profit is $250,402, and when the sundry items and royalties are included, the total profit at the mine amounts to $268,043. Ore reserves are given as 277,410 tons, or over a year's supply, compared with 215,602 tons estimated to have been in reserve a year before, much unexpected ore having been developed in the block above the 1,750 level, south of No. 167, in the Montana group. No ore was taken from the Argentine group, and the Virginius orebody has been exhausted.

The development projected in the last report has been carried out, but with disappointing results. The continuation of the Tomboy vein, when opened up, gave no encouragement for further work. No additions were made to the plant during the year and no new construction was required or is contemplated, though everything is being maintained in first-class operating condition.

Revenue and expenditure for the year is as follows:

211,667 tons milled, yielding bullion worth			$254,070
Concentrate worth			646.274
Sundry profit, boarding house, rents, etc			14,343
Royalty from leasers			3,298
Total			$917,985
	Per Ton		
Mining and development expenses	$1.29	$272,547	
Milling	0.58	121,943	
Concentrating (including transportation to railway)	0.59	124,154	
Water supply	0.18	39,121	
Assay office	0.03	5,760	
General	0.24	52,452	
Taxes and insurance	0.16	33,964	
Total expenses	$3.07		649,942
Profit			$268,043

The general manager states: "At this time one year ago the outlook for another year's profitable operation was fairly good, but no such profit as actually resulted was even hoped for. While the outlook of a year ago has been carried over and remains the same or even better today, a like profit for the coming year can hardly be expected, for the reasons that the ore values are quite likely to become poorer, and that there is little likelihood of being able to further reduce operating costs."

Tomboy shares were recently quoted on the London exchange at 4s. 6d. On this basis, the property last year earned 55½ per cent, and yielded dividends, during the calendar year of 1925, at the rate of 35 per cent. The high yield is, of course, due to the limited ore reserves.

The directors of the company are: The Marquess of Ormonde (chairman), Marquis d'Hautpoul, and J. H. M. Shaw. Consulting engineer: P. L. Foster; general manager; N. S. Kelsey; Secretary and offices: H. F. Wreford, 24 Lombard St., London E.C. 3. Operating office, Telluride, Colo.

International Nickel's Profits Increase

The financial statement of the International Nickel Co., with nickel-copper mines, smelters, and a refinery in Ontario, and a rolling mill in West Virginia, shows increased profits for the quarter ended Sept. 30 compared with that ended June 30. Net operating income for the quarter ended Sept. 30 was $1,776,570.16, compared with $1,648,914.52 in the preceding quarter. With deductions for depreciation and depletion and extraordinary expense, the profits for the last quarter amounted to $1,421,118.22, compared with $1,294,117.25 in the preceding quarter. The preferred dividend absorbed $133,689, and the common dividend, $836,692, leaving a surplus of $450,737.22.

Annual earnings, available for common dividends after payment of preferred, at last quarter's rate, would amount to $5,150,000, or $3.08 per share on the 1,673,394 shares of common outstanding. Present dividends are at the rate of $2 per year. At recent prices of $48 per share, the dividend yield is 4.2 per cent and the earnings yield 6.4 per cent. Evidently, market followers expect earnings to increase further.

El Oro About Breaks Even, but Has Hopes for La Noria

The annual report of the El Oro Mining & Railway Co., Ltd., operating gold and silver properties at El Oro, Mexico, and the Noria silver mine, in the State of Zacatecas, shows an operating profit for the year ended June 30, 1925, of £37,032. From this was deducted the usual provision for plant depreciation, £25,000, and £22,221 loss on exchange, so there resulted a loss for the year of £10,188. Deducting this from the balance of a year before, there is a credit to profit and loss of £24,348, of which the directors have applied £6,000 as a further reserve against advances to the Cia. de Inversiones del Oro, S. A., the balance carried forward being £18,348.

During the year, 467,290 tons of ore were treated, yielding $1,888,427, being an average recovery of $4.04 per ton, compared with 447,060 tons, averaging $4.20 per ton, in the preceding year. Total costs were $3.83 per ton, compared with $4.05 last year.

The lower levels of the mine were practically depleted of payable ore last June, and the Descubridora vein cannot be relied upon for further supplies beyond the end of the current year. Further work will be confined to mining the low-grade but payable ore and old fills in the upper levels of the San Rafael vein.

No predictions as to the further life of the mine are possible. The 20-ton pilot mill treating La Noria ores has operated continuously and a 200-ton mill for treating this ore is expected to be in operation early in 1926. The main shaft at this mine has reached the 266-meter level, with five years' supply of ore already developed, at the rate of 200 tons per day.

The metallurgical statement of the mill and cyanide plant shows that the mill ran an average of 28.37 days per month and crushed a total of 467,290 tons of ore of an assay value of $3.77 in gold and $1.12 silver. The theoretical extraction was 87.76 per cent of the gold and 67.37 per cent of the silver. The gold value of the bullion realized was $1,526,037 and the silver value, $362,390, a total of $1,888,427. The percentage actually recovered was 86.54 per cent of the value of the gold, and 69.40 of the silver, a total of 82.62 per cent.

Average costs per ton were as follows: Mining, $1.83; development, $0.23; milling, $0.18; cyaniding, $0.83; water supply, $0.01; general expense, $0.19; taxes, $0.52; further expense in London and Mexico, $0.04; total, $3.83.

The railway made a net profit of $79,413, and the Suchi Timber Co. made a satisfactory profit, though not so large as last year.

The company has an issued capital of £1,147,500, in £1 shares. Investments in property are carried at £810,848, in addition to which the company owns 100,000 10-peso shares of the Cia. de Inversiones del Oro (a 72 per cent interest), nominally carried at £1; 42,687 shares (£1 par) of the Suchi

Timber Co., Ltd., valued at £21,343; and 22,600 £1 shares of the Mexican Corporation, Ltd., carried at £4,520. Dividend No. 34, 10d. per share, amounting to £28,687, was paid during the year, but the dividend recently due was passed.

Directors of the company are: R. T. Bayliss, chairman; L. Breitmeyer, P. L. Foster, Alfred Naylor, J. H. M. Shaw, Major Henry V. Hart Davis, and A. F. Main, who is managing director in Mexico, with headquarters at El Oro. The secretary is H. F. Wreford, at 24 Lombard St., London, E. C. 3, England.

November Dividend Total Slightly Increased

The following dividends were paid by American mining and metallurgical companies during November:

Companies in the United States	Situation	Per Share	Total
American Smelting & Refining	Various	$1.75 Q	$1,067,465
Anaconda Copper Mining	Various	.75 Q	2,250,000
Chief Consolidated, l,s	Utah	.10 I	113,870
Colorado Fuel & Iron, pfd	Various	2.00 Q	40,000
Consolidated Lead & Zinc	Kans.	.20 M	.....
General Development	Various	.25 Q	30,000
Gladstone Mountain, l	Wash.	.005 M	6,610
Homestake Mining, g	S. D.	.50 M	125,580
International Nickel, pfd., n,c	W. Va., Ont.	1.50 Q	133,689
Miami Copper	Ariz.	.25 Q	186,778
New Cornelia Copper	Ariz.	.25 Q	450,000
New Jersey Zinc	Various	2.00 Q	981,682
U. S. Steel, pfd	Various	1.75 Q	6,304,919
United Verde Extension, c	Ariz.	.75 Q	787,500
Vanadium Corporation	Colo., Peru	.50 Q	186,667
Companies in Other Countries			
Amparo Mining, g,s	Jalisco	.04 QX	80,000
Cerro de Pasco, c,s	Peru	1.00 Q	1,122,842
Hollinger Consolidated Gold	Ont.	.08 4 wks.	393,600
Total			$14,261,202

l, lead; s, silver; g, gold; n, nickel; c, copper; Q, quarterly; I, irregularly; M, monthly; X, includes 2c. extra.

The total of dividends paid during November was slightly in excess of those paid in the corresponding quarter, in August, owing to increases in the rate paid by some of the companies. American Smelting & Refining increased its distribution from $1.50 to $1.75 per share; United Verde Extension from 50 to 75c. per share; and Amparo Mining paid an extra of 2c. per share. Chief Consolidated again paid a 10c. dividend, the first since May, when a similar amount was declared. In all probability Bunker Hill & Sullivan paid its usual monthly dividend, of 75c. or more, and also Lucky Tiger-Combination. No report of dividend action was received from Keystone Mining or the Asbestos Corporation, in Canada.

World Copper Production Rate Increased in October

Supplementary to the table published on page 678 of the Oct. 24 issue of *Mining Journal-Press*, the American Bureau of Metal Statistics has issued the following data on blister copper production for October:

Country	Tons	Country	Tons
United States	82,616	Australia	620
Mexico	3,667	Europe, estimated	10,600
Canada	3,091	Belgian Congo	8,566
Chile and Peru	23,182	Others, estimated	4,000
Japan, estimated	6,000		
		World total	142,300

The total compares with 129,100 tons for September, or, accounting for the longer month, represents a 7 per cent increase in rate of copper production for October over September.

Zinc Export Association Organized

The Zinc Export Association, Inc., has been organized, under the laws of Delaware; papers were filed Nov. 13. The officers and directors are as follows: President, A. J. McKay; vice-president, B. N. Zimmer; vice-president, Chas. T. Orr; treasurer, William A. Ogg; and secretary, Carl Klaustermeyer. Directors are A. J. McKay, B. N. Zimmer, C. T. Orr, W. A. Ogg, C. Klaustermeyer, J. G. Starr, B. Lissberger, L. E. Wemple, H. H. Roseman, and C. W. Martin.

The association has been formed to increase the exportation of slab zinc from the United States. Organization is now being perfected, and it is expected that the association will start functioning within the next few days. The main office will be in New York City.

Chief Consolidated's Earnings Improve

The quarterly report of the Chief Consolidated Mining Co., of Arizona, operating lead-silver mines in the Tintic district of Utah, states that earnings in the quarter ending Sept. 30, 1925, were improved partly by the increased market values of the metals and by the reductions made in the operating costs at the mines. Earnings since the close of the quarter "have shown further marked increase, which gives quite assured promise that the dividends can now be paid regularly." In the deeper workings of the Chief, a new extension of the ore-body has been discovered, of improved grade, which promises well for the immediate future.

The wet end of the concentrator is operating satisfactorily, but some major mechanical changes have yet to be made in the volatilization plant, changes which have, up to now, been postponed because of the necessity for curtailing expenses in general. It is expected that this work can soon be done. The metal contents of the total shipments for the quarter were as follows: Gold, 4,192 oz.; silver, 594,562 oz.; lead in lead ores, 5,038,194 lb.; copper in copper ores, 357,128 lb; lead in zinc-lead ores, 59,406 lb.; and zinc in zinc-lead ores, 125,782 lb. The average gross value per ton of all ores was $26.43, of which smelting, freight, and sampling absorbed $12.32, leaving the average net value, $14.11, a total of $91,224.50 being realized on the 38,618 dry tons of ore shipped, after payment of all charges.

Operating profit for the nine months ended Sept. 30 was $240,645.12, to which is to be added $7,955.04 interest. Accrued interest on bonds, of $26,250; dividend No. 41, of $100,322.40 (paid May 1); and reserve for bond retirement, of $37,500, were all deducted, leaving cash carried to surplus, $84,527.76. Total surplus, Sept. 30, was $2,815,286.26.

Dividends in 1924 and 1925 have been as follows:

No.	Date Paid	Rate	Number of Shares	Amount
39	Feb. 1, 1924	10c.	992,758	$99,275.80
40	May 1, 1924	10c.	1,000,000	100,000.00
41	May 1, 1925	10c.	1,003,224	100,322.40
42	Nov. 1, 1925	10c.	1,138,705	113,870.50

Based on the last nine months' work Chief Con. has been earning, available for dividends, at the rate of about $246,000 per year, or 21.6c. per share. At the recent selling price of $3.80, this is at the rate of 5.7 per cent. If recent earnings are such that the 10c. quarterly dividend rate can be maintained, as is suggested in President Fitch's report, the yield will be 10.5 per cent.

Auction Mining-Stock Sales

Mining securities sold at auction in New York recently brought the following prices for the total lot indicated:

500 Federated Metals Corp., v.t.c.	$15
1,263 Bonanza Creek G. M., par $5	20
4,700 Goldfield Deep, fourth assessment paid, par 5c.	6
60 Florida Mountain Mines	1
3,000 McNamara Crescent Development, par 25c.	4
300 Phosphate Mining	4
9,000 Leadville Mine Development, par $1	50
4,000 Cleveland Mining Co., par $1	25
250,000 Majuba S. T. & C., par 10c.	55
152,000 National Antimony, par $1	5
210,720 Water Witch Mines, par 10c.	1
$368,000 participation certificates Anna Beaver Mines Co., out of total of $430,000	1,420,000
80,000 Buffalo Hunter M. & D. common, par $1, with 15 notes for $21,942 and judgment for $59,073	10,000
$120,292 claim against Complex Ores Recoveries Co.; 2,556 shares of same company; 166,665 shares of Gold Canyon Dredging Co.; $128,664 claim against same company	25,000
2,602 Humboldt Mines Co.	16,000
89,853 Iona Gold Mining Co., par $5; $14,927 in notes; $4,853 in claims	25,000
300 Lewiston Dredging Co., par $1; $184,622 note	225,000
5,209,676 United Comstock Mines, par $1; $4,806,422 in notes	500
69,791 shares Cache Creek Dredging, par $1; 25 notes, $143,656	10,000
4,000 Colorado Corporation, no par; claims of Metals Exploration Co. aggregating $234,294	100,000
143,718 Colorado Superior Mining Co., par $1; 576 bonds of $136,450; judgment in favor of Metals Exploration Co. for $397,765	300,000
$113,400 participating certificates Electro Metals Co.	5,000
4,670 Radium Co. of Colorado, pfd.; 2,775 common, no par; claim by Metals Exploration Co. for $330,227	55,000
802 Smuggler Union Mining Co.	1,000
11,900 Rimu Gold Dredging Co., pfd., par £1	40,000
All rights of Metals Exploration Co. against Idaho-Maryland Consolidated Mines	75,000
77,100 Cresson Consolidated Gold, par $1	163,837
10,000 Golden Cycle M. & R., par $1	15,500
57,767 United Gold Mines, par $1	6,932
20,000 Vindicator Consolidated Gold, par $1	1,000

Current Prices of Mine Materials and Supplies

Rise and Fall of the Market

During the past month there has been a decided show of firmness in pine and hemlock timbers, wire nails, spikes, c.-i. pipe, drill rod, steel plates, and steel sheets except black. Declining tendencies developed in fir timbers, linseed oil, rope, zinc dust, and calcium carbide.

SHEETS—Quotations are per 100 lb. in various cities from warehouse also the base quotations from mill:

Blue Annealed	Pittsburgh, Large Mill Lots	St. Louis	Chicago	San Francisco	New York
No. 10	$2.30@2.40	$3.60	$3.50	$3.85	$3.89
Black					
No. 28	3.15@3.25	4.50	4.00	4.80	4.35
Galvanized					
No. 28	4.40@4.50	5.50	5.00	5.90	5.35

STEEL RAILS—The following quotations are per ton f.o.b. Pittsburgh and Chicago for carload or larger lots:

	Pittsburgh Current	Pittsburgh One Year Ago	Birmingham	Chicago
Standard bessemer rails	$43.00	$43.00	$43.00	$43.00
Standard openhearth rails	43.00	43.00	43.00	43.00

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

	Pittsburgh Current	Pittsburgh One Year Ago	Chicago	St. Louis	San Francisco	Birmingham
Standard spikes, 5/16-in. and larger	$2.80	$2.70@2.80	$3.55	$3.65	$4.35	$2.90
Track bolts	3.90@4.15	3.75@4.00	4.55	3.25	5.85	3.90
Standard section angle bars	2.75	2.75	3.30	3.25@3.75	4.00	3.85

STRUCTURAL MATERIAL—Following are base prices f.o.b. mill, Pittsburgh and Birmingham together with quotations per 100 lb. from warehouses at places named:

	Pittsburgh, Mill	Birmingham Mill	New York	Dallas	St. Louis	Chicago	San Francisco
Beams, 3 to 15 in.	$1.90@2.00	$2.05	$3.34	$4.00	$3.25	$3.10	$3.30
Channel, 3 to 15 in.	1.90@2.00	2.10	3.34	4.00	3.25	3.10	3.30
Angles, 3 to 6 in., ¼ in. thick	1.90@2.00	2.10	3.34	4.00	3.25	3.10	3.30
Tees, 3 in. and larger	1.90@2.00	2.10	3.34	4.00	3.35	3.10	3.30
Plates	1.90	2.00	3.34	4.00	3.25	3.10	3.30

WIRE ROPE—Discounts from list price, f.o.b. New York and east of Missouri River, on regular grades of bright and galvanized are as follows:

Cast steel round strand rope	20%
Galvanized steel rigging and guy rope	7½%
Round strand iron and iron tiller	5%
Plow steel round strand rope	35%
Special steel round strand rope	30%
Galvanized iron rigging and guy rope	+12½%

	New York	Cleveland	Chicago
Drill Rod (from list)	50@60%	55%	60%

WROUGHT PIPE—The following discounts are to jobbers for carload lots at Pittsburgh mill:

	Inches	Steel Black	Steel Galv.	Iron Inches	Iron Black	Iron Galv.
BUTT WELD—	⅛ to 3	62	50½	¼ to 1¼	30	13
LAP WELD—	2½ to 6	59	47½	3 to 6	28	13

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

	Black New York	Black Chicago	Black St. Louis
3½ to 6 in. lap welded	48%	51%	46%

CAST-IRON PIPE—The following are prices per net ton for carload lots:

	New York Current	New York One Year Ago	Birmingham	Chicago	St. Louis	San Francisco
6 in. and over	$50.60@52.60	$56.60@57.60	$41.00@42.00 base	$49.20@50.20	$48.00	$53.00

NUTS—Semi-finished, ⅜x¾-in., 2c. each. Discount 70% for 5/16-in. and smaller; 65% for ½-in. and larger. Case hardened, 6c. each, less 50%.

HOLLOW TILE—Price per block in carload lots to contractor for hollow building tile.

	New York Current on Trucks	New York One Year Ago	Chicago	Philadelphia	St. Louis	San Francisco	Perth Amboy N. J., Factory
4x12x12	$0.1027	$0.1162	$0.075	$0.12	$0.07	$0.108	.....
6x12x12	.1541	.1743	.096	.....	.095	.156	$0.252*
8x12x12	.1926	.2179	.135	.22	.132	.244	.312†

* 10x12x12; † 12x12x12.

MACHINE BOLTS—½x1½-in., per 100, $1.70. Discount at New York warehouses on all sizes up to 1x30-in., 40%.

LUMBER—Prices of rough Douglas Fir No. 1 common, in carload lots to dealers at yards in San Francisco. To contractors, $2 per M. ft. additional.

	6-8 and 12 Ft.	10-16-18 and 20 Ft.	22 and 24 Ft.	25 to 32 Ft.
3x3 and 4	$26.00	$27.00	$28.00	$31.00
3x6 and 8	26.00	27.00	28.00	31.00
4x4-6 and 8	26.00	27.00	28.00	31.00

Wholesale prices to dealers of long leaf yellow pine. To contractors in New York City, delivered from lighters or cars to job, $5 additional.

	New York 20 Ft. and Under	New York 22-24 Ft.	Chicago 20 Ft. and Under	Chicago 22-24 Ft.
3x4 to 8x8	$48.00	$49.00	$42.50	$43.50
3x10 to 10x10	52.00	53.00	46.50	47.50
3x12 to 12x12	56.00	57.00	54.50‡	55.50‡

Other Cities	8 x 8-In. x 20 Ft. and Under Pine	Fir*	Hemlock	Spruce	12 x 12-In. 20 Ft. and Under Pine	Fir*
Boston	$50.50	$48.00†	$51.00	$50.00	$60.00	$58.00†
Cincinnati	37.00	73.00	73.00	85.00	48.00	77.00
Denver	.....	32.25	33.75	33.75	.....	33.75
Minneapolis	43.00	35.75	35.00	.....	44.50	35.75
Kansas City, Mo.	41.50	40.75	.....	.....	54.50	.....
Philadelphia	56.00	34.00	37.00	40.00	67.00	34.00

*Douglas fir. † Prime. ‡ 4x12 to 12x12.

NAILS—The following quotations are per keg from warehouse:

	Pittsburgh, Mill	Chicago	San Francisco	Dallas	St. Louis	Montreal
Wire	$2.65	$3.15	$3.40	$4.28	$2.93	$4.95
Cut	2.90	.....	5.00	5.00	3.13	5.00

PORTLAND CEMENT—Prices to contractors per bbl. in carload lots *without bags*. Cash discount not deducted.

	Current	One Month Ago	One Year Ago
New York, del. by truck	$2.50@2.60	$2.50@2.60	$2.50@2.60
Chicago, f.o.b.	2.10	2.20	2.20
Cleveland, f.o.b.	2.29	2.39	2.39

LIME—Warehouse prices:

	Hydrated, per Ton Finishing	Hydrated, per Ton Common	Lump, per Barrel 280-lb. net Finishing	Lump, per Barrel 280-lb. net Common
New York	$18.20	$12.@13.10	$3.50	$2.25@$2.75
Chicago	20.00	18.00	.....	(180-lb. net) 1.30

LINSEED OIL—These prices are per gallon:

	New York Current	New York One Year Ago	Chicago Current	Chicago One Year Ago
Raw in barrel (5 bbl. lots)	$0.99	$1.08	$1.01	$1.05

WHITE AND RED LEAD—In 100-lb. kegs, base price in cents per pound:

	Dry Current	Dry 1 Yr. Ago	In Oil Current	In Oil 1 Yr. Ago
Red	15.75	15.25	17.25	16.75
White	15.75	15.25	15.75	15.25

HOSE—Quotations at New York warehouses:

Fire Protection 50-Ft. Lengths
Underwriters' 2½-in. coupled, single jacket ..... 71c per ft.

Air—Best Grade
¾-in., per ft. ..... 3 ply $0.37½ 4 ply $0.46

Steam—Discounts from List
First grade ..... 30–10% Second grade ..... 40% Third grade ... 40–10%

RUBBER BELTING—List price 6-in., 6 ply, $1.83 per lin.ft. for rubber transmission belting.
Best grade ..... 50% Second grade 50–10%

LEATHER BELTING—List price, 24c. per lin.ft. per inch of width for single ply at New York warehouses:

Grade	Discount from list
Medium	40%
Heavy	30–10%

RAWHIDE LACING—For cut, best grade, 50%, 2nd grade, 60%. For laces in sides, best, 41c. per sq.ft.; 2nd, 37c. Semi-tanned: cut, 50%; sides, 41c. per sq.ft

PACKING—Prices per pound:

Rubber and duck for low-pressure steam, ½ in.	$0.90
Rubber sheet	.45
Rubber sheet, wire insertion	.70

MANILA ROPE—Per lb., ¾-in. and larger, 1,200-ft. coils.

Atlanta	$0.32	New Orleans	$0.24½
New York	.26	Seattle	.24
Chicago	.24½	San Francisco	.24

EXPLOSIVES—Prices per pound of dynamite in small lots:

	Gelatin 40%	Gelatin 60%
New York	$0.27	$0.295
Minneapolis	.1917	.2123
Denver	.2025	.2275
Seattle	.165	.19
Cincinnati	.22	.245
New Orleans	.233	.26
San Francisco	.1625	.1925

FLOTATION OIL—
Pine tar, 50 gal. bbl., gross weight 500 lb., f.o.b. New York, carload lots, per gal. $0.37

CHEMICALS—

Zinc dust, 550 lb. casks, f.o.b. works, per lb.	$0.10@10½
Litharge, f.o.b. New York, kegs, per 100 lb.	15.75
Sodium cyanide, 220 lb. single case lots, f.o.b. works, per lb.	18@.22
Calcium carbide, in drums, f.o.b. works, per lb.	.05½@.06

Mining Stocks—Week Ended November 21, 1925

Stock	Exch.	High	Low	Last		Last Div.
COPPER						
Anaconda	New York	51⅛	49	49⅜	Oc.17,No.23,Q	0.75
Arcadian Consol.	Boston	1⅛	*99	*99		
Ariz. Com'l	Boston	14¼	13	13	Jy.21, Jy. 31 SA	0.50
Calaveras	N. Y. Curb	4¼	4	4⅛		
Calumet & Arizona	New York	59⅞	51⅛	58⅛	De.4, De.21 QX	1.50
Calumet & Hecla	Boston	15⅜	15¼	15⅜	Nov 30,De.15 Q	0.50
Cerro de Pasco	New York	63¾	60⅛	61¼	Oc.22, Nov.2 Q	1.00
Chile Copper	New York	37	35	35	Dec.2, Dec.28, Q	0.62½
Chino	New York	20⅞	20½	20½	Sept., 1920	0.37½
Con. Coppermines	N. Y. Curb	2⅛	2⅛	2⅛		
Copper Range	Boston	21⅜	20¼	20⅛	Ap.9, My.4	1.00
Crystal Copper	Boston Curb	*61	*54	*55		
East Butte	Boston	4½	4½	4½	Dec., 1919	0.50
First National	Boston Curb	*23	*20	*20	Feb., 1919	0.15
Franklin	Boston	1	*99	*99		
Granby Consol	New York	20	18⅞	19	May, 1919	1.25
Greene-Cananea	New York	15½	14	14⅛	Nov., 1920	0.50
Hancock	Boston			*80		
HoweSound,new,r.t.c.	New York	26⅞	25	25⅜	Oc.5, Oc. 15 Q	0.50
Inspiration Consl.	New York	28	26½	26½	Se.17, Oc.5, Q	0.50
Iron Cap	Boston Curb	2½	2½	2½	May, 1923	0.15
Isle Royale	Boston	14	13⅜	13⅞	No.30, De.5	1.00
Jerome Verde Dev.	N. Y. Curb	1⅛	*96	1⅛		
Kennecott	New York	58⅜	56¼	56⅜	De.4,Jan.2 Q	1.00
Lake Copper	Boston	1⅛	1⅛	1⅜	Jn.1, Jn.15 Q	0.50
Magma Copper	New York	44⅛	43	43⅜	Oct.1, Oct.15,	0.75
Mason Valley	N. Y. Curb	1⅜	1⅜	1⅜		
Mass Consolidated	Boston			*60	Nov., 1917	1.00
Miami Copper	New York	12⅞	11	11⅜	No.2, No.16 Q	0.25
Mohawk	Boston	34½	33⅜	34¼	Oc.31, De.2	1.00
Mother Lode Coa.	New York	8	7⅛	7⅝	Jn. 12, Jn. 30	0.37½
Nevada Consol	New York	14½	13⅛	13⅜	Sept., 1920	0.25
New Cornelia	Boston	19⅜	18⅞	19⅝	No.6, No.23 Q	0.25
North Butte	Boston	3⅜	3	3¼	Oct., 1918	0.25
Ohio Copper	N. Y. Curb	*83	*75	*80	No. 14, De. 2	0.05
Old Dominion	Boston	19½	19¼	19½	Dec., 1918	1.00
Phelps Dodge	Open Mar.	†130	†125		Se.19, Oc.2 Q	1.00
Quincy	Boston	24½	23½	24½	Mar., 1920	1.00
Ray Consolidated	New York	13½	13	13	Dec., 1920	0.25
Ray Hercules	N. Y. Curb			14		
St. Mary's Min. Ld.	Boston	39	36¾	37½	Ap.20, My.20,	3.00
Seneca Copper	Boston	10½	10	10		
Shannon	Boston	*65	*55	*60	Nov., 1917	0.25
Shattuck Arizona	New York	6½	5⅞	5⅞	Jan.,1920	0.25
Superior & Boston	Boston	1½	1½	1½		
Tenn. C. & C	New York	13⅜	12⅞	12⅞	De.31, Ja.15,Q	0.25
United Verde Ex	N. Y. Curb	27¼	27⅛	27⅛	Oc. 6, Nov. 20	0.75
Utah Copper	New York	111	111	111	Se. 18, Se. 30, Q	1.00
Utah Metal & T	Boston	*60	*55	*55	Dec., 1917	0.30
Victoria	Boston	*50	*45	*50		
Walker Mining	Salt Lake	1.90	1.85	1.85		
NICKEL-COPPER						
Internat. Nickel	New York	48⅛	40⅜	46⅛	Se.11, Se.30, Q	0.50
Internat. Nickel, pfd.	New York	102	102	102	Oc.15, No.2, Q	1.50
LEAD						
Gladstone M. M. Co.	Spokane	*28¾	*27½	*27½	No. 1, No. 10 M	0.01½
National Lead	New York	167	162⅜	165	De.11, De.31 Q	2.00
National Lead pfd.	New York	118	117⅜	117⅞	Aug.21, Se.15	1.75
St. Joseph Lead	New York	46	44	45	Nov.10,De.21 Q	1.05
ZINC						
Am. Z. L. & S	New York	10⅛	8⅝	9	May., 1920	1.00
Am. Z. L. & S, pfd.	New York	39½	36½	37⅜	Nov., 1920	1.50
Butte C. & Z	New York	7⅜	6⅞	6⅞	De.10, De.24	0.50
Butte & Superior	New York	16⅝	14	15½	De.9, De.24	0.50
Callahan Zn-Ld	New York	2⅝	2⅛	2⅛	Dec., 1920	0.50
New Jersey Zn	N. Y. Curb			214½	No.20,Dec.10 X	2.00
United Zinc	N. Y. Curb	*35	*35	*35		
Yellow Pine	Los Angeles	*56¼	*45	*45	Se.10 Se.21 Q	0.04
GOLD						
Alaska Juneau	New York	1⅞	1⅞	1⅞		
Argonaut	Toronto	*14½	*13⅞	*14½		
Barry-Hollinger	Toronto	*29½	*26½	*27		
Carson Hill	Boston	*40	*30	*35		
Consol. W. Dome L.	Toronto	*18½	*12	*18		
Cresson Consol. G.	N. Y. Curb	2⅞	2⅞	2⅞	Se.30, Oc.10	0.10
Crown Reserve	Toronto	*17⅛	*16	*17¼	Jan., 1917	0.05
Dome Mines	New York	18⅛	16	18	Se.30, Oc.20, Q	0.50
Golden Cycle	Colo. Springs			1.51	No.30, Dec.10 Q	0.03
Hollinger Consol	Toronto	17.05	16.86	17.00	Nov.19, Dec.2	0.08
Homestake Mining	New York	48⅜	48	48	No.20, No.25 M	0.50
Kirkland Lake	Toronto	*86½	*83	*86		
Lake Shore	Toronto	9.85	8.85	9.75	Se.1, Se.15	0.05
McIntyre-Porcupine	New York	21⅛	20½	21⅛	No.2, De.1 Q	0.25
Newray	Toronto	*35	*33	*34		
Night Hawk Pen.	Toronto	*10	*9	*9¼		
Portland	Colo. Springs			*43	Oct., 1920	0.01
Rand Mines	New York	34½	34½	34½	Au.17, Au.25	1.52
Teck-Hughes	Toronto	2.23	2.04	2.13		
Tom Reed	Los Angeles	*51	*50	*51	Dec., 1919	0.02
Tough-Oakes	Toronto	*49¾	*48	*49½		
United Eastern	N. Y. Curb			*48	July, 1924	0.05
Vipond Cons	Toronto	1.21	1.15	1.20		
Wright-Hargreaves	Toronto	7.45	6.60	7.40	Se.15, Oc.1 QEx	0.05
GOLD AND SILVER						
Black Oak	N. Y. Curb			*81		
Carnegie Metals	Pittsburgh	19⅞	19	19		
Con. Cortez	N. Y. Curb			*6		
Con. Virginia	San Francisco	14½	11½	13½		
Continental Mines	N. Y. Curb			*75		
Dolores Esperanza	N. Y. Curb	*80	*79	*79	July, 1923	0.05
Premier Gold	N. Y. Curb	2½	2½	2½	Se.18, Oc.3	0.08
Tonopah Belmont	N. Y. Curb	1⅞	1⅝	1⅝	Se.15, Oc.1	0.05
Tonopah Divide	N. Y. Curb			*23	Oct., 1923	0.10
Tonopah Extension	N. Y. Curb	1⅜	1½	1⅜	Mh.11, Ap.1, Q	0.05
Tonopah Mining	N. Y. Curb			4⅛	Se.30, Oc.21	0.07½
Unity Gold	N. Y. Curb			*40		
West End Consol	N. Y. Curb			*30	Mar., 1923	0.05
Yukon Gold	N. Y. Curb	*58	*50	*50	June, 1918	0.02

Stock	Exch.	High	Low	Last		Last Div.
SILVER						
Alvarado	N. Y. Curb			*76	Oct., 1920	0.50
Beaver Consol	Toronto	*53½	*52	*52½	May. 1920	0.03
Castle-Trethewey	Toronto	1.37	1.31	1.35		
Coniagas	Toronto	2.97	2.85	2.96	May, 1924	0.12½
Keeley	Toronto	1.49	1.46	1.48	Au.31,Se.15RX	0.12
Kerr Lake	N. Y. Curb			1⅛	Oc. 1, Oc.15 Q	0.12½
La Rose	Toronto	*38	*35	*37	Apr., 1922	0.10½
Lorrain Trout Lake	Toronto			*90	Jy. 2, Jy. 15	0.05
McKinley-Dar.-Sav	Toronto	*18	*16	*17½	Oct., 1920	0.03
Mining Corp. Can.	Toronto	3.20	2.97	3.15	Jy.1, Jy.15	0.12½
Nipissing	N. Y. Curb	5	4⅞	4⅞	Se.30, Oc.20, Q	0.15
Ontario Silver	New York	10⅜	10⅛	10⅜	Jan., 1919	0.50
Temiskaming	Toronto	*13	*10	*11½	Jan., 1920	0.40
SILVER-LEAD						
Ahumada	New York	9⅜	9	9⅜	De.15,Ja.2, QX	0.25
Bingham Mines	Boston	56½	54⅝	55	De.19, De.20 Q	1.00
Cardiff M. & M.	Salt Lake	*75	*65	*65	De.16, No.18	0.10
Chief Consol	Salt Lake	4.00	3.85	3.90	Oc. 10, No. 1	0.10
Columbus Rexall	Salt Lake	1.50	1.50	1.50	Aug., 1923	0.05
Erupcion	Boston Curb	2⅛	2	2 1/16	Se.19,Oc.2,QEx.	0.15
Federal M. & S	New York	77	55⅜	74⅛	No.25, De.15 Q	1.75
Federal M. & S., pfd.	New York	91	81	91	Au.25, Se.15	1.75
Hecla Mining	N. Y. Curb	18	17¾	17⅞	No.15, De.15 Q	2.00
Iron Blossom Con	Salt Lake			*39	Oc.25, 1924	0.01½
Iron King Mining	Salt Lake	*49	*42	*49		
Keystone Mining	Salt Lake	*64	*64	*64	Au.12, Au.26	0.07½
Lucky Jim	Spokane	12¾	12	12¾		
Mammoth Mining	Salt Lake	3.05	3.00	3.05	My.15, My.25	0.10
Marsh Mines	Spokane	*9¼	*8	*8	Se.15, Oc.1	0.15
Park Utah	Salt Lake	8.40	7.90	8.25	Se.15, Oc.1	0.15
Prince Consol	Salt Lake	1½	*75	*75		
Silver King Coal	Salt Lake	10.12½	10.00	10.12½	Se.20,Oc.1, Q	0.25
Silversmith	Spokane	*32½	*30½	*32½	Oc.1, Oc.10	0.01
Tamarack-Custer	Spokane	*38½	*35	*35	Sept., 1924	0.25
Tintic Standard	Salt Lake	14.50	14 37½	14.50	Se.22, Se.29	0.40
Utah-Apex	Boston	5⅞	5⅝	5⅞	Oc.3, Oc.15, Q	0.35
Western Utah Copper	N. Y. Curb			*10		
IRON						
Bethlehem Steel	New York	48⅞	45½	47⅛	July, 1924	1.25
Colorado Fuel & Iron	New York	39½	36	36	May, 1921	0.75
Gt. North'n Iron Ore	New York	31⅞	27	27⅜	Ap.11, Ap.30	1.00
Inland Steel	New York	44	42⅜	43½	No.13, De.1 Q	0.62½
Mesabi Iron	N. Y. Curb	2	1⅞	1⅞		
Replogle Steel	New York	15⅜	14½	14⅝		
Republic I. & S	New York	56	52⅜	54½	May, 1921	1.50
Republic I. & S. pfd.	New York	94	92⅝	93	De.15, Ja.2, Q	1.75
Sloss-Sheffield S. & I.	New York	119½	109⅞	115½	De.10, De.21 Q	1.50
Sloss-Shef. S.&I. pfd.	New York	102⅞	100	102⅞	De.21, Ja.2, Q	1.75
U. S. Steel	New York	136	128	129⅞	No.28, De.30 X	Q1.75
U. S. Steel pfd	New York	126	125	125⅝	No. 3, No. 28, Q	1.75
Virginia I. C. & C.	New York	45⅛	45⅛	45⅝	Jan., 1924	1.50
Virginia I.C.&C.pfd	New York	77	77	77	De.15, Ja.2,	2.50
VANADIUM						
Vanadium Corp.	New York	31	30	30½	No.2, No.16 Q	0.50
ASBESTOS						
Asbestos Corp	Montreal	98	95	96½	Se.30, Oc.15 Q	1.50
Asbestos Corp., pfd.	Montreal	117	114⅞	116	Se.30, Oc.15, Q	1.50
SULPHUR						
Freeport Texas	New York	20⅝	18	19⅛	Nov., 1919	1.00
Texas Gulf	New York	117⅞	113⅛	114¼	De.1, De.15,QX	2.75
DIAMONDS						
De Beers Consol	New York			27½	Jy.27, Au.30	0.97
PLATINUM						
So. Am. Gold & P	N. Y. Curb	6	5½	5½		
MINING, SMELTING, REFINING AND GENERAL						
Amer. Metal	New York	55⅜	53½	53⅜	No. 20, De. 1, Q	1.00
Amer. Metal pfd	New York	118	118	118	No. 21, De. 1, Q	1.75
Amer. Sm. & Ref.	New York	123½	118⅝	121½	Oc.16, No.2, Q	1.75
Amer. Sm.&Ref.pfd.	New York	112⅝	111⅞	112	No.6, De.1, Q	1.75
Consol. M. & S	Montreal	156	149	150	Jn.30, Jy.15	0.75
Federated Metals	N. Y. Curb	27¼	25⅛	25⅛		
Newmont Mining	N. Y. Curb	45¼	44⅛	44⅛	Oc.1, Oc.15	0.60
Southwest Metals	N. Y. Curb			1		
U. S. Sm. R. & M.	New York	47	45	46	Oc.7, Oc.15, Q	0.75
U.S. Sm. R.&M.pfd.	New York	48½	47⅛	47½	Oc.7, Oc.15, Q	0.87½

* 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.

Boston quotations courtesy Boston Stock Exchange; Toronto quotations those of the Standard Stock Exchange of Toronto, by courtesy of Arthur E. Moysey & Co.; Spokane, Pohlman Investment Co.; Salt Lake, Stock and Mining Exchange and George H. Watson & Co.; Colorado Springs, Colorado Springs Stock Exchange.

LONDON QUOTATIONS, WEEK ENDED NOV. 14, 1925

	High	Low	Last	Date	Per Cent
Aramayo Mines (25 frs.)	83/1½	78/1½	82/6	Nov. 1925	5(c)
British Platinum	8/3	7/6	8/—	Feb. 1925	2½
Burma Corpn. (10 rupees)	18/6	18/—	18/1½	Aug. 1925	6 annas.
Bwana M'Kubwa	7/1½	6/9	6/10½		
Camp Bird	5/—	4/3	5/—		
El Oro	5/6	5/1½	5/3	Nov. 1924	2½*
Esperanza	1/1½	—/10½	1/—		
Frontino & Bolivia	9/9	8/9	9/—	July 1925	3¾
Mexican Corporation	18/1½	17/4½	17/9		
Mexican Mines of El Oro	40/—	39/4½	40/—	June 1925	10*
Nechi (pref. 10s.)	1/3	1/—	1/3	1921–22	25
Oroville Dredging	3/6	3/3	3/6	Dec. 1923	3¾
Ouro Preto	2/6	2/3	2/6	May 1925	2½
St. John del Rey	12/10½	11/10½	12/6	June 1925	6½
San Francisco Mines	28/—	26/10½	27/3	June 1925	15
Santa Gertrudis	18/4½	16/1½	18/3	July 1920	5
Selukwe (2s. 6d.)	11/3	10/—	11/—	April 1917	6¾
S. American Copper	7/—	6/6	6/9	Nov. 1917	75
Tanganyika	47/9	44/9	46/10½	Sept. 1925	5
Tomboy	4/7½	4/3	4/6	Sept. 1925	5
Union Minière du Haut-Katanga (Brussels) 100 Fr.	6.975	6.490	6.975	July 1925	150(b)

* Free of British income tax. (b) Belgian francs. (c) Swiss francs.