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ENGINEERING AND MINING JOURNAL

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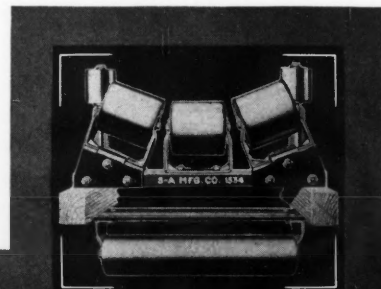
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Stand by the Federated American Engineering Societies

THE Federated American Engineering Societies have had a year of trial. It has been a year of experiment and adjustment. American Engineering Council, as the executive committee of the Federated Societies is confusingly called, has had its troubles. The Civil Engineers, a fine body, have not come in. A great many Western organizations of lesser type have come in, swelling the numbers who clamor for representation and diminishing the attention which the "founder societies" may expect. American Engineering Council has not been entirely clear what it was it was expected to do, or how to do it. The societies which compose this league have expected star performance from the new broom, but have no idea what should be done or how it should be done; and they have not helped much with their guidance.

Our own American Institute of Mining and Metallurgical Engineers has suffered a relapse into indifference as to the Federated Societies. The mining industry has received scant and doubtful attention from the Washington organization. Such general work or investigation or propaganda as the Federated Societies have undertaken for engineering in general or the world at large (as in the report of the Committee on the Elimination of Waste in Industry) have not appealed to some of the mining engineers as being thorough, or carefully considered, or wisely decided. They have expected expert and satisfactory leadership, and they do not sense it. They feel that they are not getting their money's worth.

We must get on a plane a little elevated and detached to solve this problem. Distinguish, first, between the advancement of the mining industry and the advancement of the engineering group or class. The Federated American Engineering Societies can never—will never—properly or adequately represent the mining industry. Your mining and metallurgical engineer has two sides—first, he is interested in the mining industry; second, he is a member of the engineer class. He accordingly desires the protection and advancement and extension of influence of both. For the mining industry, the mining engineer will depend on the American Institute itself and on the independent mining press for his technical progress, on the Mining and Metallurgical Society of America and the independent mining press for his information concerning policy problems, and on the American Mining Congress and the independent mining press for the representation of the industry at the seat of government.

For his interest and ambition and loyalty as a member of the great engineer class, however, he has no group representation if he abandons or helps to scrap the Federated Societies. Regardless of what has been done, whether you approve its first halting and tentative steps,

or not, stay with it! The idea of its organization was excellent and necessary; and the details can be arranged. Guide it, lecture it, help it, quarrel with it; but stay with it. Rome wasn't made in a day. We sympathize and agree in the main with the adverse criticisms as to the ineffectiveness during the past year of the Federated Societies. Nevertheless, it would be foolish to abandon the good ship because we do not like the course or the weather.

Freight Rates on Farm and Mine Products

THE PRESSURE of the farmers' "bloc" in the Senate, and the representation that the prosperity of farmers is being seriously affected by reduced price for their products, while costs, such as those of transportation, remain disproportionately high, has resulted in a voluntary proposal by the railroads to make a 10 per cent decrease in freight rates on agricultural products, and this proposal has been accepted by the Interstate Commerce Commission.

We congratulate the farmers on this much relief in the pressure of operating costs; but why is not the same cut made for all raw materials produced? Why does it not extend to the raw materials produced by mines, which furnishes the bulk of all freight and is the basis of the bulk of our manufactures? Surely the argument for the farmers holds good for the miners, for they are far from prosperity, to the extent that many plants are inoperative; and the fact that there has been no decrease in transportation charges is one of the elements of the existing situation that prevents them from operating. High transportation charges and excessive taxes are among the chief obstacles to their return to prosperity.

The railroads hold one of the important keys to industrial activity. The higher they make their charges, the less business they are likely to get. As they can reduce, mines as well as farms will see their way clear to operate. If we look on the whole country as one gigantic industry, certainly we could afford to run the railroads at cost—and at as low a cost as possible—in order that transportation, without which there can be no mines or factories, might be made easily available.

Conditions are changing for the better, however, and rates have already been materially lowered in individual cases. The Southern Pacific, for example, has made general reductions; and on the tenth of this month the rate on metal from St. Louis to New York and other Eastern points was reduced approximately 28 per cent.

The railroads have taken the desired steps largely as a result of wage decreases, allowed and expected. The first one, of twelve per cent, went into effect last July; another, of ten per cent, has been asked. These wage decreases, if made gradually and coeval with the declining cost of living, seem just and the only way to effect

the desired reduction in rates. A revision of the working rules, allowing a man to do more and different kinds of work in his eight hours, is also possible, and a substitute for part of the wage reductions that existing conditions have made inevitable.

Strike threats need cause little worry now. Recently we were interested in hearing Mr. W. G. Besler, president and general manager of the Jersey Central, speak of the preparations made for handling the strike called for Nov. 1. It is altogether likely that had the order of the unions stood, the walkout would have been a complete failure. There were more than enough men, most of them experienced, ready to accept the jobs of any so foolish as to strike, and there would have been little disruption of traffic. Most of the jobs on a railroad are not highly skilled and most of the employees in all branches have not had more than a grade-school education. A young man possessed of common sense and an ordinary amount of latent intelligence can be taught to fill almost any railroad position in from one to two days, according to Mr. Besler.

The American Zinc Institute Pioneers

OUR READERS are possibly not all aware of the monthly publication in these pages of valuable and timely statistics covering zinc production, shipments, and retort capacity, figures which we are permitted to use through the kindness of the American Zinc Institute, whose able secretary, Mr. Stephen S. Tuthill, compiles them. The issuance of this statistical information marks a distinct step forward in the dissemination of compilations which private research and business associations generally have held and do hold as strictly confidential and only for their own eyes.

The American Zinc Institute is young and virile. Already it has brought a spirit of co-operation among its members that has largely dispelled any distrust and enmity that formerly existed. It is probable that much internal persuasion and discussion preceded the decision to make public these statistical figures; and, now that it has been done, have the zinc producers found that it affects their pocket-books? Will it affect competition with their fellow producers? Will it have any undesirable effects? Assuredly not. It is far better to acquaint the public of the true status of any metal situation than to have it influenced by guesswork and fly-by-night rumors. The joke of it is that private statistical organizations are usually unable to prevent leaks, so that their statistics are generally freely published by the press.

There is another point that perhaps ought not to be overlooked. During the last year many so-called statistical bureaus, particularly those having to do with the building trades, have fallen into ill repute because of nefarious practices in the collecting and dissemination of price statistics, bids, and other matter. Although ostensibly formed for the purpose of collecting harmless statistics, some vicious activities were shown to be concealed. By making their statistical information public, as the American Zinc Institute has done, statistical organizations cannot help but merit the confidence of the public in what they are doing.

That the zinc industry, which has often been criticised for its secretiveness, should be the first to take this forward step is deserving of especial commendation. We hope the movement will spread to other metal groups.

German Economics and German Propaganda

AT A RECENT MEETING of the New York Section of the American Institute of Mining and Metallurgical Engineers, Dr. Richard Moldenke gave some account of German conditions and their relation to American industrial prosperity. Dr. Moldenke pointed out, what we all know, that the purchase by Germany of our raw materials, as of old, would promote our prosperity. The trouble was (which we also all know) that Germany has no money to buy with. Dr. Moldenke had visited Europe and talked with President Ebert and Hugo Stinnes, the Teuton financial octopus; and it was to be inferred accordingly that he had big news, straight "from the inside"; was, indeed, the bearer of an important message.

Did the United States wish again for the boom days of prosperity, which could only be obtained by German buying? Let the United States supply the raw materials without money, but on credit—two, five, or ten years—so that Germany could manufacture, and sell her manufactures—not in America, in competition with American goods. Oh, dear, no—in Russia. Only German culture could revive the vanished civilization of Russia.

Of course, the reparations conditions must be amended, so that Germany could pay. One thing more, also, America must do, if she is to be prosperous. She must see that the Treaty of Versailles is changed. She must see at once that Germany gets back Alsace-Lorraine, Upper Silesia, and Danzig. This is the only thing that will prevent the next war, for which the Germans are already planning, to achieve their revenge, and win back their lost territory. The next war, said Dr. Moldenke, will not be a naval war, a war between armies, a submarine, or an airplane war; it will be a chemical war, and at the proper moment Hell, he implied, would break loose. If we would purchase immunity, we gathered (for were we not and are we not allies of France and of England?), we must immediately get busy to see that the Treaty of Versailles is abrogated, goods for Germany's factories are supplied without pay, and the exploitation of Russia turned over, as a compensation for her wrongs, to Germany.

All of which sounds astonishingly like the crude and insistent propaganda with which we were bombarded before the war and in the early stages of it. Can the leopard change his spots? Dr. Moldenke unwittingly portrayed an unregenerate, treacherous and vindictive Germany, the same Germany that broke her faith with Belgium, systematically wrecked the industries of France, and torpedoed passenger ships—the Germany of efficient frightfulness. And if we should take the implied message from Ebert and Stinnes at what it appears, our obvious reaction would be to cease blaming Briand for his plea for retaining a strong French army of defense; and to advise him at once to march to Berlin and operate under a receivership a country bankrupt, not only in finance, but also in the possibilities of reform and regeneration.

Most Christian German gentlemen: We of the United States have just finished helping to save the world from your undesirable domination. The price you ask for a return for taking our copper and cotton without pay—that of betraying Europe again, and incidentally ourselves, into your power—is too great. Keep your paper marks at home—and your propaganda. You have to deal with a new and wiser America.

L. V. J. Kimball, Romantic Geologist

A CORRESPONDENT sends us a clipping from the *Lordsburg (N. M.) Liberal*, of Nov. 10, being a published report on the properties of Pierce-Hardin & Co. in Frio County, Tex. In this report is given very cheering news concerning the property of the company:

"This tract of land—3,327 acres, on the Brown holdings—is indeed a veritable treasure-house of oil, of the best grade known to commerce. It is located on one of the larger rivers of the Carboniferous Age; one of the western rivers of the great Mississippi Valley. These rivers of the Carboniferous Age are the oil depositories of the world. . . . In about the 300-ft. level you will strike sufficient gas to run all your machinery, and about the 600-ft. level you will strike lubricating oil in paying quantities. In about the 2,000-ft. level you will strike gusher oil."

Our correspondent writes:

"Scientific Geologist' L. V. J. Kimball, for the enlightenment of the mining fraternity, will tell you in this article that the rivers of the Carboniferous Age are the oil depositories of the world. While Mr. Kimball was in Lordsburg getting up a tremendous enthusiasm in oil, out of which was born the Pierce-Hardin Oil Co., he gave some extremely interesting lectures and demonstrations with his magnetic-galvanic-static-electro oil finder, showing that great rivers of petroleum flowed across the land, draining the Mississippi Valley in Carboniferous times and draining into Texas, with one branch draining into New Mexico near Lordsburg, as the Kimball electro-galvanic-static oil detector 'proved.' It was described how, later, these petroleum rivers became covered up by dust storms, but were still flowing beneath the soil into Texas and forming lakes underground there, and under Lordsburg, and thence overflowing and streaming on to Tampico and connecting up there with the lower strata of the Gulf Stream. So great was the enthusiasm generated in Lordsburg when it was learned and proved by the 'detector' that a Carboniferous river flowed under Lordsburg, that \$50,000 was subscribed for immediately in the town and the Pierce-Hardin Oil Co. was formed, headed by Mr. Hardin, the present postmaster of Lordsburg, and drilling was started at once near Lordsburg. A number of subsidiary companies were formed, one of which is incorporated as the Hardin Oil & Gas Co. and another the Buffalo Bull Oil Co., which also has a rig west of Lordsburg and is down 300 ft. now. The most reliable citizens of Lordsburg are directors of the electro-galvanic-static syndicate. Mr. Hardin, the honorable postmaster, is president, while R. Spann, well-known attorney, is attorney; while C. Schaber is prominent in the activities of the concern. . . . I forgot to add that I understand that a syndicate is now forming in Lordsburg, whereby it is aimed to devise a long extension tube to which extensions can be added to let this down into the lower strata of the Gulf Stream from a chartered barge off the coast of Florida. A compressor will force the air out, when it is the expectation of the syndicate that the lower strata of the Gulf Stream, which is rich in oil, will rise to the top, making an inexhaustible well, thereby, smoothing and oiling the financial waters of the syndicators. The Carboniferous Rivers of Petroleum, it has been proved by the 'detector,' are flowing from Texas and Lordsburg to Tampico, where they empty subterraneously into the ocean, thereby being one of the fundamental causes of the Gulf Stream. This is the same Kimball who a year or so ago went to California and demonstrated blindfolded with his 'detector' and attracted some attention at that time, but failed when, blindfolded, he was led on top of a large oil tank and the 'detector' showed no activity. Know that this galvano-electro-static 'detector' will not only tell to the foot how deep the oil is, but it will tell the quantity and the grade as well as which direction the stream is flowing (which is generally Tampico-wards) and the speed of the stream flow and whether or not it is dammed up into a lake or merely a river (Carboniferous)."

These are very remarkable claims which Mr. Kimball

puts forward. It is, moreover, interesting to note that he is a "scientific" geologist, recording the swing of the pendulum of nomenclature. For twenty years the tendency among geologists has been to become "practical" geologists, and accordingly various special societies have arisen, among them a thriving and numerically strong association of petroleum geologists, in Texas. From these "practical" geologists of Texas Mr. Kimball plainly wishes to be distinguished. He desires it to be understood that he is a scientific geologist, just as the barber loves to hang out his sign that he is a practical hair cutter. The precaution is unnecessary, in either case. Certainly nobody would suspect Mr. Kimball of being practical nor the barber of being scientific. But there are also among our readers those who would challenge Mr. Kimball's claim that he is scientific, and petition that his designation be changed to Romantic Geologist. And the romance-spinner always has the larger audience, and runs to best-sellers. Down the Carboniferous rivers of Texas a sucker slips every minute.

The Mission of the Business Press

THE TECHNICAL, business, or industrial press, with which class of publications *Engineering and Mining Journal* is to a degree affiliated, since it serves the mining industry, is assuming an increasing responsibility in giving to its great mass of intelligent readers sound facts respecting political, civic, and industrial conditions and problems, and pointing out the logical conclusions and the indicated trend of events and necessary course of individual action.

At a recent annual meeting of the Canadian National Newspapers and Periodicals Association, the Lieutenant Governor of Ontario, Colonel Henry Cockshutt, a prominent business man and financier, said:

"I make a distinction between the business newspapers and the daily press because I believe that your papers—the business newspapers of Canada—exert a greater influence than the daily press because of the greater confidence your readers have in them. People read daily newspapers to satisfy their desire for excitement or interest or entertainment. But this is not the case with the business newspaper. Business men need the service of these papers in the conduct of their everyday business life.

"In these days when there is disorganization, dissension, disruption in all walks—business, politics, and religion—there is a great place for the business paper to bring out more complete information, to assist in making us all realize we must work for a common cause, the upbuilding of our country. The business men of this country need your assistance. They are looking to you for information and advice, and are expecting it. On your shoulders, therefore, perhaps more than on the shoulders of any other single agency, rests the obligation to meet the needs of these trying days, with a sane and sound presentation of the case as it exists at the present time, a presentation free from private bias, or the desire to serve a popular demand."

It is interesting to note the last sentiment, and pleasant to report that there seems to exist a great and growing purpose among industrial journals, not only not to cater to public taste or demand, and also not, of course, to the taste and demand of any private interest, but, moreover, to set up the lofty and sound principle that they will not campaign for any benefit for the industry they individually represent if that special benefit be not for the interests of the whole nation. Adequate principles are thus developing, proportionate to the growing influence and responsibility of this type of scientific journalism, so especially devoted to sober truth-telling.

WHAT OTHERS THINK

Electrical Prospecting for Gold

In the Oct. 8 issue of *Engineering and Mining Journal*, in response to an inquiry by a correspondent, appeared the statement that no system of prospecting by electricity for gold ore had ever proved successful. Specific mention was made of the article abstracted from my translation of Professor Schlumberger's book which appeared in the *Engineering and Mining Journal* of May 7 and 14 of this year.

I have been carrying on experiments with Professor Schlumberger's method in several mining districts of the United States and Canada, among others the gold camps of Timmins and Kirkland Lake. The system was in the main successful. At Timmins I obtained good results on auriferous pyrite veins impregnating the country rock in the neighborhood of quartz stringers. Where the mineralization was confined to the quartz, not extending to the wall rock, the results were negative. This was to be expected, for where the mineralization is in quartz the individual grains of sulphide are electrically insulated one from another and oxidation is negligible. This prevents the generation of an electrical current through the chemical process of oxidation, described under the head of "Spontaneous Polarization" in the article mentioned.

At Kirkland Lake, where the mineralization is auriferous pyrite disseminated in vein-like zones of siliceous porphyry, the electrical situation is analogous to that of pyrite disseminated in quartz, and the results with electrical prospecting were equally negative. However, on one property the mineralization was rather heavy in schistose graywacke. Here the conditions for spontaneous polarization were ideal, and excellent results were obtained.

Incidentally, I may remark that excellent results have also been obtained by this method on other deposits of copper sulphide, nickel sulphide, and cobalt sulphide.

Obviously, from the theory of spontaneous polarization, bodies of native gold will give no reaction whatever, and to such deposits this method of electrical prospecting is absolutely inapplicable.

From the foregoing it will be seen that Schlumberger's method may be expected to work on certain types of orebodies carrying gold values. SHERWIN F. KELLY.

Lawrence, Kan.

He Speaks From Experience

Your editorials in the Nov. 26 number of the *Journal* concerning the revision of the present mining law give me the inspiration to make the following remarks:

The abolition of extralateral rights is the most important point in the new bill. When two mine operators conclude that a suit is necessary to determine their rights under the present apex law, the procedure is as follows:

In the first place the law is based on geology, which is not an exact science. The mine operators send out calls for geologists who will be expert witnesses, and

these witnesses view the same conditions and have altogether different conclusions. One geologist says that two and two make four, as in surveying or in other exact science. The others have conclusions ranging all the way from one to ten. One operator finds he can secure the services of four geologists whose conclusions are that the answer to the problem is one. He decides to use these four geologists, and, as in poker, when you have four aces, it is useless to try to draw the joker, but in this case he finds that it would be well to have the joker, so he engages another geologist to give a discourse on general geology and surround his four aces with a barbed wire entanglement that will make it difficult for his opponent to attack the testimony of his four aces.

The other operator is unable to get geologists who agree on the principal points that are in his favor. However, he secures one geologist whose conclusion is four; one whose conclusion is five; one whose conclusion is six; one whose conclusion is seven; and one whose conclusion is eight. As this testimony is all on his side, it is all of one color, and hence he goes into court with a straight flush and with the idea that his straight flush knocks the four aces for a row of tin ash cans.

Up to this time, the operators have both had poker in mind, but it now develops that the judge is a pinochle player, and he judges the hands from a pinochle standpoint. The result is general dissatisfaction all around.

The above remarks are not intended to be a slam at geologists, but they are results of my own personal observations. For three years I was engaged entirely in apex litigation, and during that time came in contact with many of the best experts in geology in apex litigation and with some of the widely known attorneys who specialize in this business. All of the geologists agree that these trials are a farce, and they are the ones who are endeavoring to have the present law changed.

The absurdity of a law based on geology is at once apparent, when we can just as well have a law based on surveying, where all witnesses would agree that two and two are four.

If we abolish the present apex law, we must give the prospector a square claim or at least a wider claim in order that he may be sure of some of the benefits from his location. These two points, the abolition of the apex law and a larger claim, are the only two points upon which everyone is agreed. Why not, therefore, cut out everything from the present bill except these two points and secure the united support of the mining industry for the bill? If later some of the other provisions seem to be advisable, they can be introduced as a separate bill, but they are of small importance as compared with the apex law, and we should not allow them to be tacked on to the present bill and cause opposition from many sources.

Some of the objections to the bill, as voiced in this district, are as follows:

1. There is no provision in the bill to designate when the law will take effect, and it is assumed that it would

be in effect as soon as signed by the President. It will take several months at least after a law goes into effect to inform prospectors in the field, especially in Alaska, of the provisions of the entire bill. If the new law goes into effect immediately, there will be an untold number of invalid locations made in accordance with the old law.

2. The provision for doing location work on placer claims in Alaska is out of line. A claim staked on June 30 would have to have \$200 worth of work done on it before July 1, which is evidently a physical impossibility.

3. The new bill states that locations shall be filed in the Land Office within ninety days. In many instances, especially in Alaska, this is not practicable, because of the remoteness of the prospector from points where he could mail his location notice and the uncertainty of the mail in those districts. Why make it necessary for a prospector to go all the way to Juneau to record his location? This savors very much of the Pinchot conservation program, and will meet with strenuous objection from Alaska.

4. There are approximately twenty cases of boundary litigation pending in the Portland Canal district of British Columbia. Attorneys point to the fact that there are twenty cases pending in the Portland Canal, and they use this as an argument to the effect that the British Columbia law using vertical side lines causes more suits than we have in this country. These attorneys neglect to mention, however, that these are boundary suits which could be obviated by making the provision for marking the boundaries of the claim more stringent. At any rate, these suits can be decided on the basis of surveying, which is an exact science and much easier to work with than geology.

5. The regulation that a patent must be completed within seven years would necessitate starting application for a patent four years after location, in order to be sure that the patent would be complete within seven years. This is the experience of prospectors in Alaska. It would be manifestly unjust to require a man to patent a claim four years after discovery, when in ninety-nine cases out of a hundred he has nothing of value to patent.

I give an outline of the above objections to show some of the opposition that will be lined up against the bill, and to support my contention that in order to assure the passage of the present bill everything should be dropped from it but the abolition of the apex law and the provision for a larger claim. J. G. MURPHY.

Seattle, Wash.

Concerning an Optical Illusion

In his article "Rail Linings for Ball Mills," in *Engineering and Mining Journal* of Dec. 3, Mr. Hardinge calls attention to a peculiarity in the picture on page 900.

The mortar seems to protrude from around the rails, and when turning the magazine upside down we get just the reverse.

May I suggest the following cause: Our eyes are accustomed to see objects and pictures from objects with the light falling from above; in this way protruding parts obtain a shadow at their lower side.

In the picture on page 900, however, the light has been coming from the bottom of the cut, as there are several bright spots at that side; therefore the shadows fall from the rail cutting on the mortar that is just above it.

As the border lines of the rails are not distinct, it appears as if the shadows are on the rail itself and are thrown there by the mortar, which in that case ought to protrude.

By turning the page upside down we get the light from the top, as we always get it, and therefore the effect is reversed; the shadows are now thrown on the mortar by the protruding rail cuttings.

I hope I have thrown some light (from the right side this time) on this peculiar phenomenon.

Des Moines, Iowa.

J. C. SEELIG.

Prevention vs. Cure

Referring to your editorial "The Origin of Apex Litigation" in the issue of Nov. 26 wherein you quote from Mr. Winchell's article in Professor Peele's handbook, it seems proper to forestall the drawing of an inference that there had been in British Columbia much extralateral right litigation and that *therefore* the law had been changed.

As a matter of fact, up to the time that the old law was repealed in April, 1892, lode mining had barely been commenced and our courts had had before them not a single extralateral-right case.

In the summer of 1891 I had several conferences with the Minister of Mines of that day, the late Col. James Baker, made plain to him the evils which could be expected from a continuance of the extralateral privilege, and induced him to get the consensus of opinion of the several mining districts active at the time concerning desirable changes in the law. The result was that petitions to the Minister from the miners themselves, notwithstanding some opposition, were largely signed and presented, asking that the law be amended to provide for vertical limitation.

As stated, the new law became effective in April, 1892. Before that year our total production from lode mines was about \$264,000. Since then, to the end of 1920, it has been more than \$384,000,000 and there is still no evidence that we have suffered from the change. In the meantime our courts have tried only two extralateral-right cases of any importance and thus we may be said to have "flourished peaceably under a sensible law."

Riondel, B. C.

S. S. FOWLER.

Discovery of New Nitrate Lands in Chile

The Chilean government has sent a mining engineer to Iquique to investigate the report of the discovery of a new nitrate zone, according to Consul Homer Brett, at Iquique, in *Commerce Reports*. A prospector claims that he has found nitrate beds underlying a district of about 2,000 sq.km., where no nitrate was previously known to exist.

This region is in the Province of Tarapaca, to the east of the fields now being worked. It is said that the results of about forty blasts, put in at distances of from 3 to 4 km. apart, show that beds of caliche from 2 to 3 ft. thick and containing from 20 to 40 per cent of nitrate of soda underlie the region at a depth of 11 ft. below the surface.

The government has signed a contract with the discoverer, granting him a tract of nitrate land 9 km. square to be selected by him in the new district, as a reward for his efforts, if his assertions are correct.

As the nitrate industry at present is prostrated because of overproduction, the reported discovery, even if true, possesses only eventual importance.

Traveling in Morocco

Transportation Facilities Poor—Some Districts Unsafe, but Carrying Of Arms Is Inadvisable—The Selection of Outfit—An Interpreter Needed—Mining Laws Favorable to Investigation and Exploitation

By J. P. HUTCHINS

Written for *Engineering and Mining Journal*

THERE ARE COMMERCIAL IRON ORES, galena, manganese and manganiferous ores, phosphate beds, petroleum, zinc ores, coal, mercury ores, copper ores, and nickel ores in Spanish and French Morocco. It is the opinion of men who are familiar with the mineral deposits of southern Spain, and who have been to Morocco, that deposits similar in extent and richness to those of southern Spain will be found in northern Morocco. This conclusion is based upon the belief, apparently well founded, that the geological features of southern Spain and northern Africa are similar.



MARKET PLACE IN TETUAN

These countries have laws favorable to exploration and exploitation that seem certain to attract investigators. Inasmuch as there are large areas that have been little studied, and as it is likely that engineers will be sent to determine the value of mineral deposits, some data as to the conditions affecting travel in Morocco should be of interest.

The winters, with about 20 to 30 in. of rain, are mild, but the summers are hot, with a maximum shade temperature over 100 deg. F., though with slight humidity. Malaria exists practically everywhere along the coasts, and as houses are not properly screened, infection from mosquitoes is to be expected, both in summer and winter. In other respects the climate is healthful.

TRANSPORTATION FACILITIES POOR IN INTERIOR

The ports of French and Spanish Morocco can be reached by steamers from southern France, southern Spain, and from Gibraltar. No particular suggestions are necessary as to traveling to Morocco by steamer.

Internal communications depend largely upon automobile service, which varies inversely in quality with

its need by the traveler. There are some well-established and efficiently operated routes, especially in French Morocco, but frequently the service on the routes usually traveled by engineers is most deficient and with automobiles badly out of repair. This circumstance, combined with the general badness of the roads, scarcity of bridges, and carelessness of inferior chauffeurs, usually takes all the joy out of travel by auto in Morocco.

It is strongly recommended to anyone anticipating much traveling in Morocco that he take his own automobile and chauffeur to that country. Otherwise loss of time may be serious. I have had a local Moroccan chauffeur drive off during a heavy rainstorm, late in the afternoon, without caring in the slightest how I, who had paid well for the hire of the debilitated automobile, was to find shelter and food. This occasioned a loss of two days, besides much mental anguish.

ADVANTAGEOUS TO HAVE OWN AUTOMOBILE—ROADS POOR

In traveling by auto in Morocco one should have a light but powerful car. With a Ford one can probably get about best. There is always a market for second-hand automobiles in Morocco, and a car can be easily sold after the completion of an investigation, and without great sacrifice.

It is considered that the possession of one's own car is a matter of importance in Morocco and well worth the trouble and initial expense of importing it into that country. Thus one may avoid the numerous difficulties which are inevitable if one relies upon the inferior local garages and lazy, dishonest, and unpunctual local chauffeurs.

In the event of hiring the local cars, it must be remembered that it is wise not to pay in full in advance. One should try to put off payment until the service has been completed. Examination of and a short test run of the car, to prove its condition, may save delays later. Assurance as to there being a sufficient supply of gasoline to make the projected trip is essential. These precautions and warnings should be more particularly kept in mind by those who come from countries where one may rent good automobiles without risk of being cheated. The degree of inefficiency of automobile service in some parts of Morocco is almost unbelievable.

The road system is not well developed, and existing highways are generally bad, except where there are strategic roads, although these, too, are often poor. Mineral deposits in Morocco, having for the most part the customary unfortunate characteristic of being situated at a distance from the roads, must often be approached on horseback. Roads that are good enough for automobiles in the dry season become bogs of black adobe mud in wet weather, impassable for wheeled vehicles. Therefore one should take to Morocco a saddle, a bridle, and plenty of saddle blankets to use on



STREET IN ALKAZAR KEBIR

the underfed, undersized horses or mules that must be used.

One should have a simple camp outfit, with the usual articles, and also a mosquito net. Such equipment had better be got abroad and taken to Morocco. No particular warnings as to clothing are necessary. Winters are mild and about 20 to 30 in. of rain may fall from October to June. Summers are hot and usually rainless.

It is not necessary to import food, as such supplies can be bought at the larger seaports. Everything except simple fare had better be brought from abroad, as the stocks of the shops do not include even what may be considered the commoner tinned goods found in the smaller towns in other parts of the world. The standard of living in Morocco is rather low, as compared, for instance, with that of the miner in the western part of the United States, and this is reflected in the poor variety and inferior quality of the goods for sale in the shops in Morocco as compared with those of the American mining town.

SOME DISTRICTS UNSAFE FOR TRAVELERS

As has been well shown by the recent developments near Melilla, in Spanish Morocco, the Moors are not by any means pacified everywhere in Morocco. There are considerable areas that are not safe, and the adventurous engineer, particularly, must be warned to ascertain from one of the numerous police posts whether or not the particular region he wishes to visit is safe. There will be constant incentive to minimize the importance of this warning, with the object of saving time, and also the temptation to ignore the advice of the police and to go unaccompanied or unguarded into a district where the Moors are in control and unfriendly. Such procedure may be decidedly dangerous.

On the other hand, I was most hospitably treated when caught in a hailstorm of positively frightening intensity and marrow-congealing coldness and penetration and compelled to ask for shelter in a huddle of Moorish huts, not far from where active fighting was going on. Nothing could have been kinder than the reception I received and the efforts of the simple Moors to warm and dry my frigid exterior and to cheer the inner man with hot mint tea and specially baked bread, in the traditional Arab fashion of hospitality. Some simple gifts of lead pencils and matches and a superfluous note book delighted these simple souls. It is suggested that the intending investigator of Morocco

have some extra lead pencils for distribution. It may be found that the lead pencil is mightier than the sword or the automatic pistol.

I have never been an advocate of carrying arms in the field. I have found it preferable to carry a cane, heavy enough to knock over a man in case of need. A cane, even a heavy one, does not convey a bellicose significance. Much trouble is encountered by the other fellow thinking, often mistakenly, that one is looking for trouble. A large pistol in a conspicuous holster is likely to cause this mistake. Therefore, if one goes to Morocco and also believes in having firearms, he should keep them out of sight. Not only are they provocative, but they may even be the objects of covetousness. Carrying arms in Morocco is honorable among the Moors, and the Moor, usually a good shot at 300 yards, who carries arms is considered to be a fighting man, a battler for the Prophet. It is quite logical for a Moor to consider a peacefully penetrating engineer to be a fighting man, battling against the Prophet, if he goes about with a large weapon dangling from his belt. Fights, otherwise avoidable, may conceivably occur, either because some Moor may desire to gratify the apparent belligerency of the armed engineer or because the Moor may wish to add the arms of the engineer to his stock of weapons.

MALARIA AND VERMIN ABOUND

As noted, malaria is prevalent, and medicines to combat it should be provided. Like other countries of the older civilizations, water pollution is general, and care should be taken to drink none but boiled water. What may be called domestic insects, fleas, bedbugs, and lice, infest the Moorish houses and huts. Insect powder is, therefore, desirable. Smallpox is likely to be epidemic. The Moor, like all true followers of the Prophet, scorns chairs and sits on the floor. A portable camp chair, for use in the field, will be a source of much comfort.

A camp table will be a great convenience, for tables do not exist in the purely Moorish towns and villages. The remarkably ingenious camp devices made in America had best be purchased in America by those leaving there for Morocco, although they can often be bought in Europe, as, for instance, in Madrid. It must be remembered that mining tools and materials are not stocked in Morocco.

Usually, the Spanish and French officials met in Morocco are polite and obliging, and the rather extreme and often tedious civilities should be reciprocated in



STREET SCENE IN CEUTA

similar vein. It is preferable not to discuss religion or politics. It is a mistake to try to hurry matters faster than the slow and dignified pace, sanctified by centuries of usage and custom, that is common to business transactions in Morocco. Time devoted to courtesies extended to officials and others, even to the lowly, is undoubtedly well spent. The customary democratic attitude of Americans should not be left behind when entering Morocco.

INFORMATION HARD TO OBTAIN—AN INTERPRETER GENERALLY NEEDED

It is exceedingly difficult to get accurate information from anyone in Morocco. Information such as concerns the arrival or departure of steamers or post is usually of not the slightest interest to the hotel managers of the seaport towns.

It is necessary to have an interpreter who can talk the language, a corrupt Arabic. Apparently, linguistic facility, reliability, and honesty, as in some other countries, seem to be characteristics hostile to the mental attitude of the natives of Morocco. Although many can be found who know Arabic and French, Spanish or English, it is difficult to obtain an interpreter who is also honest and trustworthy. It is not wise to engage the first glib-tongued applicant that one may meet in Gibraltar, Tangier, or in some other seaport. Care must be taken to be sure that the interpreter can be trusted to some degree, and then he should be trusted no more than is absolutely necessary, at least until one has tried him out enough to be assured as to the degree of his trustworthiness. It is easy to get into difficulties if one is not very careful in this regard. One can usually find an interpreter through his banker or consul. The French language is generally understood by Spanish officials.

SUSPICIOUS ACTIONS TO BE AVOIDED

If the investigator be patient and courteous and if he make an effort to comport himself as do the people he meets in Morocco, he will have no other difficulties than are usually encountered in other backward countries and will leave Morocco with the satisfaction of having had an enjoyable stay in an interesting region. One must remember, however, that he is in a country where there is active warfare. One must not carry on any investigation in such manner as may be considered suspicious by the officials.

Unfortunately, and, probably, quite without good reason, there seems not to be good feeling between the Spanish officials in Spanish Morocco and the French officials in French Morocco. This circumstance should be kept in mind, particularly, should it be necessary to investigate areas near the boundary between Spanish and French Morocco. In the international zone about Tangier this distrust is rather stronger than elsewhere.

Identical laws and regulations for exploration and exploitation apply both in Spanish and French Morocco. Interpretation, however, differs greatly in the two protectorates. In Spanish Morocco it seems to be more the policy to encourage those not of Spanish nationality to become interested than is observable in French Morocco toward those of other than French nationality. According to the laws, anyone can get as many prospecting permits as desired, in claims not larger than 1,600 hectares each, of prescribed form and orientation. These permits are good for three years and cost 20 centimos, or 20 centimes, per hectare per year.

Exploitation concessions can be obtained, but only after the receipt of prospecting permits. One person or company cannot get exploitation concessions for more than an aggregate of 60,000 hectares, and the cost of getting and holding concessions varies with the kind of mineral to be exploited from 1 peseta or 1 franc to 3.50 pesetas or francs per year per hectare. In addition, a tax of 3 per cent ad valorem, except in the case of gold, for which the tax is 10 per cent, must be paid



A MARKET NEAR TANGIER. TYPICAL MOROCCAN MOUNTAINS IN BACKGROUND

on minerals and metals exported. There is no obligation to give back any claims, or parts of claims, to either the Spanish or French governments after the discovery of commercial deposits, and there are no requirements as to prescribed expenditures, or amount of work, to keep prospecting permits in effect and valid.

With the present feeling of acute nationalism, resulting from the Great War and observable everywhere, it is easier to work, either in Spanish or French Morocco, under the auspices of Spanish or French syndicates or individuals, respectively.

Tube Milling in South Africa

In his inaugural address, F. Wartenweiler, the new president of the Chemical, Mining and Metallurgical Society of South Africa, made some interesting remarks on the present status of gold metallurgy on the Rand. Speaking of tube milling practice he states that the tube mills are called upon to grind to a finer degree of comminution than ever, one plant delivering a final product of which 90 per cent passes the 90 linear mesh screen. Good practice now demands a coarse feed, the newer installations feeding $\frac{1}{2}$ -in. maximum size.

Scoop discharges of varying effective lift, with screen openings of ample size to permit free discharge of the spent pebbles, are generally adopted, except on old plants where the use of small motors does not permit the resulting high power load. Shell liners of the Osborn and El Oro type find general favor. These are keyed and require no holding bolts. End liners are either cast or forged from discarded stamp-mill shoe shanks or dies.

No recent data have been published of the merits of the short 6 ft. diameter by 16 ft. length tube in comparison with the orthodox size, 5 ft. 6 in. diameter by 22 ft. There are also a few 6 ft. diameter by 20-ft. mills in operation whose performances have yet to be compared.

The French Creek Iron Mine

Pennsylvania Property, Now Ready for Production, First Worked Almost Two Hundred Years Ago—Orebody Is a Magnetite Lens—Crushing and Sintering To Precede Furnace—Mining Method Novel

BY A. H. HUBBELL

Written for *Engineering and Mining Journal*

AT THE PRESENT TIME there are only two iron-mining projects on a production basis in Pennsylvania—namely, the French Creek mine, about a quarter-mile from the village of St. Peters, and the open-pit workings of the Cornwall Ore Bank Co., at Lebanon. The former property, which is about an hour's ride from Philadelphia, is seven miles west of Pottstown and five miles east of Elverson at the end of the French Creek branch of the Philadelphia & Reading R.R., and is owned and operated by the E. & G. Brooke Iron Co., whose furnace, crushing and sintering plants and general offices are at Birdsboro, fifteen miles by road from the mine. The mine is at present shut down owing to the market situation and high freight rates.

The ore deposit is said to have been worked as early as 1725, and it is considered that the property is one of the oldest iron mines in the United States at which operations are in progress today. About seven years ago the E. & G. Brooke company undertook to reopen the mine and to provide modern equipment, and the property has been brought to its present stage of development and the existing plant erected under the direction of the superintendent, M. T. Hoster, who has been in charge from the start.

According to the Pennsylvania State Geological Survey and the company engineer, J. Burke, the area reaching westward from the orebody to Elverson consists of the so-called French Creek granite, which is really a dike of hornblende diorite. The orebody lies on the north side of the diorite dike. It is a replacement of Pre-Cambrian limestone. North of this area lie red sandstone and conglomerate. Near the mine a stream, French Creek, has cut a small valley. The general topography consists of small, low, rolling hills. The elevation of the property is about 600 ft. above sea level.

ORE MAGNETITE—FOUR YEARS' SUPPLY BLOCKED OUT

The ore is magnetite, and lies in a lens or chimney. An average analysis of 700 cars, or 35,000 tons extracted, is as follows: Iron, 56.98 per cent; phosphorus, 0.027; sulphur, 2.82; silica, 7.46; alumina, 1.36; lime, 3.32; magnesia, 1.26; manganese, 0.10; and copper, 0.18. Fine crushing (to $\frac{3}{8}$ in.) and sintering by the Dwight & Lloyd process, which removes all the sulphur, are the only treatment the ore receives before going to the furnace.

There are two parallel orebodies about 700 ft. apart, but only one has been worked on an operating basis. The main orebody strikes east and west, dipping at 43 deg., and is about 600 ft. long. At one end it rolls into the hanging wall.

The main orebody had one old shaft, but when the mine was reopened it was decided to sink a new one, which is the present main hoisting shaft. This is situated 50 ft. in the foot wall and is a 43-deg. incline to a point 950 ft. from the collar (650 ft. vertical depth), flattening at this point to 33 deg., which slope continues to the 12th level at 1,200 ft. on the incline, or 830 ft.

vertical plus a 50-ft. sump. The curve at a point 950 ft. from the collar has a 500-ft. radius, the chord being 86 ft. long. The shaft has three compartments and is 20 x 6 ft. inside the timbers. The two skipways are 6 ft. x 6 ft. 4 in. inside and the ladderway is 6 ft. x 4 ft. 4 in. Ninety-pound rails are used in the shaft.

In sinking this shaft a section of 293 ft. was sunk in eighteen weeks at a cost of \$44.74 per ft. for breaking, mucking, and explosives only. The drilling was done by working one eight-hour shift, sinking in hard, fine-grained diorite. Mucking was done on night shift.

The orebody has been opened on seven levels, and it is claimed that about 400,000 tons is fully blocked out,



GENERAL VIEW OF HEADFRAME AND SURFACE PLANT, FRENCH CREEK MINE

or about four years' supply, if 9,000 tons is taken as the monthly consumption. Development for blocking out greater tonnage is to be started as soon as the mine begins operating again. About 2,500 ft. of diamond drilling has been done.

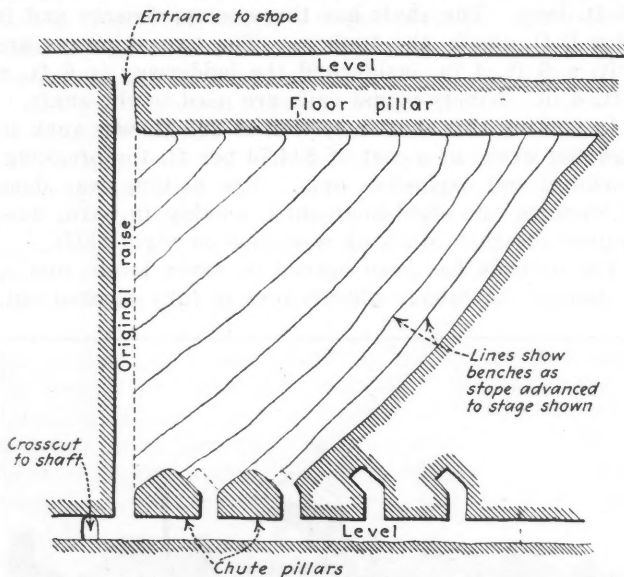
MODIFIED METHOD OF UNDERHAND STOPING USED

The system of mining employed is indicated in the accompanying sketch, and is a modified method of underhand stoping which is thought to be different from any other method previously adopted. It is described as follows by M. T. Hoster, the superintendent, who is responsible for its adoption:

"In opening a new level a crosscut is driven to the foot wall of the ore and drifting done in both directions, following close along the foot wall. Stopes are started 20 ft. to each side of the center of the crosscut by driving a 6 x 6-ft. raise in the ore and on the foot wall to the next level. In order to leave a 15-ft. floor, pillar stoping is started 15 ft. from the top of the raise by cutting a breast or bench the full width of the ore and then carrying the same forward along the strike in the ordinary manner by underhand stoping. At 40-ft. intervals along the drift, beginning from the raise, stub raises are driven 25 ft. high, with the last

10 ft. sloped off at 45 deg. toward the original raise and provided with chutes for future extraction of broken ore from the stope. As the underhand stope bench advances, these stub raises automatically connect with the stope, and the chute pillars remain directly above the level formed by the blocks of ore between the stub raises.

"This method of mining takes the place of the regular underhand open-stope method previously used, and instead of the ore from the stopes being shoveled by hand from the level and from under the high and often dangerous level (or floor) pillars above the stope, the



SKETCH ILLUSTRATING MODIFIED METHOD OF UNDERHAND STOPPING

ore now is loaded direct from chutes, and trammers are free from danger.

"This method has the advantage over shrinkage stopes in that the development cost is less, less broken ore is tied up, and no ore is left on either foot or hanging, as frequently happens with the latter method on account of becoming covered up. For steep veins or where the ore is very soft and the walls are very poor, the shrinkage stope or other method is no doubt superior, but for a vein lying 50 deg. or less, with ore adaptable to open stope work, this method is far the safer and cheaper. The level floor pillars can be recovered by breaking them down on to the chute pillars and extracting the ore through the chutes as before. The chute pillars can be recovered by retreating toward the shaft."

EQUIPMENT AMPLE FOR NEEDS

The drills for development work in rock and ore are 248 Leyners. For stoping, I-R Jackhamers, mounted and unmounted, are used. One Waugh Turbro is also employed. The steel used is 1½-in. hollow octagon for the Leyners and ¾-in. hollow hexagon for the I-R Jackhamers.

One and a half-ton Easton side-dump mine cars have been selected for tramping on an 18-in. gage track with 20-lb. rails and a one-half of 1 per cent grade. The cars are dumped into a seventy-five-ton shaft pocket at the station of each level. From these the ore is loaded into three-ton skips working in balance. The solid ore runs 8 cu.ft. per ton; the broken ore 15 cu.ft. per ton.

There is little water in the mine. It is all pumped to a sump 760 ft. from the collar, (on the incline), and

from this sump it is lifted by a Dean triplex pump to the surface.

The surface plant includes a hoist and compressor house, a change house, and a hospital, housed together with the foreman's office in one building; also a blacksmith shop and main office, railroad ore bin and powder house. At the shaft is a 75-ft. steel headframe erected by the Lackawanna Bridge Co.

The hoist house is equipped with a double-drum geared electric hoist made by the Nordberg Manufacturing Co. The drums are 6 ft. in diameter, with a 60-in. face. The rope speed is 1,000 ft. per minute, and the total load 13,300 lb. The hoist is driven by a 200-hp. Westinghouse motor. The compressor is an Ingersoll-Rogler Class P.R.E.-2 duplex, direct-connected, 22 x 14 in., with a 16-in. stroke, driven by a 2,200-volt self-starting synchronous G.E. motor.

The blacksmith shop is equipped with two Ingersoll-Rand drill sharpeners, one for the hexagon and one for the octagon steel; one coke furnace for heat treatment; two coke forges for miscellaneous blacksmith work; a hand press drill, and an emery wheel.

Power is purchased from the Metropolitan Edison Co., of Reading, Pa. It is received at 19,000 v. and stepped down to 13,200 and 440 v. for motor purposes and to 110 v. for lights; three 200-kva. transformers are employed for this purpose.

As stated, the property is at present shut down. When operations are resumed it is estimated that a force of sixty-one men will be needed for a production of 400 tons per day of one shift only. This force probably will be distributed as follows: Nineteen miners; twenty-three trammers; two timbermen; two shaft chute men; one nipper; one hoist man; four on the surface inclined hoist and on loading railroad cars; one compressor man; one mechanic; two blacksmiths; one change-house man; and four laborers.

TRAMWAY PLANNED TO LESSEN TRANSPORTATION COST

The company is considering the construction of an aerial tramway between the mine at St. Peters and the crushing and sintering plant at Birdsboro, seven and one-half miles away, and survey work for this is already under way. This should reduce the transportation cost from \$1.12 per ton to under 35c. per ton. Buckets of 7-cu.ft. capacity will probably be used, carrying 1,050 lb. of ore, spaced 200 ft. apart, and traveling 400 ft. per minute. One 75-hp. motor will be required, as the tramway will be electrically operated.

The ore hoisted by skips is dumped into a thirty-five-ton pocket built in as part of the headframe. From here the ore is loaded into a five-ton hopper-bottom side-dump car operating over a 4 per cent inclined track 900 ft. long to a 250-ton bin, from which railroad cars are loaded direct for transportation to Birdsboro. This surface car travels from the shaft headframe bin to the railroad ore bin by gravity and is pulled back by an electric hoist situated near the shaft. This method of transferring the ore to the railroad has proved satisfactory and cheap.

Radium Ore in Belgian Congo

A discovery of radium-bearing ores at Shinkolow, in the Belgian Congo, is reported to the Department of Commerce. Prof. Alfred Schoep, director of the Institute of Mineralogy at Ghent, is credited with the discovery.

Some Aspects of the Revenue Act of 1921

Excess Profits Tax Repealed Beginning 1922—Corporate Income Tax Increased—Surtax Rates Reduced—New Class of "Capital Gains" Created—Advantageous Provision Will Govern "Closed Transactions"—Losses May Offset Gains Within Two Years

BY ROBERT MURRAY HAIG

Consulting Editor, *Engineering and Mining Journal*

AMONG THE NUMEROUS CHANGES made by the new tax bill signed by President Harding on Nov. 23, five stand out as of great importance from the point of view of the business man and the investor. These are:

1. The abolition of the excess profits tax as of the beginning of next year, coupled with an increase in the income tax on corporations at that time from 10 per cent to 12½ per cent.

2. The reduction in the surtax rates on individual incomes which comes into effect at the same time.

3. The establishment, with the beginning of next year, of a new class of income to be known as capital gain, which will be subject to a maximum rate of 12½ per cent.

4. The broadening of the definition of the "closed transaction," effective for the current year, which makes possible many exchanges of property for property without subjecting the gain to taxation.

5. The recognition, beginning this year, of a net loss from one year's operation as an offset against any profits which may accrue in the two following years.

The first two changes, the repeal of the profits tax and the changes in the rates, have been the subject of wide comment, but the other changes, being of a somewhat more technical character, have been less discussed, and their significance has been less fully appreciated.

CONGRESS REPEALS EXCESS PROFITS TAX

In spite of great pressure, Congress finally declined to repeal the profits tax for 1921, but did agree to abolish it thereafter. With it disappears the "personal service corporation," a special class established to care for certain corporations which it was desired to exempt from profits taxation. When the profits tax goes, the income tax rate on all net income of corporations rises from 10 to 12½ per cent. The change in the rate will cause corporations which make only moderate profits to pay slightly heavier taxes, but the total tax burden on corporate income will be much lighter, the official estimates of revenue under the new bill calling for \$1,030,000,000 from this source (ignoring back taxes) this fiscal year and only \$695,000,000 for the next fiscal year, when the changes will be in force.

SURTAX REDUCED

The surtax rates on individual incomes are scheduled for reduction beginning with the first of next year. A comparison of the new scale with the old is difficult to make. It should be made clear, however, that the change affects small taxpayers as well as large ones. The maximum rates remain very high—50 per cent as compared with 65 under the old law. The 50 per cent rate applies to all income in excess of \$200,000. The old rate which applied to the increment of income above \$200,000 income was 60 per cent. Surtaxes in the future will not begin until the \$6,000 point is reached and will be 1 per cent for income between \$6,000 and

\$10,000. Under the old law, the surtaxes begin at \$5,000 and mount by more rapid steps. There are also slight changes in the personal exemptions, effective at once. According to the revenue estimates, these changes will not provide much relief for the individual taxpayers, for the Government expects to get \$780,000,000 next year with the changes in effect, as compared with \$850,000,000 this year.

"CAPITAL GAINS"

The most revolutionary section in the new act is Section 206, which sets up a new division of income. After the first of next year money made by individuals by selling or exchanging property "held for profit or investment" is subject to a maximum rate of 12½ per cent, instead of the regular rates, which range as high as 58 per cent (normal plus surtaxes). This is hedged about by several restrictions. The individual may not take advantage of the permission to use the 12½ per cent rate unless he is willing to pay at least 12½ per cent on his other income as well. The property "held for profit or investment" must have been so held for more than two years and may not include property "held for the personal use or consumption of the taxpayer or his family," or property which properly is subject to inventory. It is not necessary, however, that the property be connected with his trade or business.

The reason for the adoption of some such section as this is plain, whatever one may think of the wisdom of choosing this particular method of meeting the situation. As everyone knows, many sales of property have been postponed or entirely blocked by the unwillingness of prospective sellers to take their profits when they would immediately become subject to heavy surtaxes. This, of course, handicapped business. The solution adopted was practically to wipe out the offensive surtaxes on profits from this class of transactions.

One anomalous result of the selection of this solution, however, is that under this new arrangement a dollar of profit made from property which has grown in value is taxed at the maximum only 12½c., whereas a dollar made otherwise may be taxed as much as 58c. For example, in the case of a bond bought at a discount and sold at a profit, every dollar of interest on the bond may pay a tax nearly five times as great as every dollar of appreciation in the value of the bond, a fact which is likely to affect profoundly future methods of corporate financing.

Much more could be said regarding the effects of this new section from the points of view of equity and of administration, but what is of particular interest here is to point out the very substantial relief granted by it to investors in property which appreciates in value.

The advantage to the investor in property which is gaining in value, conferred by the section just described, is accentuated by the liberal provisions governing the "closed transaction." (Section 202.) This has long been a troublesome section of the field of income tax procedure. When one exchanges property for cash, no

question arises. The transaction is "closed," and one accounts for his gain to the tax collector. But when one barter instead of sells, receiving other property instead of cash for his property, very serious questions arise. There are sometimes differences of opinion as to the value of the property received which lead to disputes and litigation. The old law went so far as to say that, in the case of such trades, the property received was to be treated as cash "to the amount of its fair market value, if any" (with certain exemptions in the case of a corporate reorganization—1918 law, Section 202). The new law goes much further. It now states positively that no gain or loss on trades shall be recognized unless the property received on the trade "has a readily realizable market value." The phrase, "readily realizable" adds a new and liberalizing element.

Even more important, however, are the exceptions made to the general rule. Even though the property received has such a "readily realizable market value," one need not account for the gain in certain cases. This is one:

"When any such property held for investment, or for productive use in trade or business (not including stock-in-trade or other property held primarily for sale), is exchanged for property of a like kind or use."

How the Treasury will interpret this section is, of course, as yet unknown, but it would be a very narrow interpretation which would exclude exchanges of bonds for bonds or real estate for real estate. In other words, so long as one "barter" or "trades" his property for other similar property, instead of selling it for cash, he need not account for his gains to the Treasury for tax purposes. Even if he does sell for cash, as has been noted above, he is subject to a tax of only 12½ per cent.

The provisions governing corporate reorganizations and sales of property to corporations are also greatly liberalized, so as to make it unnecessary to report many gains for taxation.

With one minor exception included in the 1918 law, it has been the practice since the beginning of income taxation in this country to treat each year as a unit and to refuse to permit the fact that one has lost money this year to affect the amount of profit he must report the following year. Each accounting period has been carefully "insulated" from other accounting periods. This practice has worked much hardship, and the new law breaks away from the old precedents by inserting a provision, effective for 1921 (Section 204, with a restriction on mines), which permits a net loss suffered in one year to be offset against any net income realized in the two next succeeding years. In other words, losses may be used to blot off subsequent gains, but losses are "out-lawed" for this purpose after the expiration of two years.

The new law contains many other new provisions which it would be interesting to discuss did not the limits of this article prevent it. Such changes include the new rule regarding gifts, which makes the recipient, if he sells a gift, account for the gain in the value of the gift before he received it [Section 202 (a) (2)]; the section aimed to prevent "wash-sales" to establish losses [Section 214 (a) (5)]; the provision covering cases where property is involuntarily converted into cash [Section 234 (a) (14)] and the modifications in the various special taxes.

It has been possible to stress here only the most important departures in the new statute. Careful examination by the business man and the investor will

reveal the fact that it contains provisions, aside from the repeal of the profits tax and the changes in the rates, which will yield him very substantial relief from the burdens of war taxation under which he has been struggling for the last five years.

Cyaniding Practice on the Rand

No fundamental changes have been effected in cyaniding in South Africa in the last few years, according to F. Wartenweiler in *The South African Mining and Engineering Journal*. Considerable experimentation, however, has been conducted quietly, resulting in gains here and there. The practicability of collecting sand and its treatment in the same tank is well established at one of the most recently erected plants. Careful classification is a corollary. The importance of close classification and the advantage of fine grinding of the pyritic portion of the ore is receiving constant attention.

Cyanide solution strengths have been on the down grade, and with the adoption of de-aëration of solutions prior to precipitation they will continue on this course. The saving of cyanide and zinc resulting from this constant pressure of experimentation with lower and lower cyanide strengths and with improved precipitation technique has been considerable. On one group alone it has amounted to a quarter-million sterling in five years.

Precipitation has received due attention, and on some of the plants a feed rate per diem of 2.3 tons of slime solution per cubic foot of zinc shaving in extractor boxes is current practice. The Chamber of Mines financed extensive trials on the de-aëration of cyanide solution, and, resulting from these, mechanical de-aëration has been decided on at five reduction works, of which three installations are in operation. The expectation of direct and indirect economy promises to be fulfilled.

Precipitation research has not been lacking within recent years; the margin of possible improvement, however, is small, and any new process calling for a new installation with heavy capital expenditure is severely handicapped by economic considerations.

Oxidizing reagents, by reason of rapidity of reaction and expense, do not find favor. Their effect is evanescent and likely to be harmful. The economical and satisfactory supply of oxygen continues to be derived from free air. Experience with de-aëration has shown how readily air dissolves in solution and how watchful one must be to prevent this at certain stages of the cyanide process.

Vacuum filters are now accepted by the majority as standard slime-washing equipment for new plants. Their washing is controllable, depending so much less than the decantation process on ratio of dilution and on the weather. Many installations maintain a consistent daily capacity rate of 3.5 tons dry slime per leaf.

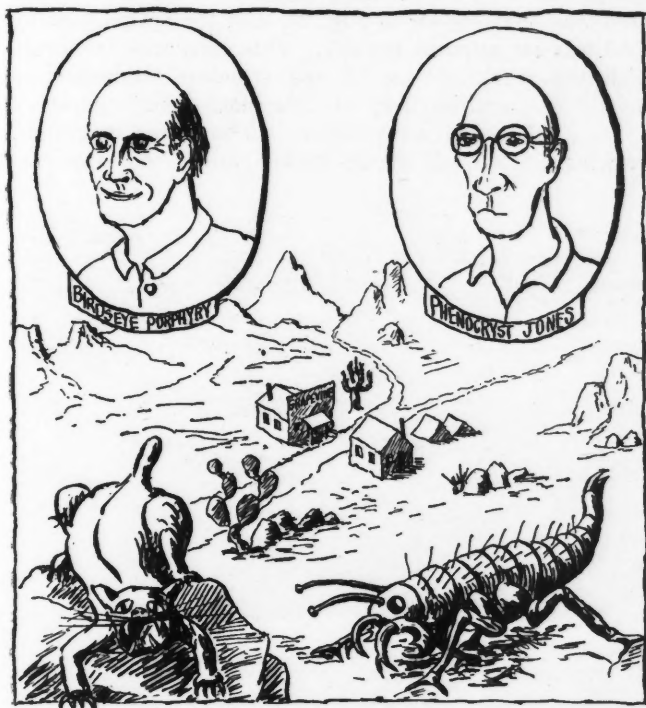
Copper Lengthens Boiler Tubes' Life

It is said that the life of a locomotive boiler tube, if made of copper, is about three times that of one of steel. A life of from 240,000 to 360,000 miles has been obtained with copper tubes, as against 80,000 to 120,000 miles with steel, it is claimed. It is also stated that by the addition of approximately 0.2 per cent of copper to steel and iron plates the corrosion rate, where the iron or steel is alternately wet and dry, is greatly lessened.

BY THE WAY

The Wildcat and the Doodlebug

"Say, Phenocryst, what's a wildcat?" asked Birdseye Porphyry as he scratched a match on the porch post of the combined store and post office at Grapevine Crossing. "A wildcat!" drawled Phenocryst. "A wildcat, Birdseye, is a forlorn hope togged out in a dress suit and wearing a coon's diamond in its shirt front. It looks like \$1,000,000. It oozes optimism and sweeps down the street, whirling its cane like a bandmaster's staff. It gathers in plain ordinary dubs and makes them feel like Rockefellers for a while. It acts like a



shot of hootch. It produces 'delirium riches' whenever anyone gazes too long at it. When the Roman candles are all gone and the sheriff has the tool house, it's just a hole in the ground or a duster. It keeps a certain kind of a gent, Birdseye, in clover, and it keeps some of us poor. Now, you smart Aleck, what's a doodlebug?"

Birdseye sucked at his pipe and sat down on the store step and threw one leg over the other. Drawing a toothpick back and forth in the sand by his side, he gazed at the distant line of brown hills. Removing his pipe and spitting, he looked up at Phenocryst. Phenocryst shifted his weight from foot to foot and returned the stare.

"A doodlebug," said Birdseye slowly and like a judge sentencing a prisoner for life, "is a human organism of unknown pedigree. It carries a little more avoirdupois than us poor desert rats can afford. It dresses a darn sight better. It has a tongue on roller bearings swimming in whale oil. You can distinguish it from surveyors, engineers, and geologists by the strange instruments and little vials of minerals, metals, and oils it sports about with. Phenocryst, you and I prospect in the orthodox fashion. We go out and use

our eyes and feet and bust up the rock with our picks. When we get some promising colors we get busy with single jack, drill, and windlass. We buy our powder and grub, and we sink our shaft with honest sweat. The doodlebug you mention just sets up his contraption of wires and batteries and bits of jimcracks. He looks wise and walks in a figure eight and says: 'It's down there 250 ft. 6½ in. and contains 300,065 tons of 6.3 per cent copper ore, averaging an ounce of silver and 0.07 oz. of gold per ton.' Now that's short-circuiting the prospecting game, isn't it? A doodlebug, Phenocryst, thinks that he has this prospecting game by-passed on the dynamite, grub, and honest sweat, but let me tell you in confidence, he's just a plain fraud. It can't be done."

"Well," said Phenocryst, squatting down and looking squarely at Birdseye, "a wildcat and a doodlebug are two of a kind. They're unsafe critters to have around. We've had the wildcat with us for a long time, and he's been here long enough to be remotely respectable, but this new bug ought to be smashed. A wildcat is like a roulette game, but this doodlebug is a packed deck."

More About "The Engineer"

The first time we meet Lord Riddell we are going to ask him what he thinks of Mrs. Whitney's statue, "The Engineer." Recently at the annual dinner of the Washington Society of Engineers, His Lordship said that it would reflect more favorably on the progress of our civilization if there were more statues to engineers and fewer to soldiers. Since the world could not live on wars, said he, engineers were furnishing a most effective cure for the after-effects of war in the setting up of great wage-producing works. We feel sure His Lordship had not seen "The Engineer" or else he would have qualified his remarks. His conception of the engineer and that of Mrs. Whitney are as far apart as are the views of Messrs. de Valera and Collins on certain aspects of the Irish free fight.

"Perhaps Mrs. Whitney merely intended her piece of sculpture to be symbolic of the dominant trait of the engineer, who has a penchant for digging in," writes M. W. Y. from the Michigan copper country. "And, figuratively speaking, he strips for action when he does that, which may account for the figure in underwear. I am fond of Chiclets. Please send them along."

Not too fast—not too fast—Mr. M. W. Y. The Chiclets will keep until others have had a chance to win the valuable prize.

W. I. Schmidt, of Los Angeles, says: "Why not call the creation 'A Miner at Work After Drinking Home Brew'? Two things are plainly apparent—the abnormal posture of the individual shows that he is laboring under pain, and the fact that he is wearing a hat and boots without the proper supply of other wearing apparel clearly shows that his mind is not functioning properly."

Another writer is less inclined to object to Mrs. Whitney's conception of the engineer. "She doubtless had in mind the engineer before he woke up and undertook to play his part in public life. Some technical men are still asleep, and these she is not far wrong in representing as she has."

We foresee that this controversy will help the Chiclet* manufacturers a whole lot. Anything to make business pick up, especially in such a basic industry.

*A prize of a box of Chiclets has been offered to the person suggesting the best name for the figure shown in the illustration on page 777 of the issue of Nov. 12. In case of a tie the box will be divided equally between the two contestants.

Scraping and Loading in Mines With Small Compressed-Air Hoists—III*

With Little or No Modification, Present Mining Systems Are Applicable to Slushing, Which Offers Distinct Advantages Over Hand Methods—Suggested and Actual Uses in Surface Operations and Coal Mines—The Scraper a Factor in Operation

BY WARD ROYCE

Written for *Engineering and Mining Journal*

THE USE OF SCRAPERS has also produced good results on the Gogebic Range. Here the mines are deep, and the sublevel caving system of mining (Fig. 32) is employed. This method of mining differs little from the top-slicing system in general layout. The ore is removed from the top down, as in top slicing, the principal difference being that the sublevels are spaced further apart vertically, and in removing the ore a pillar is left above the slice, which is removed by caving on the retreat from the slice limit.

The usual method is to carry the slice across the pillar, as in the other system; then to blast down the timbers one set at a time, cleaning up the ore from the caved pillar as it falls to the floor of the slice. There is some difference in the sequence of the operations, and the mining is probably not quite as clean as in top slicing. This method has been succeeded by the top-slicing method on the Mesabi Range for the reasons noted.

The sequence of operations, in removing the blocks of ore one after another, is not especially efficient in straight and continuous hauls for the scraper in the principal extraction openings. This factor is being studied, with an object of arranging the work for the scraper in somewhat the same manner as has been done on the Mesabi. In removing ore from many of the development openings, and in some places on the sublevels, the scraper has conclusively demonstrated the benefits that may result from its wider application.

At one property a 4H "Little Tugger" and scraper was used in mucking the ore from three development headings, all the material being handled to the same pocket in a small transfer winze, as shown in Fig. 33. Up to a distance of 75 ft., this was said to have been the fastest development in ore that had been done in this mine. The openings were fully timbered and lagged.

USE OF SLIDE IN CAR LOADING

Good results have been obtained at this same property in loading cars with the scraper. A sheet steel slide about 12 ft. long and 40 in. wide is set so that the scraper travels up the side and over a pair of rails extending about 5 ft. behind the slide, under which the cars are run. The hoist is set up at one side of the drift, and the ropes are led to a pair of snatch blocks hung from the caps above the end of the slide so that the ropes clear the slide. (Figs. 34 and 35.) In this work a car containing approximately 40 cu.ft. is loaded in from six to eight minutes, the distance hauled being 50 ft. It is advisable in using a slide in this manner to set the slide so that the foot of the incline is from 25 ft. to 30 ft. back from the breast. This assures a cor-

*This is the third and last of a series of articles, the first and second of which appeared in the issues of Dec. 10 and Dec. 17 respectively.

rect rope angle and insures the scraper centering on the foot of the slide when returning with the load.

On one occasion a 6H "Little Tugger" was set up in this manner. The distance from the breast to the dump was 50 ft., the air pressure 50 lb., the scraper used was that shown in Fig. 24, and the actual loading time was six minutes per car. This compares favorably with the work of one of the standard underground shoveling machines used at this place when operating under similar low air pressure. The latter machines, working under 60 lb. of air, loaded cars of the same size

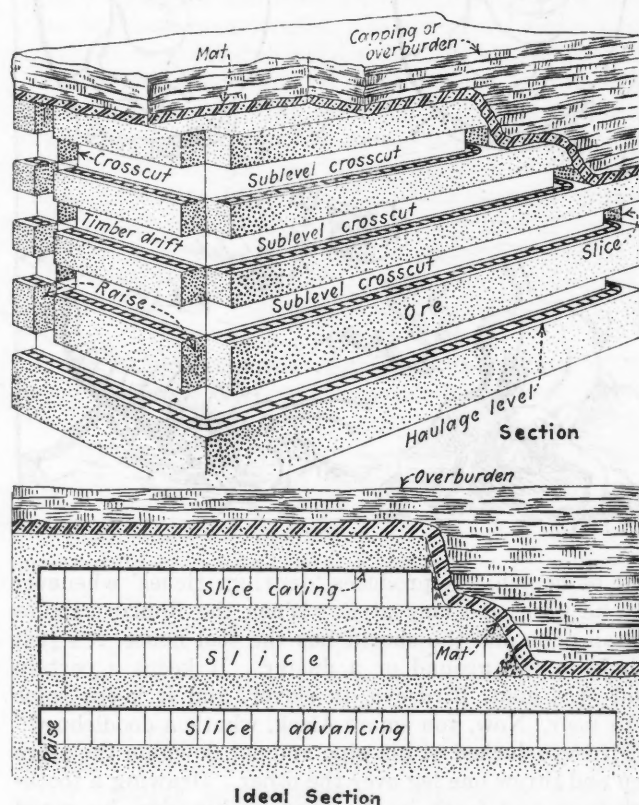
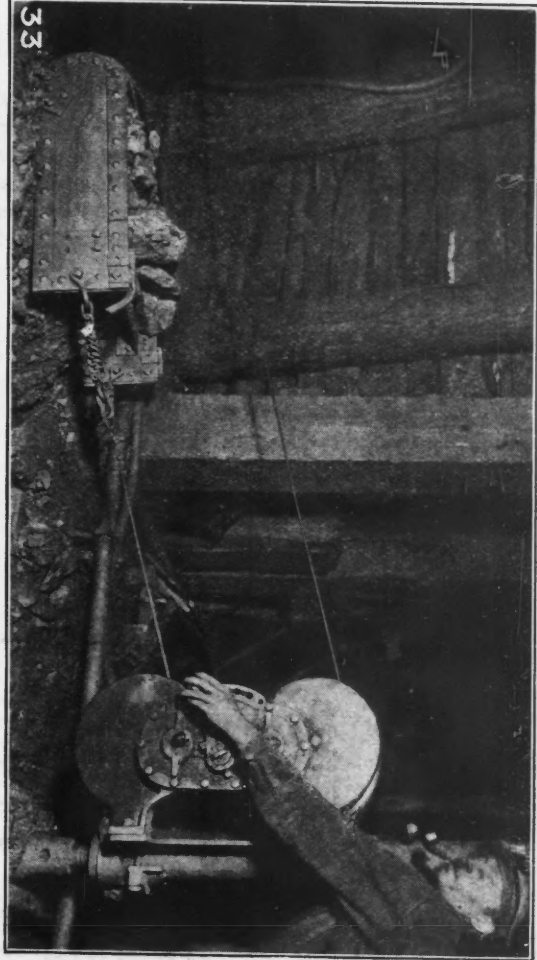


FIG. 32. DIAGRAM SHOWING SUBLEVEL CAVING METHOD OF MINING

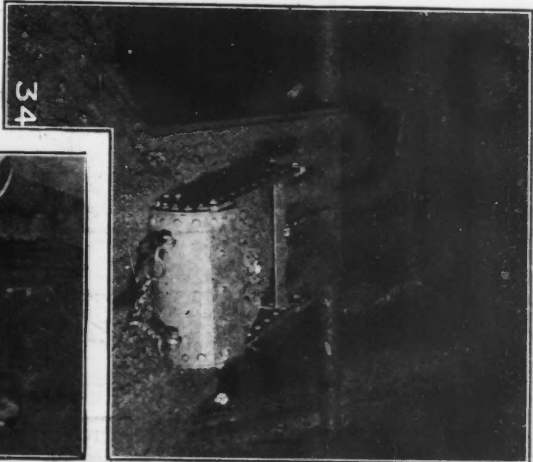
in eight minutes, or about five cars to the scraper's seven, counting actual loading time.

This comparison should not be assumed as being too favorable to the scrapers, as the mechanical loader will make a much better showing, loading nearly twice as fast as the scraper under the most favorable conditions of high air pressure and other propitious circumstances. However, when it is considered that the scraper has to go 50 ft. after a load and that the loader is at the pile, the comparison is not unfavorable.

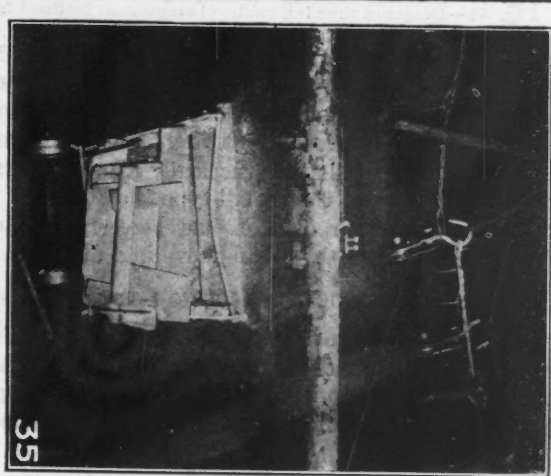
At another mine in the same district one of the 6H "Little Tuggers," operating under only 38 lb. of



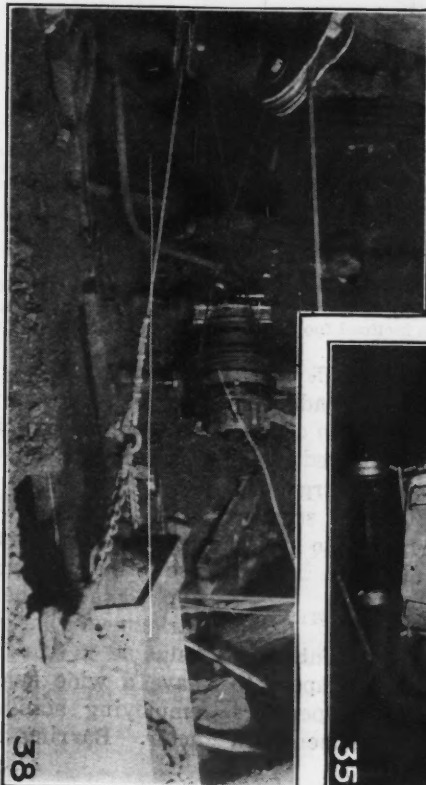
33



34



35



36



37



38



39

Fig. 33—Scrapping ore into a winze.
Fig. 34—Loading car with scraper, showing slide placed over chute for dumping.

UNDERGROUND APPLICATIONS OF SCRAPERS IN IRON ORE MINES

Fig. 35—Scrapping from a set-up at one side of opening.
Fig. 36—Tail rope snatch block hung from timber sprag across breast.
Fig. 37—Loading car with scraper, showing snatch block.
Fig. 38—Drilling and scrapping with three-man gang.
Fig. 39—Kidding a scraper in chunky ore.

air, handled ore at the rate of twenty-seven tons an hour, in scraping to a raise.

Car loading by means of the inclined slide is necessarily slower than operations where the ore may be scraped directly to an opening in the floor, but results are far above those produced by hand loading. When the length of tram is 300 ft. or more, the men will load the cars about as fast as they will tram them. In places where the tramping distance is great, or in which the cars are handled by a motor, the time lost

shift constitute a contract gang and the gang has two openings in which to operate. This permits one man to keep the two faces drilled and blasted while the two other men handle the mucking and timbering. This arrangement has worked out well, and the three men have produced about twice as much ore as four used to do previously. Fig. 36 shows a typical working place under such conditions.

Cost comparisons are practically useless, because of the great variation in wage scales, methods, and other

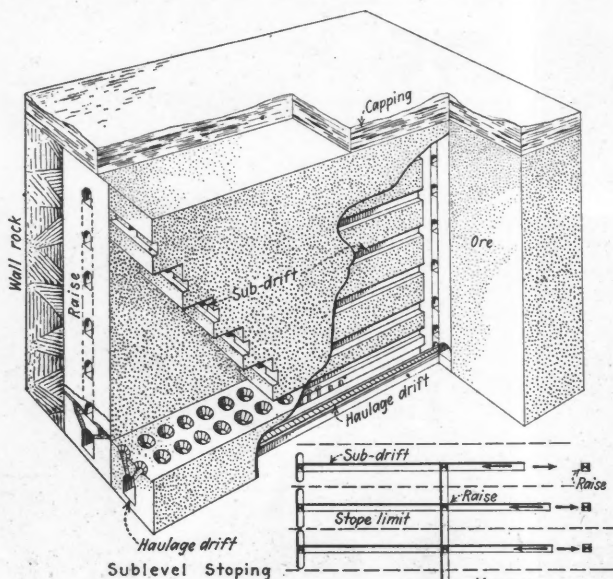


FIG. 40

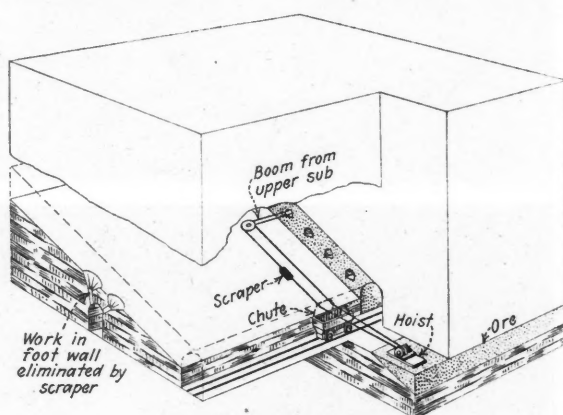


FIG. 41

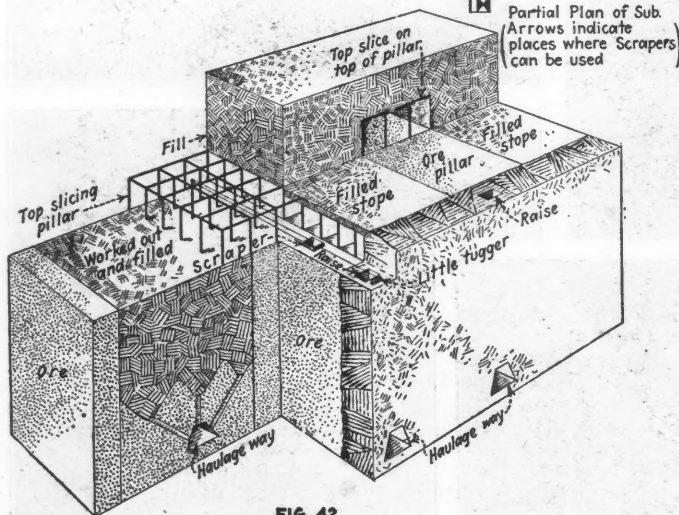


FIG. 42

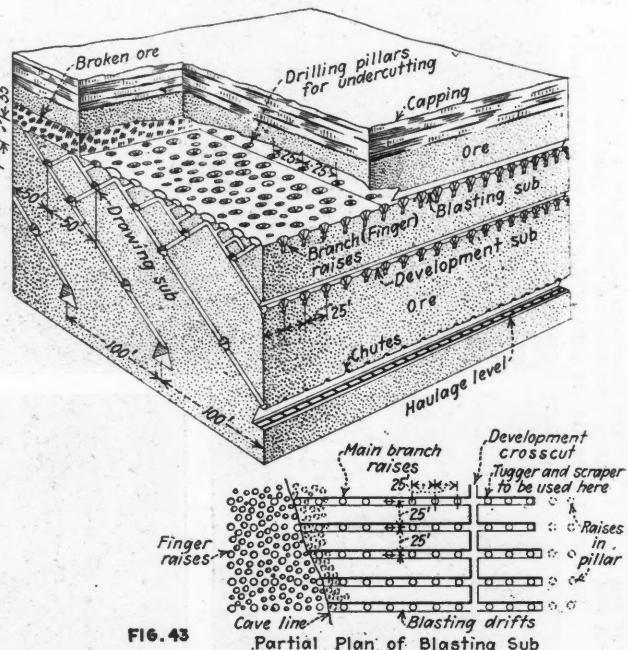


FIG. 43

APPLICATION OF SLUSHING TO VARIOUS MINING SYSTEMS

Fig. 40—Diagram showing "substopping" method.

Fig. 41—Diagram showing sublevel stoping on inclined foot wall.

Fig. 42—Top-slicing pillars, room-and-pillar method.

Fig. 43—Branch raise caving method at Inspiration Copper Co.

in tramping and switching decreases the efficiency. By using a small, easily handled platform in addition to the slide, somewhat as is done in the Michigan copper country, this condition might be greatly improved.

Speaking generally, in practically all the underground operations where the small-type hoists and scraper have been used, production has been raised to about double that shown by hand-shoveling methods.

APPLICABILITY OF METHODS TO SCRAPING SYSTEM

Present mining methods and labor arrangements may require modifications to accommodate the scrapers to the various operations. At Ishpeming, Mich., operators have tried arranging the work so that three men on a

operating factors employed in different districts, but the application of the scraper system can be counted on to reduce mucking time from one-half to one-fourth the time consumed by hand-shoveling methods.

THE SCRAPER AS A FACTOR IN OPERATION

The natural question that arises in considering the use of a new method is how and where it may be applied to any particular operation. Experience has so far shown that the small-power scraper unit is most valuable in handling the iron ores and that it should have a wide field of usefulness in mining operations employing similar methods in ore of similar character. Barring the few exceptions where material is

broken in exceedingly large and heavy peices, all mining has at least a few working places to which the scraper is applicable.

Underground operations in many of the mines in the Southwest are very similar to methods employed in the Lake Superior iron and copper districts. Many operations conducted on slightly different methods are working ore that the small scrapers could handle more efficiently than is now being done by hand, and in many instances the use of such an inexpensive means of increasing efficiency might be the deciding factor in continuous work.

In those mines employing so-called "gravity methods," the small-power scraper will, of course, have little application except in development. In some of these methods the amount of development is necessarily large, especially in the larger orebodies, and the scrapers could there be used to advantage.

The "substopping" method, employed in some operations on medium stiff ore (Fig. 40), requires considerable development, especially in wide orebodies where several stopes are opened parallel to each other, as in some of the iron mines on the Menominee Range. This requires opening several drifts through the centers of the stopes on each sublevel, and such workings should be a good place in which to use scrapers.

In this same method of mining on an inclined foot wall (Fig. 41), it sometimes becomes necessary to do a great deal of work under the foot wall in the country rock to draw off the broken ore. It would seem that this could be handled by the scraper at a considerable reduction in expense for dead work. By hanging the return rope pulley from a boom in the upper subdrift and mounting the "Little Tugger" on the haulage level, the broken ore could be scraped down off the foot wall

without trouble and without exposing any of the workmen to danger by working in the open stope. In many other of the so-called "gravity systems" there are places where scraping might be employed to advantage.

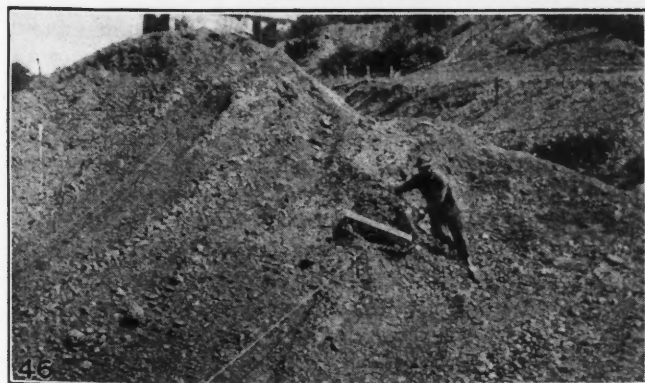
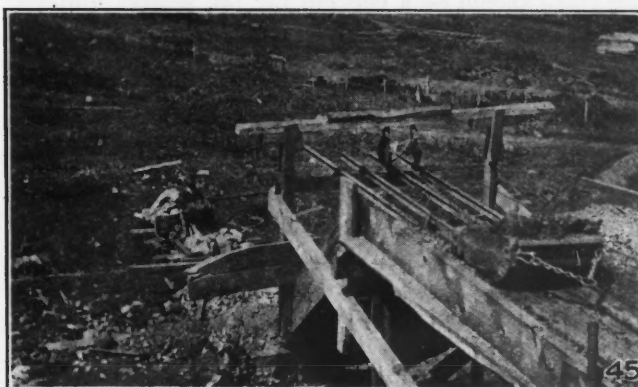
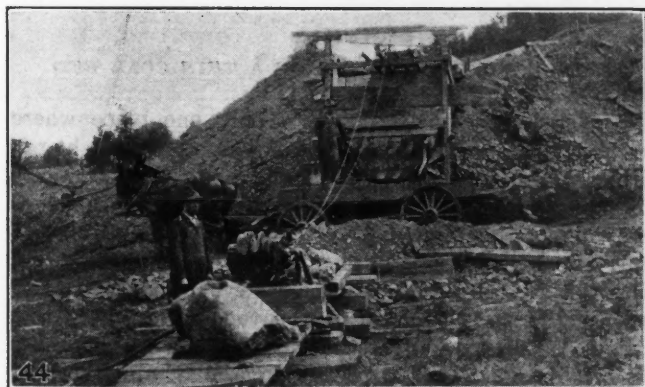
SCRAPING AS APPLIED TO GRAVITY SYSTEMS

In some of the room-and-pillar shrinkage-stope systems, the pillars are removed by top slicing after the stopes on each side are worked out and filled. The pillars are usually narrow, generally not more than 25 ft. or more than two or three sets wide. Raises are put up at one end of the pillar, and the ore broken in the slices is trammed to them. Most of the ore broken here could be handled by scrapers. (Fig. 42.)

The branch-raise block-caving combination such as is employed at the Inspiration copper properties at Miami, Ariz., and other mines offers many opportunities for the use of the scraper. Much of the development work is done after the raises are up, making short hauls necessary to get the ore from the breast of the sublevel opening into the raise. Especially in the blasting sublevels is this true, the blasting drifts being driven on 25-ft. centers, with raises coming up into the floor of the drifts at about the same interval as shown in Fig. 43.

Many other examples of the application of the scraper for use in underground operations could easily be found. The possibilities for the use of these machines by contractors and others handling the smaller grading and excavation jobs were recently demonstrated at a mine on the Gogebic Range where grading was considered necessary in enlarging the area of the stockpile ground. It was decided to fill in the depressions in the area affected rather than level it by the usual method—i.e., with teams and scrapers.

A small loading pocket of about 1 cu.yd. capacity was



THE USE OF SCRAPER SYSTEMS ON SURFACE

Fig. 44—Hauling scraper for loading wagons.
 Fig. 45—Scraper bringing load to dump over loading pocket.
 Fig. 46—Scraper in operation.

Fig. 47—Returning empty scraper. Note method of hanging sheave blocks from scaffolding that has been built on the edge of embankment.

erected at the foot of one of the waste dumps, and arranged so that an ordinary wagon could pass under the chute apron. A 6H "Little Tugger" was mounted on a weighted frame set up about 30 ft. in front of the pocket, the ropes being led through guide sheaves hung from a frame above the chute. (Figs. 44, 45, 46, and 47.)

The tail-rope sheaves were carried on a frame set up in the dump at a point about 75 ft. to the rear of the pocket, and additional sheaves were hitched to ropes attached to points on the bank, making it convenient to change the path of travel of the scraper, which was one of those used in the underground workings. Rails were laid over the top of the pocket for the scraper to ride on, and air was furnished through one of the water lines which passed close to the water pile.

Six men were employed on the job. Two men worked at the stockpile ground, spreading and leveling with shovels the material dumped from the wagons, and two teamsters and teams, and two men at the waste pile handling the hoist and scraper. The scraper haul averaged about 50 ft.; the wagon haul about 1,000 ft. Results showed that the men handled an average of 100 yd. of the material daily at a cost of a little less than 33c. per yd.

Although this showing is not remarkable as compared to similar operations on a larger scale, it is still a great improvement over work done by hand labor, and serves to indicate the possibilities in other operations such as gravel pits, small excavations, grading jobs, and the like.

In the coal fields the larger scraper units are already established. Their rather high first cost and excessive bulk and weight are the principal disadvantages which preclude their use in many properties. This indicates that there should be a demand for the smaller unit.

COAL MINING OFFERS FIELD FOR SMALL-UNIT SCRAPER SYSTEM

In mining the thin coal beds, a common method is to break roof or bottom rock to make room for the passage of the mine cars through the rooms or chambers, as shown in the section A-A, Fig. 48. In a block of coal 1,000 ft. square, with entries spaced at 300 ft.—

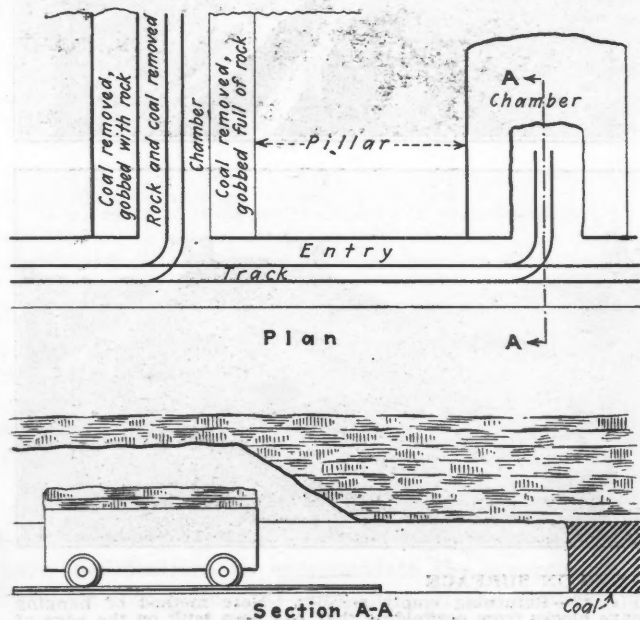


FIG. 48. ROOF REMOVED ON MINING THIN COAL BEDS

the usual distance—and the rooms spaced on 50-ft. centers, this method requires breaking and stowing away the material from about 24,000 linear feet of rock work.

The system of "buggy mining" is employed in many of the mines working thin beds, to avoid doing so much rock work. Here a small low car or "buggy" is run on a light temporary track laid on the floor of the rooms. Bottom rock is taken up in the entries only, the coal is shoveled into the buggy at the face of the room, and the load pushed to the entry and transferred to the mine cars as shown in Fig. 49.

In visiting a number of mines where the buggy min-

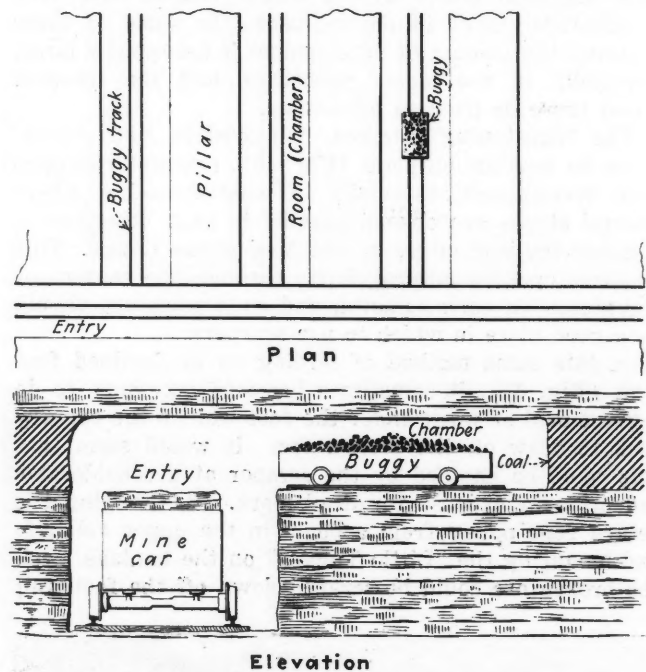


FIG. 49. "BUGGY" MINING ON A THIN COAL BED

ing system is employed, I saw only one place where arrangements were made to permit dumping the buggy directly into the car. The usual practice seemed to be to shovel from the buggy into the car. In some mines the buggy was dumped so that the coal fell on the entry floor at the side of the car and was then shoveled into the car. In another mine a clever dumping device was placed at the mouth of the room, the buggy was hoisted and lowered over the inclined floor of the room, by means of a 1H "Little Tugger" hoist, and the load fell on the entry floor, so that it had to be handled all over again to load it into the mine cars.

DISADVANTAGE OF LONG TRAVEL

By this method of mining the operators have stopped the rock work in the rooms, thereby reducing by about 80 per cent the amount of rock work required by the old method. The inefficiency of the buggy mining as conducted is apparent, and undoubtedly could be improved upon by the scrapers. The principal disadvantage is the amount of traveling the men are compelled to do in constricted quarters. That a scraper will go in and get the coal faster than men can shovel it has already been proved. The main disadvantage in the use of the large scraper units lies in the fact that the layout requires that the rooms be of great length, and the men have to crawl through them on their hands and knees. At one of the mines which I visited, it was

noticed that rooms were lying idle after having reached considerable length because men could not be found to take the contracts under the conditions mentioned.

Though modification of the system would be required to some extent to permit the use of the small scraper units, it is believed that this could be done profitably.

The present method is to start a series of rooms off an entry, and as the rooms reach the required length a parallel entry is driven to intercept them. By driving the two entries simultaneously, and opening the rooms in both directions from the entries connecting them in the center of the pillar, as shown in Fig. 50, it is probable that efficiency could be greatly increased. The length of room through which the men would have to travel would be decreased 50 per cent; one of the small scraper outfits could be set in the entry to handle the coal from two opposite rooms, and the number of points of attack would be increased. This should not inter-

that the wide-awake mine operator cannot well afford to overlook the possibilities provided by such a simple and inexpensive means of increasing the efficiency of his operations.

Mining Properties in Mexico

Few countries in the world have such extensive mining properties as Mexico. According to the latest statistics published in the *Boletín Minero*, the official organ of the government, the number of mining properties in Mexico up to July 31, 1921, was 27,350, with a combined acreage of 906,910.2. This amount is 0.0017 of the whole area of the country. The mining properties are distributed in the various states of the republic, as shown in the following table. Sonora, Chihuahua, and Durango have the largest proportion of mining properties.

EXTENT OF MINING PROPERTIES IN MEXICO UP TO JULY 31, 1921

States	Number of Properties	Extent in Acres
Agascalientes	199	2,532.5
Lower California	793	20,160.8
Coahuila	547	14,200.8
Colima	35	2,552.5
Chiapas	28	1,371.4
Chihuahua	4,153	136,495.0
Federal District	2	27.7
Durango	2,689	69,640.1
Guanajuato	1,174	35,870.5
Guerrero	1,037	42,059.2
Hidalgo	1,351	45,278.0
Jalisco	1,831	42,586.4
Mexico	855	28,377.0
Michoacan	618	43,962.7
Morelos	55	2,463.6
Nayarit	389	8,816.9
Nuevo Leon	1,078	30,257.7
Oaxaca	1,495	32,293.4
Puebla	261	18,284.0
Queretaro	180	4,919.7
San Luis Potosi	682	20,126.7
Sinaloa	1,470	32,945.2
Sonora	4,311	213,762.5
Tabasco	2	9.9
Tamaulipas	148	4,815.9
Tlaxcala	4	24.7
Vera Cruz	92	4,499.7
Zacatecas	1,871	48,560.4
Totals	27,350	906,910.2

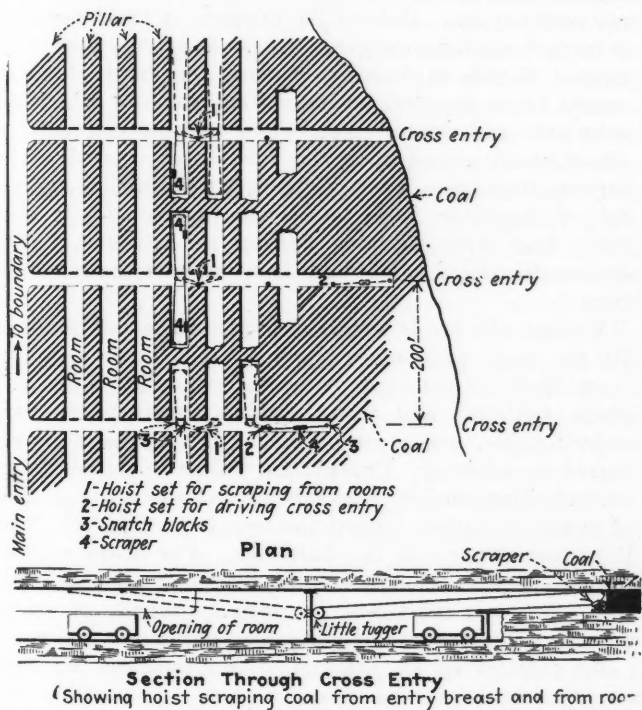


FIG. 50. SUGGESTED LAYOUT FOR SCRAPING THIN COAL

ferre with ventilation, nor with the requirements for a layout that would protect the surface. Furthermore, cutting down the working length of the rooms would have a valuable psychological effect on the men.

The scrapers can be used in many places to replace buggy mining, and also in driving the entries, by setting up the scraper to remove the coal ahead of the rock work, instead of shoveling the coal back 15 or 20 ft. and handling it at least twice, as is now the custom.

Scrapers for use in handling coal most efficiently will undoubtedly have to be markedly different from those handling ore and rock. The problem in handling coal will be in the disposing of bulk rather than weight. Such a plan must be developed at the particular mine involved, although it should present no great problem. The box scraper slightly modified should do the work in a satisfactory manner.

The use of the scraper has not reached such a stage of perfection that it can be termed a "cure-all," but it offers distinct advantages over hand methods. These advantages are so obvious and so well demonstrated

Smelting of Gold Precipitates on the Rand

In a review of gold metallurgy in South Africa, F. Wartenweiler, the new president of the Chemical, Mining and Metallurgical Society, makes the following comments:

"No innovations have been introduced in recent years into refining and smelting on the individual mines. The large refinery erected near Germiston by the Chamber of Mines for the purpose of refining the gold output of the Witwatersrand by the chlorine process is about to operate, and will be interesting to technical men.

"Acid treatment of the gold-zinc slime from precipitation remains general practice, although with the precipitation improvements referred to this will possibly be discontinued. Subsequent calcination and pot smelting or reverberatory lead smelting is the practice, according to preference or works convenience. Small blast furnaces are found useful for smelting byproducts on the larger mines. For others the Witwatersrand Co-operative Smelter, a most excellent institution, fills all requirements. The treatment by cyanide of the 'black sand' or pyritic byproducts from amalgamation has received considerable attention and is well established.

"Periodically, schemes for utilizing the zinc sulphate liquor, now wasted, are brought forward. Many of them are ingenious and have undoubted merit, and I confidently look forward to an economic utilization of this liquor."

CONSULTATION

Ability of Explosives To Withstand Low Temperatures

"Please give me the most complete information you can in regard to the following questions: What is the lowest practical temperature for the use of various grades of mining explosives known as low freezing, extra gelatine, gelatins, extra, blasting gelatin, Judson and permissible powders?"

To obtain first-hand information from specialists in the use of these explosives, we have communicated with a powder manufacturer, who informs us that it is impossible to state accurately to how low a temperature high explosives can be exposed without becoming insensitive. This is because of the peculiar behavior of nitroglycerine, the active constituent of dynamite. Sometimes, according to this informant, an ordinary high-freezing nitroglycerine will not freeze when subjected for weeks to 0 deg. F. or lower temperatures, and another lot made in exactly the same way, as nearly as the manufacturer is able to judge, may freeze in half an hour at 47 or 48 deg. F. No one has been able to find out just why this condition should maintain.

Low-freezing nitroglycerines, according to the same manufacturer, are not susceptible to cold, and when on their worst behavior do not freeze on their first trial at temperatures higher than 32 deg. F. and are not likely to freeze for several days at that temperature. Their weak point, however, is that after they have been frozen and thawed, they may freeze on the next test at about the same temperature as the high-freezing members of the explosives group congeal.

The same facts apply generally to the high explosives that contain nitroglycerine, although the low-freezing gelatins usually do not freeze either as quickly or at as high a temperature as the low-freezing "straights" and "extras." Low-freezing gelatins, low-freezing blasting gelatins, and low-freezing extra gelatins rank together in this respect, and are followed by the permissible explosives, the straight dynamites and the extra dynamites in the order given.

Although the nitroglycerine in Judson 5 per cent powder may freeze, it is such a small part of the explosive ingredient that even if it does the powder is not insensitive, and can really be classed as non-freezing. The Judson 10, 15, and 20 per cent powders, however, rank in resistance to cold with the low-freezing permissible.

Time is as important a factor as temperature in considering the freezing properties of explosives containing nitroglycerines. Whereas some varieties may freeze in a relatively short time after being subject to a temperature of, say, 20 deg. F., others resist this temperature for a week or more without freezing. The manufacturer consulted claims that the use of his non-freezing explosives is the solution to these difficulties. Although they are not as water-resistant as the gelatins, and give off more fumes on detonation, they are equal to the extras in both properties and are superior to the straights in the quality of fumes evolved.

Chemical Manganese Ore

"Will you please inform me what specifications are required of manganese chemical ore suitable for battery use? I would like to have a typical analysis."

The requirements that must be met by manganese ores used for the manufacture of dry batteries are exceedingly rigid. The important constituent is manganese dioxide, and the available oxygen is the important part of this constituent. Theoretically, manganese dioxide contains 63.21 per cent manganese and 36.79 per cent oxygen. Half of the oxygen, or 18.38 per cent, is termed available oxygen. Occasionally very pure manganese dioxide is found in nature, but in most occurrences there are various impurities, some of which are injurious and others inert. The limiting percentages (maximum) placed upon the substances classed as injurious impurities are: Copper, 0.025; nickel and cobalt, 0.10; silver, 0.04; total iron, 1.50; magnetic iron, 0.50; lead 0.06; nitrates figured as nitrogen, 0.005; carbon dioxide, 2. The total iron includes the magnetic iron.

Usually the ore is required to contain a minimum of 70 per cent manganese dioxide. Good ore contains from 92 to 97 per cent manganese dioxide. Lead sulphide (galena) and iron sulphide (pyrite) are very objectionable, and must be picked out by hand or removed by washing. Phosphates, unless in soluble form, are not objectionable. Too much iron lessens the amount of available oxygen, and if the iron is in magnetic form it causes gassing in the batteries. For these reasons limits are placed on the total iron and the magnetic iron. Silica is inert, and its presence merely serves to cut down the amount of available oxygen.

An example of an analysis of Montana ore follows:

	Per Cent		Per Cent
Available oxygen	13.78	Nickel	None
Manganese dioxide	74.90	Nitrates	None
Iron	0.764	Chromium	None
Copper	0.005	Lead	0.04
Phosphorus	0.06	Carbon dioxide	1.20
Water	8.05	Silica	11.3

Chemical manganese ores are shipped in closed cars to prevent contamination, and are sampled as the ore is unloaded by taking a small shovelful from each wheelbarrow, giving a sample of approximately 150 lb. This is crushed if necessary, mixed, and quartered down to 35 lb., which is crushed to $\frac{1}{4}$ in. size and quartered down to 200 gm., which is used as a moisture sample, being dried overnight at 110 deg. C. The sample is ground to 120-mesh, and the chemical determinations are made upon portions of it in the usual way.

As the ore is sold, it may be in lumps or fine particles. If necessary to subject it to cleaning processes, it will usually be marketed as ore particles from $\frac{3}{8}$ to $\frac{1}{2}$ in. in size and smaller. As the ore is sold in guaranteed content and percentage limit of impurity, sampling and careful analysis are especially necessary.

Important amounts of this ore are produced in the Phillipsburg district, in Montana, from which point it is shipped to manufactories upon the Pacific Coast. Japanese and Chinese shippers offer favorable guarantees, but are unable to gain any share of the market.

HANDY KNOWLEDGE

Recent Developments in Mine Ventilation

BY GEORGE S. RICE

Written for *Engineering and Mining Journal*

The U. S. Bureau of Mines has been informed by S. de Smidt, deputy mine inspector in the Department of Mines and Industry in South Africa, regarding some recent methods used in the Rand mines for improving ventilation and laying rock dust, which has been so serious in the past in the production of miner's consumption. Mr. de Smidt points out, however, that one problem that is so serious in some of our deep mines, as at Butte, namely, high temperature, does not prevail in the Rand mines, where the temperature gradient is quite low, there being only one degree rise for every 230 to 240 ft. increase in depth. The air temperature in the deeper mines, 4,000 to 5,000 ft. deep, is under 80 deg. F., and it is expected that even in the City Deep mines, which will reach 7,000 ft. in depth, it will not be over 86 deg. F. The mines being practically dry, there is no difficulty as to humidity in the use of water for laying the dust.

Water drills are used universally, and operators are now beginning to attain such refinement in practice that they are discriminating as between different water drills in the matter of dust production. The kata-thermometer has been generally adopted as giving an index of the comfort of the men so far as temperature, air current, and relative humidity are concerned.

One of the most interesting points suggested by Mr. de Smidt is the introduction of a new type of pipe for ventilating headings which appears to have great advantages over the use of either galvanized iron or cloth pipes. This is a reinforced concrete pipe made in 6 and 8-ft. lengths and 1 in. thick for 12-in. pipe. It is made in plain cylindrical form, using wire mesh as reinforcement. The interesting feature is the employment of sleeves for the joints. These are about 4 in. long, and cover the joint between the lengths. Soft clay is pressed into the joint.

The method of construction adopted has the advantage that the sleeves permit a gradual bend in the line and special curved shapes can be made. The pipe that is used in South Africa is laid on the floor, which again presents advantages, as if there is any likelihood to falls from the hanging wall, the pipe can be covered with loose material so that small pieces will not break it. The greatest advantage, however, is that when blowing in cool air the air does not become heated in passing through a long length to a hot level, the concrete being a poor conductor; and if conditions favor the exhausting of the air through the pipe when gases are given off at the face, either from the strata or from blasting, the concrete pipe is better than long lengths of cloth pipe.

As such pipe cannot be brought as close to the face as cloth pipe (in South Africa it is brought within about 50 ft.), a movable length of cloth pipe can be fastened on the end and brought up to the face, as is now done in the Butte mines. Were it advisable to use this for exhaust purposes, the cloth could be reinforced by ribs.

Neighborly Chats With the Foreman— Timber Waste

BY DUNCAN MACGREGOR

Written for *Engineering and Mining Journal*

Your memorandum, Jim, about excessive timbering costs has given me some trouble, and I'm a little doubtful as to whether I can give you much real help. However, there's one thing that you ought to do first: Find out where the timber is going—that is, what parts of the mine and kinds of work—and then make systematic observations upon the condition of the standing timber in each part of the mine—shafts, drifts, crosscuts, stopes, and raises. Keep your notebook busy and record your observations from day to day. You can't put much time upon this during your shift, but you can get a little additional information each time you make your round. Have your timber bosses keep records of the timber going into each level. Note, also, the kind of ground in various parts of the mine. You know the length of time timbers have been in place in different parts of the mine.

Gathering this information will put your mind more sharply upon the conditions affecting the support of the workings. Talk the subject over at intervals with the mining engineer, and get his opinion upon the most suitable sizes of timbers and details of timbering required for your worst conditions. Get his assistance to prepare drawings of standard timbering for different workings. Insist upon the simplest framing, so that the labor for preparation and the wastage in cutting will be a minimum.

Discuss with your shift bosses the practicability of reducing the timber sizes or increasing the spacing between sets for the different kinds of ground, and where a change looks feasible, make it and then watch the results. Don't make too many changes in the prevailing practice all at once, but do it a little at a time, and by giving a reasonable time interval you will know whether your judgment has been good or bad. I have noticed among practical men a great tendency to use large timbers where much smaller ones would answer equally well. Undoubtedly there has been great waste in mining from this cause. Intelligent observation will enable closer discrimination to be made as to the suitability of timber sizes. There are no hard or fast rules that can be laid down, as the conditions in each mine are different. Your close study of the existing conditions in the mine is of far greater value than any book of rules.

Economy begins in the careful selection of timber sizes. Next is the simplification of your kinds of timbering. This will enable the timber shop to plan the quantity production of the pieces required and will enable you to do a minimum of cutting and framing underground. Doing this work underground, you are using the time of your timbermen to disadvantage, as the space is restricted, the light poor, and hand tools must be used, and there is a greater liability to accidents. The work of the timber gang should be restricted almost entirely to erection. To attain this end

you should get the engineering departments to work up your standards thoroughly. Charles A. Mitke's little book, "Standardization of Mining Methods," is worth a considerable amount of study, as it will suggest specific things to you.

You ought to get interested, also, in the application of gunite underground. You know how much trouble you had in the long crosscut on No. 10 level. As I remember it, both you and your superintendent decided to timber it throughout. It occurs to me that there was practically no ground movement, and most of your trouble was caused by the action of the air and moisture of the rocks. Your men were always complaining about pieces flaking off, and then you had the whole crosscut timbered. This was all right at the time, but if you could have put an air-tight skin on that exposed rock you would have saved some money and would have made a permanent job. When you open up that crosscut on No. 12 level, you ought to interest the superintendent in trying out gunite. Gunite can't be used where you have heavy ground pressure due to moving ground. It's of no value except in your permanent openings, and in these only where there is no ground movement and the wall rocks show atmospheric action. If you had an outfit you could fireproof your worst stations.

The condition in your lowest stopes is exceedingly troublesome. You can avoid excessive timber breakage for a time by using more headboards, but you had better interest the superintendent in deciding upon an active campaign of waste filling. This is the only way you can minimize ground movement. As you say, the ground movement is becoming more pronounced, and you are using larger and larger timbers without much improvement. This increase of ground movement is a natural consequence of increasing the amount of open stope work. Your only remedy is systematic filling.

Relining a Hardinge Mill

BY JOHN DIXON

Written for *Engineering and Mining Journal*

On relining the 8 ft. x 30-in. Hardinge mill at the Kirkland Lake Gold Mines, Kirkland Lake, Ont., it was found that a large proportion of the liners were not worn sufficiently to be thrown away, but that the rest were worn through in places. If the whole lining were scrapped there would have been a serious waste of material, and if the partly worn liners were taken out and used again there would have been the double trouble of taking them out and replacing them, whether they were used as part of a new lining or saved until the mill could be relined entirely with partly worn liners. Also, it was necessary to open the mill periodically to observe the condition of the lining, to avoid the risk of wearing the shell. The following procedure was therefore adopted:

Every two weeks the mill is stopped with the rising manhole slightly above the center of the mill. This door is then removed and the work of replacing the badly worn liners is started without emptying the mill. The mill is lined with the standard Harding wedge and plate liners. The liners that are out of reach are left until the mill is turned further, but all the worn liners just above the ball level are replaced. If a wedge is badly worn, the bolts are loosened, the wedge is removed and a new one is put in place and bolted to the shell. If a plate is worn sufficiently, the wedge above it is removed, allowing the plate to be taken

out. A new plate is put in, and the old wedge replaced.

After all the badly worn liners have been replaced that can be conveniently reached from the first position of the mill, the mill is turned by power to expose two or three more rows of liners. The liners in the rows newly exposed are then replaced, where necessary, together with those brought within reach from the top on the opposite side of the mill. The operation is repeated until the open door is as low as possible without spilling balls and slime. The door is then replaced and the opposite manhole is brought slightly above center with the mill turned 180 deg. This door is removed and all remaining liners are changed.

Three men work together on the job. One man works outside, loosening and tightening bolts. One man works inside, removing and replacing liners, and one man helps, inside or out as needed. From five to twenty liners are replaced every two weeks, with an average of ten. From five to nine hours are required to complete the job. Though this scheme is of particular advantage in the Hardinge mill where there is considerable variation of liner wear in different sections of the mill, it could also be used in other mills.

Examining Minerals in Ore Pulp

BY ALFRED T. FRY

Written for *Engineering and Mining Journal*

In *Engineering and Mining Journal* of Aug. 20, 1921, on page 283, R. E. Head describes a method of preparing microscope slides by dropping the mineral to be examined into molten wax, where it settles to the bottom. After cooling, the piece of wax is cut, polished, and etched if necessary.

This may suit a man who has the necessary apparatus, but by the more numerous unfortunates who are miles from such gear, and whose time would not permit its use if the means were at hand, the above description will scarcely be appreciated as it should. There is a possibility, also, that heavier particles may settle to the bottom of the wax first, leaving lighter ones to follow, so that it may be necessary to cut vertically.

Recently a friend demonstrated to me the use of the Kotze konimeter, the essential of which is the impingement of dust particles on to a film of vaseline, where they are caught and examined at leisure by the aid of the microscope. I have used a modification of the method for examining some powders such as feed, concentrate, and tailing, in the following way:

Smear an ordinary glass slide with vaseline by putting a small quantity toward one end. Then with a quick stroke of a glass rod held closely against the slide, the vaseline is spread in a thin even film. Have a small heap of the sample to be examined and press the greasy side of the slide lightly on the powder. Then shake off the non-adherent portion. It is preferable sometimes to have only a dusting of sample on the slide rather than a thick layer. It will be found on examining this slide, with the glass side up toward a low-power microscope, that the particles are in one plane practically and very easy to observe.

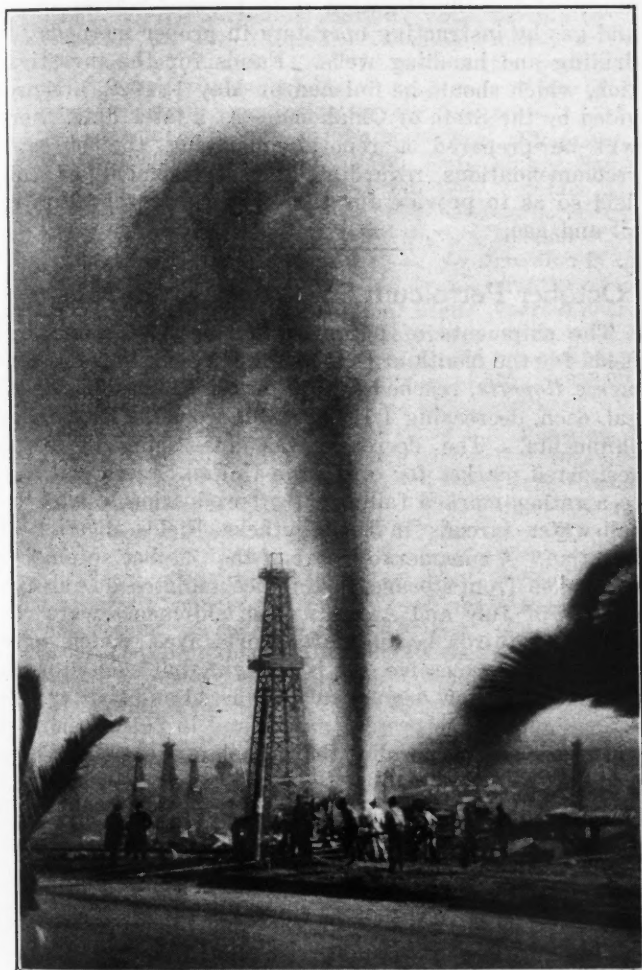
By gluing a strip of card at each end of a white card about the same size as the slide, a white background is provided which does not come in contact with the patch when the slide is rested on it for examination. As only small patches are necessary for observation, feed, concentrate, and tailing from a single machine can be accommodated side by side on the same slide.

THE PETROLEUM INDUSTRY

Snuffing a Burning Oil Well

Recently an unusual method was adopted to extinguish a burning oil well at Long Beach, Cal. The Martin No. 1 well of the Shell Co., at Signal Hill, had been cemented at a depth of 2,640 ft. for about three days when an explosion took place, and the escaping gas became ignited. This is the first time in the history of California oil developments that a well had blown out after having

near to the well to place the stand, it was necessary for two of the men, Ford Alexander and George E. Oliver, to wear asbestos suits, which had been brought by R. H. Clausen, an engineer of the H. W. Johns-Manville Co., from Los Angeles. While Alexander and Oliver were carrying the explosive, Clausen was looking after possible entanglements of the exploder wires, and as soon as the stand was in place and the powder placed thereon the charge was exploded by battery.



MEN LAYING TEMPORARY PIPE TO MARTIN NO. 1 WELL, LONG BEACH, CAL., WHICH WAS RECENTLY ON FIRE AND WAS EXTINGUISHED IN AN UNUSUAL MANNER



FORD ALEXANDER CLAD IN THE ASBESTOS SUIT WHICH HE WORE WHILE PLACING DYNAMITE, WHICH, WHEN EXPLODED, EXTINGUISHED THE BURNING WELL

been cemented. The plug had been setting for several days when the gas worked itself through the space between the 10-in. and 15-in. casing, and came out with such force that no ignition took place until the gas had come in contact with the oxygen at a point about 12 ft. above the point of discharge.

Attempts to smother the flame with steam and mud flow were unsuccessful, and it was then decided to make use of dynamite. Accordingly, a stand, about 7 ft. high, was incased in asbestos, and on this it was proposed to place 100 lb. of 80 per cent gelatin dynamite, wrapped in asbestos paper. To approach sufficiently

The explosion served to extinguish the flame, but did not shut off the gas flow. Additional boilers had been set up and a line of pipes was laid. Through this a stream of steam and mud was directed into the hole with the intention of filling it up and thus choking off the gas. For several hours the mixture poured into the well was shot out about as fast as it was poured in, the pressure from below producing an effect not unlike that of a geyser. It was not until three days' work with the steam and mud that sufficient stoppage was produced completely to shut off the gas. The well has probably been lost and must be redrilled.

Recent Patents

Chloridizing Lead Ores—No. 1,396,740. S. Ganelin, Brooklyn, N. Y. The process covers the treatment of complex lead-zinc sulphide ores. A metal chloride is added to the ore, in amount corresponding to the sulphide of lead present (as well as any arsenic and antimony) and the mixture is charged to a mechanically rabbled furnace. The lead chloride which forms is then leached out and the lead recovered as metal. Precautions are taken to prevent a reaction between the metal sulphides present in the furnace product and the lead chloride.

Metallurgy of Vanadium—No. 1,396,922. A. H. Carpenter, Sawpit, Col., assignor to the Colorado Vanadium Corporation, Sawpit, Col. A process of recovering vanadium from its ores and compounds, comprising mixing the ore or compound with sodium chloride, a relatively stable alkali-metal salt, and a sulphur-containing material, and roasting to transpose the vanadium compound to one soluble in water.

Metallurgy of Molybdenum — No. 1,399,554. E. M. Hamilton, San Francisco, Cal., assignor to Hamilton, Beauchamp, Woodworth, Inc., San Francisco. The ore or concentrate is ground, mixed with water and with a non-volatile alkali metal to form an alkaline pulp, and the pulp is then heated to convert the molybdenum into a soluble compound. The pulp is then filtered and the molybdenum recovered.

Flotation Machine — No. 1,399,539. H. H. Bonnell, Denver, Col. A V-shaped cell in which the pulp is admitted through a submerged tube, carried up one side of the cell, and allowed to flow over an apron plate, after which the froth is removed and collected.

Cyanide Process—No. 1,399,458. J. C. Haun, Tonopah, Nev., and A. Silver, San Francisco, Cal. The ore is subjected to the action of a solution containing a cyanide, a bicarbonate, and a lead compound capable of combining with the sulphur of sulphides.

Metallurgy of Vanadium—No. 1,399,246. W. F. Bleeker, Boulder, Col., assignor to the Tungsten Products Co., Boulder, Col. The process consists in mixing the ore with an alkali-metal carbonate and water, heating under pressure to a high temperature, separating the alkaline liquor from the product, treating the residue with an acid, separating the acid liquor by filtration, and removing vanadium carrying slime from the residue.

Hydrometallurgy of Zinc—No. 1,399,020. F. E. Lee, A. L. McCallum, and S. G. Blaylock, Trail, B. C., assignors to the Consolidated Mining & Smelting Co., Montreal, Que. A process for treating zinc ores, concentrates and residues, which consist in oxidizing the zinc compounds, extracting the soluble zinc, and heating the residue in a sulphating atmosphere to convert the remainder of the zinc into soluble compounds. A flow sheet is shown.

Flotation—No. 1,397,703. H. R. Robbins, Washington, D. C., assignor to Metals Recovery Co., New York. In the flotation treatment of copper sulphide ores the patent covers the use of a non-alkaline salt without organic frothing agent.

Cyanide Process—No. 1,397,684. A. W. Hahn, New York. Before the addition of zinc to the pregnant solution, a chemical is added that will be acted upon by the zinc to liberate hydrogen and precipitate the precious metal. The advantage is claimed of not consuming free cyanide present in the solution.

Dry Ore Concentrator—No. 1,397,749. A. W. Tyler, Los Angeles, Cal., assignor to Walter Young, Los Angeles, Cal. The patent covers a table having a perforated ore-supporting surface, means to blow air upwardly through the perforations, and means to move a portion of the table in an elliptical path.

Flotation—No. 1,398,989. E. W. Wilkinson, San Francisco, Cal., assignor to Minerals Separation North American Corporation, New York. An organic substance is subjected to partial decomposition in the presence of free oxygen, and the mixed volatile products of such operation are mixed with the ore pulp along with another gas, to produce a mineral-bearing froth. A second patent, No. 1,398,990, covers much the same process.

Roasting Furnace — No. 1,399,046. F. J. Bowman, Cleveland, Ohio, assignor to the Graselli Chemical Co., Cleveland, Ohio. A roasting chamber having a plurality of triangular heated elements, with means for introducing finely divided ore and oxygen.

Patent Index—The U. S. Patent Office, Washington, D. C., has issued a 1,315-page book containing a list of all the patents issued in 1920, arranged alphabetically by patentees and by inventions.

Book Reviews

Handbook for Field Geologists. By C. W. Hayes, Ph.D. Third edition. Revised and enlarged by Sidney Paige, U. S. Geological Survey. Flexible binding; 4½ x 6½; pp. 166; Figs. 22. John Wiley & Sons, Inc., New York, 1921. Price, \$2.50.

This useful and handy little volume has been standard since first published, in 1908, by the late Dr. Hayes. It is essentially a manual for young professional geologists, notably those in the Federal geological survey and shale surveys; also for geological work in connection with universities and other institutions, and for students. It is not a prospector's guide, nor even a treatise on economic geology. It describes the technique and field and office methods of the professional geologist. It is compact, valuable, and accurate, and the publication of a new edition demonstrates the fact that there is a permanent field for it.

Technical Papers

Copper Leaching—The Pechey copper-leaching process employs sulphurous acid for reducing ferric sulphate to the ferrous form. It has been used at the Mount Hope copper mine, in New South Wales, and was recently described in a government report issued by T. Blatchford, assistant state mining engineer. Mr. Blatchford's description is abstracted in the November issue of *The Mining Magazine*. (Salisbury House, London Wall, London, E. C. 2, England; price, 1s. 6d.) The ore, averaging 6 per cent copper in the form of carbonates and oxides, is leached with sulphuric acid, and the resulting solution passed through so-called pyritic filters. These are vats with false bottoms on which is placed pyritic ore. The solutions from the pyritic filter are passed over scrap iron, forming a precipitate containing about 70 per cent metallic copper.

Western Australia—The 1920 report of the Department of Mines of Western Australia is now obtainable from the Under Secretary for Mines, Perth. The report contains over 200 pages and gives a complete account of mining activities during the year. A map of the territory drawn to a scale of four miles to the inch is included.

Powdered Coal — "The Preparation, Transportation, and Combustion of Powdered Coal" is the title of a 131-page bulletin recently issued by the Mines Branch, Department of Mines, Ottawa, Canada. It may be obtained on request. The book is well written, and all who are interested in the subject will find it worth while to procure a copy. The information given has not been obtained from research work at the government laboratories, but, in the opinion of the author, John Blizard, such research work would have valuable results in increasing present efficiencies. Manufacturers and power-plant operators in the United States and Canada were the source of most of the data.

Mining Methods—The Nov. 30 issue of the *Salt Lake Mining Review* (Salt Lake City, Utah; price, 15c.) contains a three-page article entitled "Methods of Mining at the Highland Boy Mine of the Utah Consolidated, Bingham, Utah." The method of mining employed consists of overhead square-set stoping and subsequent filling.

Mining in Chile—"A History of Mining in Chile" occupies seven pages in *The Mining Magazine* for November. (Salisbury House, London Wall, London, E. C. 2, England; price, 1s. 6d.)

Mineral Resources—Recent additions to the "Mineral Resources" series published by the U. S. Geological Survey include: "Gold, Silver, Copper, Lead, and Zinc in California and Oregon in 1920," thirty-six pages; and "Natural Gas Gasoline," fourteen pages. Either may be obtained on request to the Survey at Washington, D. C.

Petroleum Investigations by the U. S. Bureau of Mines

At the Petroleum Experiment Station of the Bureau of Mines at Bartlesville, Okla., an investigation of pipeline losses from evaporation on the trunk pipe line of the Gulf Production Co. has been completed. In the course of the investigation a large number of samples of both oil and gas were collected and analyzed and the evaporation loss calculated. A similar investigation has been started on the main line of the Sinclair Pipe Line Co., and a series of tests similar to those conducted at the measuring stations of the Gulf pipe line will be carried out.

A series of tests has been conducted at the Bartlesville Station to determine pressures developed in tank cars containing natural-gas gasoline of 8 lb. vapor tension, which tests were supplementary to an investigation conducted at Drumright, Okla., on natural-gas gasoline of 10 lb. vapor tension. These tests are being conducted for the purpose of finding out the difference in hazard in handling gasoline of 8 lb. vapor tension as compared to that allowed by the regulations of the Bureau of Explosives. Arrangements have also been made for determining the temperatures and pressures that are commonly developed in insulated and non-insulated tank cars in transit and under general temperature and traffic conditions.

An investigation is being conducted to determine the effect of regulated back pressure on the production of oil. The tests are being made at two wells on the lease of the Osage Development Co. in Osage County, Okla. Results to date indicate that there is little difference between the production of the two wells against a back pressure of 30 lb. compared to a back pressure of 15 lb., but it is possible that there will be a noticeable difference at the lower pressures.

At the Pittsburgh Experiment Station a study has been made of viscosity temperature curves of fractions from Mid-Continent and Gulf Coast crude petroleum. Preliminary work has been started on cracking by means of high tension electric discharge. A study has also been made of analytical distillation of unblended casinghead gasoline, and of the oxygen bomb method of determining sulphur in petroleum.

At the Boulder, Col., field office, in the course of the oil-shale investigations, runs have been made with a large horizontal retort in which the highest yields and the best oils thus far produced were obtained. Changes in the retort have made its control much more effective than in the past. Recent work apparently indicates that oil yielded by a horizontal retort is not of as high quality as that which is recovered from retorts of the vertical type.

Experimental refining of shale oil at the Boulder office indicates the extreme difficulty of securing white refined products from shale oil without excessive losses, although oils of a somewhat darker color can be obtained with much smaller losses, and these apparently do not change color with age. The work has also indicated the value of using dilute reagents in the refining and the probability that commercial shale oil products will never be of as good color as present-day petroleum products. Lubricating oils of satisfactory color and viscosity have been obtained, but only at the expense of an excessively higher refining loss.

Work is being continued at the Boulder office on elementary analyses of oil shales. In making combus-

tion analyses of the shales and their products, the bituminous matter of the shale, when freed from the inorganic matter, takes up water very rapidly, and much care has to be exercised that the sample does not gain moisture during the weighing period or while being transferred from the balance to the combustion tube. Very good check determinations have been made, however, and it can now be considered that the combustion problem has been solved. Samples of representative shales from different parts of the country have been received in connection with the investigation now progressing.

A study of the underground conditions in the Slick oil field near Bristow, Okla., has been undertaken by F. X. Schwarzenbek, assistant petroleum technologist, and J. H. Cable, assistant petroleum engineer. The object of the investigation is to prevent wastes of oil and gas by instructing operators in proper methods for drilling and handling wells. Funds for the investigation, which should be finished by May 1, 1922, are provided by the State of Oklahoma. At a later date, there will be prepared a report embodying the bureau's recommendations regarding the development of this field so as to provide for the effective conservation of oil and gas.

October Petroleum Shipments From Mexico

The shipments of petroleum from the Tampico oil fields for the month of October, 1921, according to *Commerce Reports*, reached a total of 16,052,589 bbl., of 42 gal. each, decreasing 1,154,537 bbl. from the September shipments. The decrease was due primarily to a restricted market for oil in the United States and also to a rather marked falling off of production, caused by salt-water inroads in the Southern Fields district of Amatlan. A considerable part of the October shipments was taken from storage, having accumulated during the months of July and August, when shipments were cut about two-thirds because of export taxes, which were alleged to be excessive. It is thought that such storage reserves have now been about exhausted and that exportations during the present month and in future months will more nearly parallel the actual production of the field.

Lack of Pipe Lines in Mexia, Texas, Field

SPECIAL CORRESPONDENCE

It has announced recently that the Standard Oil Co. of Indiana has contracted with the Humphreys-Pure Oil interests to take 33,000,000 bbl. of crude oil to be produced from the latter companies holding in the Mexia, Texas, field at \$1.50 per bbl. The present posted price for Mexia crude oil is 75c., a price due entirely to the lack of pipe lines to this field. The oil probably will be handled through the projected Sinclair Pipe Line Co.'s line from Mexia to Eastland. It is stated that the Prairie Pipe Line Co. may also build into Mexia. The Texas Co. is now building an 8-in. line from its tank farm at Groesbeck, about 12 miles south of Mexia, to Freestone Junction, where it will be connected with the company's main line from North Texas to Port Arthur. The Humble Oil & Refining Co. is also building an 8-in. pipe line, to extend from Groesbeck to Hearne, where connection will then be made with the company's main North Texas line. The proposed improvements will materially benefit the Mexia district.

3—The use of the present quarters of the Boston Society of Civil Engineers in Tremont Temple building.

4—That the name of the organization be The Associate Technical Societies of Boston.

The advantages and disadvantages of such an arrangement and the obstacles in the way of its accomplishment were discussed by Allan H. Rogers, Professor Bugbee, Professor Lane, G. H. Clevenger and others, the general sentiment being that such a consolidation is desirable. Considerable doubt was expressed, however, regarding the possibility of making financial arrangements which would not be a serious burden to the section.

Professor Lane made a motion as follows, which was seconded by Professor Bugbee and carried unanimously: "That a committee of three be appointed by the chairman to recommend to the section the action which it should take in accepting or declining the invitation to join the proposed Boston Association of Technical Societies and in case of a favorable recommendation to recommend a method for financing the assessment of the section in this association and report to the section at its next meeting."

F. W. Denton gave an interesting talk on "Mining Methods at the Copper Range Mines," supplemented by lantern slides, most of which were taken underground, illustrating mining methods.

Mineral Output of Alaska for 1920 Shows 12½ per Cent Increase

In his report to Congress, the Governor of Alaska refers to mining in that territory, as follows:

"Mining at a profit has been rendered most difficult, and large enterprises have been compelled to close down or greatly curtail their operations. Both quartz and placer mining have been checked by adverse economic conditions.

"In view of the present extreme stagnation in all the mining regions of the States, and the demoralized condition of the entire metal market, the Alaska mining industry appears to be in a healthy condition. The fact that the mineral output of Alaska for the year 1920 shows a substantial increase over that of 1919—12½ per cent—and represents a normal growth when compared with the average annual production for the past decade, is very encouraging."

MEN YOU SHOULD KNOW ABOUT

W. H. Blackburn, of Tonopah, was recently in San Francisco.

C. E. Chaffin has returned to New York after a six-months' trip to South America.

F. J. S. Sur, petroleum geologist of San Antonio, is inspecting lands in Rockwall County, Tex.

V. S. Garbarini, superintendent of the Argonaut mine, at Jackson, Cal., was recently in San Francisco.

George H. Garrey, who recently returned from geological work in British Columbia, was a visitor in New York last week.

N. S. Sheridan, mining engineer with the Midnight mine, in Idaho, is in New York in consultation with the directors of the company.

Hugh M. Henton has resigned his position with Case School of Applied Science and has opened an office as consulting engineer at 615 National City Building, Cleveland, Ohio.

R. W. Stone, of the staff of the U. S. Geological Survey, has resigned to accept a position as assistant state geologist of Pennsylvania. He will enter upon his new duties Jan. 1.

David White, chief geologist of the U. S. Geological Survey, delivered a lecture on "The Origin of Coal and Petroleum" on Dec. 17 before the Royal Canadian Institute at Toronto.

Mining and metallurgical engineers visiting New York City last week included: John C. Anderson, Tucson, Ariz.; E. B. Emrick, Grand Junction, Col.; Stanly Easton, Kellogg, Idaho; Arthur C. Green, Chicago; E. Eggleston Smith, Paris; Charles Janin, San Francisco; J. S. Cheyney, Canon City, Col.; Frank M. Smith, Spokane; Gaichi Yamada, Japan; Thomas S. Roberts, Shamokin, Pa.; and David Douglas, Fort Worth, Tex.

SOCIETY MEETINGS ANNOUNCED

At the annual meeting of the Colorado Scientific Society, the following officers were elected for the ensuing year: President, W. F. R. Mills; first vice-president, J. Claire Evans; second vice-president, W. A. Johnston; treasurer, Charles W. Henderson; secretary, W. A. Johnston; members of executive committee, terms to expire Jan. 1, 1925, L. G. Carpenter and Robert W. Gordon.

The Columbia Section, A.I.M.E., will hold its eleventh annual meeting at the Davenport Hotel, Spokane, on Dec. 28. The nominating committee has submitted the following names of members for officers for the coming year: Rush J. White, Wallace, Idaho, for chairman; Frank M. Smith, Spokane, for vice-chairman; and L. K. Armstrong, Spokane, for secretary-treasurer.

The following papers will be presented at the annual meeting of the Society of Economic Geologists, Amherst, Mass., Dec. 28-30: Presidential address, R. A. F. Penrose, Jr., "The Society of Economic Geologists—Its Sphere and Its Future"; "Plain Geology," by George Otis Smith; "The Need of Expediting Topographic Mapping of the United States," by F. W. De Wolf; "Ore Deposits of Leadville, Col.," by G. F. Loughlin; "The Geology of the

Braden Mine, Chile," by Waldemar Lindgren and E. S. Bastin; "Stressing Economics in the Teaching of Economic Geology," by E. S. Bastin; "The Oil and Gas Section of the Course in Economic Geology," by Roswell H. Johnson; "Experimental Study of Invasion of Oil Into a Water-Wet Sand," by Orren W. Skirvin; "Results Obtained by Improved Methods of Extracting Petroleum," by Robert B. Bossler; "Probable Origin of Certain Vein Structures," by L. C. Graton; "A Recent Hot Spring Deposit in Bolivia" and "A Suggestion for the Terminology of Certain Ore Deposits," by Waldemar Lindgren; "The Gold-Bearing Cummingtonite Schists of the Black Hills, S. D.," by J. J. Runner; "Petrographic Notes on the Franklin, N. J., Zinc Ores," by W. C. Bowen; "Primary Native Silver Ores Near Wickenburg, Ariz., and Their Bearing on the Genesis of the Silver Ores of Cobalt, Ont.," by E. S. Bastin; "A Study of the Super-gene Process at Neihart, Mont.," by M. E. Hurst; "Some Etching Tests on Pyrrhotite," by H. C. Boydell; "Geologic and Geographic Occurrence of Precious Stones," by Sydney H. Ball; "Geology of the Virginia Emery Deposits," by T. L. Watson, and "The Domestic Magnesite Industry in 1920," by R. W. Stone.

OBITUARY

Edward C. Arnold, general mine foreman for the Federal Lead Co., Flat River, Mo., died suddenly at Farmington, Mo., on Dec. 7. Mr. Arnold was a native of Texas, and was associated with the Inde Gold Mining Co., Inde, Durango, Mexico, for several years previous to 1913, when he went to Flat River. He was thirty-six years old.

Stephen Donaldson, mine captain at the Kirkland Lake mine, was killed on Dec. 13 by a blasting accident. Mr. Donaldson was thirty-four years old.

Robert H. McKean, manager of the credit department of the McGraw-Hill Company, Inc., died at his home on Dec. 17. Mr. McKean's services began with *Engineering and Mining Journal* in April, 1902, as assistant in the accounting department. Within two years he had been promoted to the position of head bookkeeper, and at the time the *Journal* was purchased by Mr. Hill he was in charge of the accounting department. About a year after the purchase of the *Engineering and Mining Journal* by the Hill Publishing Co., Mr. McKean was appointed manager of the *Journal*, which position he held until he was elected a director and secretary of the Hill Publishing Co. At this time he assumed the management of the credit department of the company. He was a director and secretary of the Hill Publishing Co. until its consolidation with the McGraw Publishing Co. After the consolidation he became manager of the combined credit departments, and held this position until his death.

ECHOES FROM THE FRATERNITY

SOCIETIES, ADDRESSES, AND REPORTS

Exchange of Goods and Services, Not Gold, Necessary to International Trade

The accumulation of the world's gold in the United States called forth the following comment from W. P. G. Harding, the governor of the Federal Reserve Board, in a recent public address:

"During the past year we have received large additions to our stock of gold by reason of importation from foreign countries. These importations do not represent sums for account of central banks, which have as a rule increased their gold holdings since the outbreak of the war, but they represent widely scattered holdings from practically all countries which have been sent here in payment of pressing obligations or for the purchase of supplies urgently needed.

"It is evident, however, that a normal volume of foreign trade cannot be supported by shipments of gold from abroad. In ordinary circumstances international trade is based upon the exchange of goods and services, actual transfers of gold representing only a very small proportion of the total volume of business and being made merely for the purpose of stabilizing the exchanges.

"The question is often asked, Why in view of our enormous stock of gold, American bankers do not avail themselves of the opportunity of making the United States the world's banker. There is no question that our present gold supply is far beyond our domestic requirements, nor is there any doubt that a great stimulus would be given to our foreign trade were it practicable for American bankers to engage in world finance in a large way.

"Judging from our own history after the Civil War, many years will doubtless elapse before some European countries can restore the normal value of their currencies, but if the violent fluctuations in exchange which have marked the past two years can be prevented in the future, and a stabilization on some basis accomplished, it will be possible to engage in commercial and financial transactions with Europe on a much larger scale than at present.

If we wish to sell our surplus products abroad, it is evident that we must continue to exchange commodities with foreign countries, for where we sell we must buy. A curtailment of production to meet merely American requirements would involve widespread unemployment and would invite disaster. On the other hand, because of the great depreciation in the currencies of

many foreign countries, their labor costs are much less than ours, and partly because of this fact and partly because of the high premium on dollar exchange, they are able to undersell us in our own markets. One of the great problems of our national legislators today is to frame a tariff which will prevent the dumping upon our markets of foreign goods, without at the same time erecting a tariff wall so high that our exports will be greatly reduced because of the inability of foreign nations to trade with us."

Mining Policy Discussed by New York Section, M. and M. Society

C. M. Weld, chairman of the New York Section of the Mining and Metallurgical Society of America, opened the December meeting of the section at the Harvard Club, on the evening of Dec. 14. C. K. Leith was introduced and discussed the report of the Committee on Foreign and Domestic Mining Policy. Criticisms of the report were answered. Mr. Leith stated that the listing of minerals used in the committee's report might be extended and improved upon. Referring to the criticisms that the report is a "free trade document," Mr. Leith stated that in Group A, minerals of which the United States has large quantities available for export, protection was unnecessary and a tariff would bring in no revenue; in Group B, minerals in adequate amounts but without excess or deficiency, a tariff for revenue purposes was not an important matter, but under certain conditions a tariff might be put on; in Group C, minerals of which there is an inadequate supply, there existed the greatest difference of opinion.

Robert Linton, the next speaker, stated that the plans for the annual meeting of the society to be held early in 1922 included an extended discussion of the question of mineral policy which would include the statistical position of the minerals, a board consideration of the tariff and the development of mineral deposits in other countries by American capital.

W. R. Ingalls offered a resolution approving the report of the Committee on Foreign and Domestic Mining Policy by the New York Section and referring it to the society as a whole. After some discussion the resolution was passed. The discussion of the relation of the tariff to mineral policy became general, D. M. Liddell, W. Y. Westervelt, S. H. Dolbear, Van. H. Manning and others taking part.

Guy C. Riddell praised the report of the committee and advised the mem-

bers of the society to get the committee's report before the Tariff Commission or the Senate Committee without delay.

J. E. Spurr pointed out that what is most wanted is efficiency in the management of our mineral resources. After discussing the depletion of mineral deposits, he stated that the data for the appraisal of our mineral resources is available and that the U. S. Geological Survey is the instrument that should make the appraisal.

J. F. Callbreath, on being invited to speak on the subject, asked that H. W. Smith be heard instead of himself. Mr. Smith presented many complex angles of the tariff question. He sketched the work of the American Mining Congress in gathering data on the tariff question and showed various charts and groups of curves. According to Mr. Smith, the price curve upon a mineral commodity, unprotected by a tariff, showed great fluctuation over a time period of considerable duration, the depressions indicating an approach to bankruptcy in the particular industry and the peaks, profiteering. The consumer received no benefit from the very low prices. Price fluctuations of a mineral product protected by a tariff were less accentuated and there was a considerable degree of stabilization in the industry. Mr. Smith was of the opinion that we can develop mineral deposits by legislation and made a plea that tariff experimentation should be tried, to the end that various mineral industries be permitted a normal life.

Mr. Leith and Mr. Manning closed the discussion. Charles W. Potts was then invited by the chairman to present some phases of the manganese situation.

Boston Section, A. I. M. E., Considers Engineering Consolidation Plan

The seventy-first meeting of the Boston Section, A. I. M. E., was held at the Engineers Club, on Dec. 5, 1921. It was preceded by the usual dinner and was well attended.

A report was read on a plan for consolidating the administrative work and headquarters of the engineering and technical societies of Boston. The plan in question had been prepared by a joint committee consisting of representatives from the several societies and provides for:

1—A consolidation of the administrative work of the societies in the hands of a council consisting of two councilors from each society.

2—The employment of a paid secretary and office force.

THE MINING NEWS

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

Leading Events

Following repeated rumors of a proposed merger of the Anaconda Copper Mining Co. and the American Brass Co., it has been officially announced that the former has made a definite offer for the latter's stock contingent upon its securing 51 per cent of that outstanding.

Arrangements for financing the construction of a new railroad from Gallup, N. M., to Durango, Col., have been completed in Los Angeles. This road will give easy access to the San Juan district and will connect with the Santa Fe main line at Gallup.

Arizona's first industrial conference was held in Phoenix on Dec. 15 and 16. Louis D. Ricketts was the principal speaker at the mining session.

The new regulations governing the handling of claims under the recently enacted War Minerals Relief measure have been promulgated. It is also announced from Washington that the House Ways and Means Committee sees little chance for the McFadden gold bonus bill to be enacted.

The Federal Trade Commission has amended its complaint in the "Pittsburgh Plus" case, requiring the Steel Corporation and subsidiaries to file an answer within thirty days.

The state law of Arizona prohibiting the issuance of injunctions by courts in picketing during labor disputes has been held invalid by the U. S. Supreme Court.

Plan To Merge American Brass Announced

Anaconda's Offer for Stock Contingent Upon Acquisition of 51 Per Cent of Outstanding Shares

It has been officially announced that a plan has been made for the taking over of the American Brass Co. by the Anaconda Copper Mining Co. Stockholders of the former will soon be offered an opportunity to dispose of their shares to Anaconda on a basis of \$150 in cash and three shares of Anaconda stock in exchange for each share of American Brass Co. stock. The period of time to be allowed for the deposit of American Brass stock will probably be the month of January. It is said that the offer will be conditional upon the deposit within that time of not less than 51 per cent of the \$15,000,000 par value of American Brass stock outstanding.

This announcement was made after a meeting of the representatives of the larger stockholders of the American Brass Co. with John D. Ryan, chairman of the Anaconda, and J. A. Coe, president of the American Brass Co. Mr. Ryan said that no new financing would be necessary to carry out the merger of the two companies.

Spanish Producers Object to Tax on Pyrites Exports

By Reuters Agency

Madrid, Nov. 27—The mine owners at Huelva, Spain, are beginning to protest against the proposed duty of eight pesetas per ton on pyrites. They say that this duty will mean the ruin of the industry. The defenders of the proposed tax reply that the restrictions on exports will lead to the establishment in Spain of the manufacture of superphosphates, refined copper, and sulphuric acid.

Rich Radium Ore in Cornish Mine

By Cable From Reuters to "Engineering and Mining Journal"

London, Dec. 20—The manager of the South Terras mine, Cornwall, which is controlled by the Societe Industrielle du Radium, reports that a rich patch of ore has been struck, of which two tons were extracted. The assay averaged 80 to 100 mg. radium per ton.

Relief Work in Butte District Well Organized

At the time of the shutdown in Butte, Mont., last spring there were left on the mining companies' payrolls about 4,000 men, who since that time have been employed on rotation in ten-day shifts, with preference given to married men. Likewise at Anaconda there have been about 800 on rotating shifts.

Among the others in the Butte district who are not thus taken care of, it is possible that some may occasionally need temporary relief. To furnish such relief an organization known as the Silver Bow Relief Association was formed with some of the prominent members of different benevolent societies as directors. As to the necessary funds, there was in existence at this time the "War Chest," a relic of the war period. This was renamed the "Community Chest" and now receives and distributes funds and acts as treasurer for the Silver Bow association. All applications for relief are strictly investigated. As this scheme would be apt to divert business from local merchants, in order to be fair to the latter the association solicits bids for furnishing the supplies it distributes, the lowest merchant bidding getting the business. Contributions to the Community Chest are solicited from individuals, generally on a monthly basis. Each of the mining companies also contributes.

New Railroad to Durango, Colo., from Gallup, N. M., Assured Construction To Begin Early in 1922—Will Connect with Santa Fe—Project Financed

Announcement is made that the requirements stipulated by a group of Los Angeles capitalists for furnishing the necessary capital to construct a broad-gage railroad from Gallup, N. M., to Durango, Col., have practically been complied with, and that construction work will start early next year. At present the San Juan district is served by a narrow-gage branch of the Denver & Rio Grande. The route is through cañons and over mountain passes, expensive to maintain, and the service, especially in the winter, is irregular and often entirely suspended for weeks at a time. Freight rates are almost prohibitive, and in consequence, a well-mineralized country, that is also rich in agricultural and stock-growing possibilities, lies almost dormant for lack of a market for its products. The proposed road connects with the Santa Fe at Gallup, and would offer direct connection with the East as well as the Pacific Coast.

I. C. C. Refuses To Continue Reduced Iron Ore Rates

Action Affects Certain Carriers Only—Holds Reduction Unfair and to Advantage of Competing Interior Furnaces

The Interstate Commerce Commission has refused to grant special permission to certain carriers to reduce rates on iron ore. In taking this action, the Commission explains that this decision is in no sense to be interpreted as a disinclination to approve justifiably lower rate levels. In this particular case the action is based upon the continuance of premature reductions confined to certain rates. The Commission

points out that the reduction of these rates would be prejudicial to iron and steel manufacturers on the Lakes to the advantage of competing interior furnaces. In announcing its refusal, the Commission says:

"The Commission's action is based upon protests of shippers located at Buffalo, Cleveland, Erie, Chicago and other lake ports alleging that the proposed rates result in undue discrimination against them and preference for competing furnace interests at Pittsburgh and other interior points.

"Coal and iron ore are two of the important elements entering into steel manufacture. Most of the iron ore used in the East comes from Minnesota by lake. Lake front furnaces, therefore, pay no rail freight charges on ore but transport their coal by rail from Pittsburgh and other interior points. Interior furnaces on the other hand, while paying rail freight from Lake Erie ports on ore, are in most cases located in close proximity to the coal fields and pay only short haul rates on coal.

"In 1917, iron ore was transported from Lake Erie ports to Pittsburgh for 82c. per ton of 2,000 lb., whereas coal was charged \$1.40 per ton from Pittsburgh to Buffalo, a difference of 58c. per ton. Iron ore rates in the East were not increased during Federal control, but coal rates were increased approximately 25 per cent. Rates on both commodities were increased in August, 1920, resulting in rates on ore and coal of \$1.14 and \$2.51, respectively.

"Under the adjustment now proposed by Eastern railroads the ore rate would be 82c. or the same as in 1917, whereas the coal rate would continue \$2.51, including the increases of 1918 and 1920 and being higher by \$1.69 per ton or 206 per cent than the ore rate. The rates on iron ore which will apply after Jan. 1, 1922, will include materially less increase over the pre-war basis than rates on commodities generally—even less than the reduced rates on farm products soon to be made effective."

New Idria Wins \$1,803,364 Verdict in Damage Suit

Following ten days of testimony at Providence, R. I., in the \$2,500,000 suit brought by the New Idria Quicksilver Mining Co., of California, against the British-American Manufacturing Co., of New York, a verdict for \$1,803,364.05 was given on Dec. 16 in favor of the plaintiff. The New Idria claimed that the defendant had failed to keep its contract to buy 11,000 flasks of quicksilver.

Great Northern To Build New Dock at Duluth

Duluth—The Great Northern Railroad is preparing to begin work on a new ore dock which is estimated will cost \$3,000,000. The new dock will take the place of the present No. 2 which is of wooden construction.

Arizona Industrial Conference Convenes

Phoenix Scene of First Gathering of Its Kind in State—Robert E. Tally Presides Over Mining Session—L. D. Ricketts Principal Speaker

BY JAMES H. MCCLINTOCK

THE civic and economic needs of Arizona inspired the gathering at Phoenix, Ariz., on Dec. 15 and 16, of about 200 representative business men of the state, with the mining interest prominent, though hardly in a majority. It was generally agreed that concerted action must be secured and to this end a state industrial body was organized through which reforms might be suggested.

The mining session of the conference was presided over by Robert E. Tally, assistant general manager of the United Verde Copper Co. of Jerome. In his brief address Mr. Tally told of the value to Arizona of the mines' payroll and of how the companies are striving to co-operate with all other state industries.

Dr. Louis D. Ricketts was the main speaker of the session. His address was a logical array of facts and figures showing what mining means to the Southwest and its advancement in the years since he came to Arizona, in 1890. In that time the population had increased 420 per cent, agriculture 600 per cent, railroads 145 per cent and mining production 1,500 per cent. When he came there were only tiny blast furnaces and 10-per cent copper ore was the leanest that could be handled. Jerome alone produced matte. In 1894 Dr. James Douglas introduced, at Bisbee, the first converter and about the same time small and imperfect concentrators were started in the Clifton district. In 1903 there was a great advance, the Copper Queen introducing at Douglas the large blast furnace, electric haulage, mechanical feeding and large slag cars. Three years later, at Cananea, came the first reverberatory furnace. In 1912 experiments at Inspiration proved flotation applicable to Arizona ores and then came development of new chemical processes by acid leaching and electrolytic recovery of copper in the mine at Ajo. The first great advance in mining methods was when Cates brought the shrinkage system from Utah for the Ray mines. Then, with Felix McDonald supervising, the so-called Ohio system was introduced at Inspiration.

In 1890 about 140,000 tons of copper ores were treated in Arizona, with a yield of about 250 lb. to the ton and a production of 35,000,000 lb. In 1920 probably 100 times this ore tonnage was handled, with a yield of not over 30 lb. of copper.

Upon this matter of methods, Dr. Ricketts laid especial stress, saying: "In the early days we were able to work only rich ore, because our methods were crude and our appliances inadequate and small. Through improvements in processes and the wonderful revolution in methods of handling ma-

terial we have been able to pay labor at higher rates, to meet the increased demand for labor from other industries and to do away with it to a very large extent. The efficiency of a man today is tremendously increased. Probably the man output today is ten times as great as in 1890."

The peak of the Arizona copper output was in 1917, a matter of 720,000,000 lb. The expenditures of the Arizona mines for the year were: For labor, \$34,299,000; freight, \$17,786,000; refining, \$5,035,000; supplies at their source, including fuel oil and coke, and taxes, etc., \$26,055,000. Thus, the gross cost reached \$83,173,000. Without inclusion of New York or central office costs, the cost of copper production, per pound, was 11.5c. About 50 per cent of the freight was paid for Arizona transportation. Over \$40,000,000 went to wages and taxes. In 1920 the output was 20 per cent less, and refining, taxes and labor, especially the last, were much higher and the amount of money spent was about the same as during the peak year, so the copper cost rose to about 15c. a lb. These charges do not include eastern office expenses, interest charges, depreciation or mine exhaustion.

Since April of this year scarcely an Arizona mine has operated, yet there have been costs possibly amounting to \$2,000,000, a quarter of the sum in the Warren district alone. Much copper has been sold during the year, but at a loss, at between 11 and 13c. a lb. The companies will have a cash surplus and will be able to resume operations when the time comes.

The great Arizona questions of the future concern freight rates and the fuel supply. The rates assuredly will be reduced, but only a few years will elapse, according to Dr. Ricketts, "when this commodity will become so costly we cannot afford to use it. We probably can get an inferior coal at high cost sufficient for smelting purposes, but I hope we will not be obliged to use this coal for power. The mines of the Southwest now use about 70,000 hp., in addition to that recovered from heat waste, and 100,000 hp. will be needed within a few years. Cheap power is essential, such power as can be obtained through hydro-electric development on the Colorado River." With this available, at low cost, the speaker stated his belief that there will come great development and extension of leaching and the production of electrolytic copper in Arizona will become a much more important industry than at present. He said that he has able chemists at work, "trying to devise methods of leaching certain classes of mixed and sulphide ores, in order to provide for future contingencies."

Truax Picketing Case Decision Reversed

U. S. Supreme Court Declares Ruling of Arizona Court Unconstitutional—Guarantee of Equal Protection Violated

The Arizona state statute prohibiting the issuance of injunctions by courts in picketing cases during labor disputes has been held invalid by the U. S. Supreme Court in a decision handed down on Dec. 19 by Chief Justice William Howard Taft. The court split five to four on the decision, Associate Justices Holmes, Brandeis, Pitney and Clarke dissenting. The statute violates the guarantees in the Federal Constitution of equal protection under the law and prohibition against the taking of property without due process of law, in the opinion of the majority of the court.

This decision reverses that of the Arizona Supreme Court refusing an injunction applied for by William Truax, proprietor of a Bisbee eating house, who was picketed because he refused to put in operation an eight-hour day for his cooks and waiters, as demanded by organized labor. The methods used by the picketers were illegal, according to the decision just handed down. The effect of the ruling now held unconstitutional, the opinion states, is that "under the statute, loss may be inflicted on the plaintiff's property and business by 'picketing' in any form if violence be not used, and that because no violence was shown or claimed the campaign carried on, as described in the complaint and exhibits, did not unlawfully invade the right of the complainant."

American Labor Cheapest

When the relative efficiency of American labor is compared with foreign labor, according to a study made by H. E. Miles, chairman of the Fair Tariff League, it will be found that American labor is the cheapest on earth. In a statement to the Senate Finance Committee, who is conducting hearings on the tariff bill, Mr. Miles stated that Japanese labor receives only one-sixth the wage paid American labor, but on the basis of the units produced the Japanese workman receives two-thirds the wages paid here and he quotes the Tariff Commission to show that this third is offset by other considerations.

Exports To Be Reclassified

A new schedule governing the classification of exports of domestic commodities will be put into effect Jan. 1 by the Bureau of Foreign and Domestic Commerce. In order that the new regulations in regard to statistical returns of exports may be carried into effect, J. Hohn, the chief of the Bureau's Division of Statistics, points out that the co-operation of exporters is essential.

Beginning in 1922, the amendment to the Ontario Mining Act passed in 1919, regarding the testing of hoisting ropes, will come into effect. The new regulation provides that at least once in every six months the hoisting rope shall have at least six feet in length cut off the lower end and shall be sent to a reliable laboratory for a breaking test. A certificate of such test must be kept on file at the mine.

Pittsburgh Plus Case Complaint Amended

Steel Corporation Must Answer Charges of Federal Trade Commission—Hearing Starts Jan. 9

An amended complaint in the "Pittsburgh Plus" case, charging discrimination in prices between different purchasers and consumers, has been filed against the U. S. Steel Corporation and eleven subsidiary companies by the Federal Trade Commission. This complaint does not generalize the offences as the former one did, but makes specific charges of discrimination in prices between purchasers and consumers of rolled steel products which are manufactured and sold by the defendants.

The charges on the amended complaint will be heard by the Federal Trade Commission in Washington, D. C., on Jan. 9, when the United States Steel Corporation will present its case and show cause why an order should not be entered by the commission requiring the companies to cease the listed violation of the law. An answer is required to be filed with the commission within thirty days.

The Federal Trade Commission further announces that in the controversy which arose between the commission and various steel companies relative to the questionnaire that the commission desired to be filed by the steel companies, an amended answer also has been filed. The answer is registered against the petition of the steel companies for a permanent injunction to prevent them from having to answer questionnaires as to the affairs of the steel industry.

NEWS FROM WASHINGTON

By PAUL WOOTON
Special Correspondent

New War Minerals Regulations Announced

Govern Reopening of Claims Under Liberalized Relief Act—Some Uncertainty as to Unspent Balance

Regulations governing the reopening of claims under the liberalized War Minerals Relief Act were promulgated Dec. 17 by E. C. Finney, acting Secretary of the Interior. In a statement to "War Minerals Relief claimants and attorneys therefor," Mr. Finney says in part:

"Should you conceive that your claim, or any claim properly represented by you, heretofore filed within the time mentioned in the Act, is within the contemplation of the Act as now amended, a motion for re-hearing of the claim will be duly considered, pursuant to the following regulations:

"I. As To Claims Heretofore Passed On:

"1. Such motion for re-hearing must be in writing and must be filed not later than Feb. 15, 1922, in the

office of the War Minerals Relief Commissioner, Room 2117, Interior Department Building, Washington, D. C. It must plainly designate the claim and state specifically the grounds upon which re-hearing is asked.

"2. If the claim for which a re-hearing is asked, or any part thereof, has heretofore been rejected on the ground that there was no government request or demand, the written motion must be duly under oath, setting forth:

"(a) The exact character of the personal, written, or published request, demand, solicitation or appeal which stimulated the claimant to produce or prepare to produce the mineral.

"(b) The government agency mentioned in the Act from which the request, demand, solicitation or appeal came.

"(c) How or by whom the request, demand, solicitation or appeal was communicated to the claimant.

"(d) The time and place of such communication.

"3. If the claim has been rejected, or partially rejected, on other grounds than the question of stimulation, the errors complained of should be stated

in detail in the written motion for re-hearing.

"II. As To Claims Heretofore Excluded:

"If the claim is one which was mailed in time but not received in time, so that no action has ever been taken on it, written request for a hearing thereof, filed in the office aforesaid not later than the date aforesaid, will be granted as of course, and the claimant should proceed with due diligence to establish the claim by proof before the War Minerals Relief Commissioner."

Some further uncertainty as to the unexpended balance of the War Mineral appropriation has been occasioned by an item in the first deficiency bill. The language in this item, some believe, is such as to allow the War Department to draw upon the War Minerals fund in payment of claims against that department. The discussion of this point in the House of Representatives indicates that it is highly improbable that any efforts will be made by the War Department to take advantage of this technicality to draw upon the War

Minerals Relief appropriation, but it is recognized that there is some uncertainty as to the action that may be taken by the Comptroller of the Treasury. The War Minerals Relief Act is a section of an act providing for relief of War Department claimants.

Now that the Secretary of the Interior and the War Minerals Relief Commissioner have worked out the policy which will be followed under the liberalized act, it is expected that hearings will begin in the near future, although no actual dates have been set.

No Chance for Gold Bonus Bill, House Committee Believes

Western Senators To Continue Fight—Campaign Caused Adoption of More Liberal Revenue Clause

The McFadden gold bonus bill is dead. This is the opinion of members of the Ways and Means Committee of the House of Representatives and of many of the proponents of the bill. With the economic tendency now operating to the advantage of the gold producer, it is believed that it will be impossible to overcome the very vigorous adverse report made by the Secretary of the Treasury. Though it is the intention of Senator Oddie and the twenty-one Western Senators who joined him in a recent letter to Secretary Mellon, to continue the fight for special assistance for the gold mining industry, the opinion is generally held that there is no chance for legislation along lines of McFadden's proposal.

It is believed, however, that the agitation for the McFadden bill made possible the adoption of the retroactive provision in the recently enacted revenue law, which broadens the exemptions on profits made in gold production to include those of 1917.

Gold Situation Reviewed by Secretary of Treasury

The Secretary of the Treasury, in his annual report to Congress, reviews gold production and makes reference to the McFadden bill as follows:

"Due to the unfavorable influence of high prices and consequent high costs of production on the mining and reduction of gold, there have been further discussions of proposals for subsidizing the gold-mining industry. A bill has been introduced in the House of Representatives (H. R. 5025) 'To provide for the protection of the monetary gold reserve by the maintenance of the normal gold production of the United States, by imposing an excise, for revenue and other purposes, upon all gold used for other than monetary purposes, and by the payment of a premium to the producers of newly-mined gold, and providing penalties for the violation thereof.' The Treasury does not approve this bill or other measures for subsidizing the gold-mining industry, believing that the problem will ultimately adjust itself and gold mining become more remunerative as the purchasing power of the dollar increases. The position of the Treasury with reference to this question was stated in some detail in a letter dated September 30, 1921, in reply to a resolution signed by twenty-two Senators from the western states and submitted to the Secretary of the Treasury, requesting an opinion as to H. R. 5025.

"The production of gold in the United States, as well as in other countries of the world, is still below pre-war figures. This is true even of the South African gold fields, notwithstanding the arrangements for sale to the highest bidder of the product, after shipment to London, by which arrangements producers of that region reap the benefits incident to exchange conditions. These benefits have averaged since January, 1920, according to the June, 1921, report of the Rhodesian Chamber of Mines, more than £1 5s. per ounce

above normal, about 30 per cent. The United States production in 1920 is estimated at \$51,186,900, a reduction from the prior year's output of over \$9,000,000. The industries of the United States are estimated to have consumed in 1920 new gold to the value of about \$54,000,000, approximately \$3,000,000 more than the domestic production.

"The Treasury, acting in accordance with the advice of the Department of State, does not accept at United States mints and assay offices gold known or suspected to be of Soviet origin, but does regard as free from any suspicion or possibility of Soviet origin gold which bears the official coinage or mint stamp of recognized governments, including for this purpose Germany and Mexico. Privately stamped gold bars are accepted only if accompanied by a satisfactory certificate of ownership and non-Soviet origin executed by a responsible bank or banker, or by other satisfactory proof of new mine production or other facts negating Soviet origin."

Hearings on Mine Law Revision Bill To Start in January

Definite announcement has been made by Representative Rhodes, chairman of the Committee on Mines and Mining of the House of Representatives, that hearings on the bill providing for the revision and codification of mining laws will be begun during January. The exact date has not been set, but in all probability the first hearing will be held during the week beginning Jan. 23.

Metric Bill Hearings Resumed

Hearings on Senator Ladd's bill providing for the compulsory adoption of the metric system after ten years, were reopened recently. The hearing is being conducted by a sub-committee of the manufacturers' committee of the Senate, of which Senator McNary, of Oregon, is chairman.

NEWS BY MINING DISTRICTS

London Letter

Prestea Block A Makes Poor Showing—Van Ryn Gold's Report Satisfactory

By W. A. DOMAN

London, Dec. 5—While attempts are being made to revive interest in West African gold mining, the results achieved by some of the existing companies are not such as to encourage investors to venture more capital. At one time the Prestea Block A looked to be a sound property, but last year it fell upon bad times. Labor shortage was a great factor, for it not only affected the output and working costs, but seriously delayed the development, which is all important in the present state of the mine. As an indication

of the shortage it may be mentioned that the daily average attendance dropped from 3,242 in 1917 to 1,496 in 1920, the year under review. During the period 115,670 tons of ore were milled, for a yield of £256,678 (including £61,924 premium) or 44/4 per ton. As working expenses were 48s. 6d. per ton, there was a loss of £23,982.

Depreciation called for a sum of £22,896, and no less than £183,076 was written off as development redemption in consequence of reduction in the ore reserves, owing to permanent unavailability and other causes. The debit balance on profit-and-loss account is £216,152.

A good deal of unproductive driving was done on the 13th level north of

Prestea shaft; also on 13th level south of north shaft, and, owing to the intersection of a body of loose graphite, most of Prestea shaft below the 13th level collapsed. As against the tonnage milled only 35,780 new tons were added of an average value of 39.85/—. At the end of 1920 the reserves were 199,315 tons at 41.11/— as compared with 317,350 tons at 38.69/— at the beginning of the year. Unless additional pay tonnage is developed, the outlook is critical.

A satisfactory report is presented by the directors of the Van Ryn Gold Mines Estate for the twelve months ended June 30 last. Tonnage crushed was 381,230, against 408,430 in the preceding year, the recovery being 31/8

per ton, against 22/3. Expenses rose from 19/6 to 25/9, due to a higher per cent of sorting, to heavy outlays on sand filling, and to extra cost of feeding natives.

On the standard price of gold, the pay ore reserves amount to 864,583 tons, averaging 6.1 dwt. over 48 in. These reserves have been paid for out of profits. The year's profit was £90,393 in contrast with £87,307, the improvement being due partly to the higher grade of ore crushed, and partly to the increased price of gold. Owing to the sand filling scheme, no less than 165,781 tons of ore, representing 33.31 per cent of the total ore mined, was drawn from reclamation in the old workings. In 1918 only 1,136 tons was so obtained. According to the view of Sir George Albu, the quantity of ore remaining to be reclaimed is sufficient to last the mine for many years. On the year the reserves on standard price of gold are down 283,000 tons, owing to a fall in the price of gold and higher working costs.

In the year to June 30, the El Oro Mining & Railway Co. treated 383,043 tons of ore, producing bullion to the value of \$2,546,446, in contrast with 366,730 tons yielding \$2,789,457. Ore reserves were drawn upon to a small extent, as is here shown:

	June 30, 1920	June 30, 1921
Total tons.....	293,779	282,124
Gold value per ton..	\$11.27	\$7.96
Silver, oz.....	2.71	2.11

The falling off in values was \$1.13 per ton in the northern and southern sections, and \$5.17 in Somera and Ofir, and in the San Patricio region the average value rose from \$4.56 to \$5.65.

It has been decided definitely to abandon operations on the 2,200 level of the San Rafael vein. Profits were largely the result of a reduction of approximately \$1 per ton in expenses.

Johannesburg Letter

Discoveries of Minerals in Namaqualand Not New

BY JOHN WATSON

Johannesburg—With reference to the reported discovery of gold-copper and minerals in Namaqualand, a correspondent of "The Star" interviewed Dr. W. Verseld, of the Government Analytical Laboratory in Cape Town, who has had much experience in prospecting in Southwest Africa. The doctor believes that Namaqualand has a great future in minerals; but some of the finds reported are not new. Gold was found long ago, associated with copper ore. As quartz had been found and not alluvial gold the outlook was quite promising. There must be plenty of copper left in workable quantities. Kaolin had been reported and corundum had been worked there. Tin occurs further inland in the Southwest Protectorate and was worked in 1900 by a party of Britishers, who were considerably ham-

pered by the German authorities, and had to give up the attempt. Dr. Verseld had identified columbite and tantalite from Namaqualand.

CANADA

British Columbia

Florence Silver To Sell Part of Output To Paint Company

Ainsworth—Negotiations are about concluded which will open up a market for disposal of a large portion of the Florence Silver Mining Co.'s output to a British Columbia coast firm, for use in paint and color manufacturing.

Ontario

Provincial Geological Survey of Cobalt Camp Completed

Cobalt—During November Nipissing produced 359,000 oz., with an estimated net value of \$251,253, and shipped bullion from Nipissing and customs ore of an estimated net value of \$71,807. The value was estimated at 66½c. per oz. The low-grade mill treated 6,343 tons, and the high-grade plant 197 tons. The refinery shipped 100,602 oz. of fine silver. Some small veins were cut during the month, but they were of no particular importance. November output constitutes the high record in production for any month of this year, and the estimated value was \$60,000 greater than for the corresponding month of 1920. The directors have declared the regular quarterly dividend of 3 per cent, with a 3 per cent bonus, payable Jan. 20. The financial statement shows cash in the bank, investments and ore and bullion to the amount of \$4,124,961.

The Bailey Silver Mines has taken a lease on the Silver Cliff property and expected to start shipping Dec. 19.

The Coniagas was the only company which shipped ore from Cobalt for the week ended Dec. 10, sending one 60,000-lb. car to Perth Amboy.

A 4-in. vein, carrying high-grade ore, and which has been uncovered for 60 ft., has been found on the Sanderson claims in Gowganda.

During November the Coniagas, Hudson Bay, the Mining Corporation and the O'Brien shipped a total of 213.5 tons of ore and concentrates from Cobalt. Of this 64 tons went to Canadian smelters, and the balance to the United States.

Kirkland Lake—Repairs to the hoist at the Ontario Kirkland have been completed and the mill has again been started.

The directors have decided to get the plant of the Bourkes Mines in shape for operations, and have also started to replace the buildings destroyed by fire last summer.

Porcupine—It is understood that the McIntyre shaft will reach the 2,000-ft. level in the course of a few days. During the sinking other work was curtailed to a certain extent, and mill heads have been running from \$8.50 to \$9, which is somewhat less than formerly.

On the lower levels of the Dome a section of the orebody has been found to contain selenium. Recently there has been a great deal of trouble in the mill owing to the reprecipitation of gold, and the chemists are endeavoring to determine whether or not the selenium would have any effect, as they cannot find any other cause.

During the last three months the Hollinger has had the highest recovery in the Porcupine district, with an average of \$8.83 a ton. Production for the period, including exchange, is valued at approximately \$2,800,000. The Hollinger's recovery of \$8.83 a ton compares with \$8.50 for the McIntyre, and \$7.10 for the Dome. The directors have declared a 1 per cent dividend, payable Dec. 31. There was some talk of an additional bonus being paid, but the shareholders who expected it will be disappointed.

An announcement has been made by the T. & N. O. Commission that the question of electrification of the road will be thoroughly investigated. The proposed extension of the railroad north of Cochrane to the vicinity of Tin Can Portage would facilitate this work, as it is understood that approximately 300,000 hp. could be developed on the river.

C. W. Knight, of the Ontario Geological Survey, has just completed his survey of the Cobalt camp, on which he spent a year. The only possible criticism that could be offered regarding this work is that it should have been started several years ago. If the work had been done earlier a great many underground openings would have been available for the survey which cannot now be reached. Mr. Knight deserves a great deal of credit for the work that he has done. While his report will not be available for some months to come, the results have already shown ample justification for the survey. Those who have been in touch with this work are of the opinion that it will result in the discovery of new orebodies in practically undeveloped territory. He has made a complete and exhaustive study of all the geological data in all underground workings that were available, and his final report will cover the entire camp. It is hoped that this work will result in the government taking similar action in Porcupine and Kirkland Lake. The time to start this work is now, when the mines are in the early stages of their development and all geological data are available. It appears to be of sufficient importance to keep a man permanently occupied on these three camps.

MEXICO

Chihuahua

Construction of Chihuahua & Oriente Road To Start About Jan. 1

Work will start about Jan. 1 on the construction of the Ferrocarril de Chihuahua y Oriente, which is being built to connect the property of the Erupcion Mining Co., and the Ahumada Lead Co., with the main line of the Mexican Central railroad at Lucero station, 136

kilometers south of Juarez, Chihuahua. Col. John C. Greenway, of Warren, Ariz., who is interested in the mining companies, closed the contract for the road bed and bridges with Dudley & Orr of El Paso. The proposed line will be 47 kilometers long, of standard gage, and will carry both freight and passengers. The contract given must be completed within 150 days. It is expected that the railroad company will lay the steel, as this item was not included in the contract. It is generally understood that there are several hundred thousand tons of lead-silver ores blocked out in this camp awaiting transportation to the El Paso and Chihuahua smelters. Colonel Greenway is president of the new railroad company and Louis D. Ricketts vice-president.

Word has been received of the capture of R. A. Atkins, manager of La Dorada mine in the Allende district, in the southern part of the state of Chihuahua, by armed bandits, who are holding him for ransom of 5,000 pesos.

Coahuila

Furnaces at Torreon Smelter To Be Blown In Soon

Torreon—Repairs of the Torreon smelter are nearly completed and it is expected that several furnaces will be blown in early in January. A number of mines in this district are resuming operation and shipping their ores to this plant.

Durango

Rosario Company To Build Mill

George Stinson, who for a number of years was mining in the Mapimi district west of Torreon, is now representing the Cia. Minera El Rosario, which is taking over some properties in the Victoria camp west of Santiago Papasquiari. One of the properties taken over by this company is the Montoros, located on the east side of the Perico Mountains. Some gold-silver ore is being mined but it must be carried some distance on the backs of burros to the wagon road and from there by wagon to the Santiago Papasquiari station. The Rosario company, which is composed of American capitalists and miners, proposes to begin the erection of a mill soon for treating its ores on the ground.

A general meeting of the stockholders of the Soledad y Anexas Mining Co., with mining properties in Durango, is to be held in Mexico City on Jan. 15, where a majority of the shareholders reside. Aside from the general routine of business to be transacted a proposition for the sale of the San Juan de Mata mine will be discussed.

An issue of 24,813 shares, par \$1, is to be made by the Queen Creek Copper Co., of Arizona, to be used in payment for the purchase of three unpatented lode claims in Pioneer district. The controlling interest in the company, which is operating a copper property at Superior, is almost identical with that of the Dundee-Arizona at Jerome.

ARIZONA

Stene Consolidated To Be Heard on Hydro-electric Project—Navajo Copper Co. To Be Reorganized

By JAMES H. MCCLINTOCK

Phoenix—For a year or more the Stene Consolidated Copper Co has been planning a hydro-electric development on Bill Williams fork, in western Arizona. A notice of a hearing on its application for stream rights has been issued, this to be held at Phoenix Jan. 12 by E. C. LaRue, engineer of the Geological Survey. The plans include a 150-ft. dam, a 35-mile canal, a power house near Planet and then irrigation of 95,000 acres of land near Parker. The company has a large acreage of low-grade surface carbonates, said to be suitable for leaching.

The "smoke farm" idea appears to have had material around Douglas, Ariz., where organization has been effected of ranchers who own property within seven miles of the city and its smelters. In expectation of purchase by the smelting interests, prices ranging from \$20 to \$200 an acre have been put on the land alleged to be affected. Several meetings of an amicable sort have been held with the mining representatives, though it is alleged that the people of Douglas are more friendly to the smelting interests than to the farmers. In Douglas there would be a joyous welcome to sulphur fumes, however thick.

Dos Cabezas—According to a recent report by John W. Prout, Jr., manager of the Central Copper Co. the company is employing about 250 men on development and operation, mainly on the Central and Mascot properties, the latter being held under a twenty-year lease together with the 15-mile railroad to a Southern Pacific connection at Willcox. Eleven new orebodies are reported to have been opened within the year in the Mascot section, and development in the Elma mine is declared gratifying. Altogether about 70,000 ft. of underground development has been accomplished. The company has thirty claims of its own and fifty-six held under twenty year lease from the Mascot. The camp has about ninety buildings, including power plant, offices and store. A clubhouse has been added for benefit of the employees, for whom housing has also been provided at lowest possible cost.

Grand Canyon—Lloyd C. Ashley states that the Navajo Copper Co. is to be reorganized, with expectation of operating on more modern and more economical lines. A commissary is to be opened at the Gap, on the Navajo Reservation, 90 miles from Flagstaff, where the company already has a camp from which transportation of ore by tractor was directed. The corporation has been inactive for three years. Its ores are rich, but hardly rich enough, it is understood, to defray the costs of 120 miles of motor-truck transportation to the railroad at Flagstaff over poor roads.

NEW MEXICO

Coal Cheaper—Freight Rates on Zinc Ores Reduced—E. P. & S. W. Gets Permit To Take Over A. & N. M.

By JAMES P. PORTEUS

Lordsburg—Reductions in rates and wages favorable to mining operations continue in evidence. In the Raton section the reduction in coal miners' wages to conform to the southern Colorado scale has been reflected in a reduction in coal prices at the mine, effective at once. The Santa Fe railroad has announced a reduction in freight rates, effective about Jan. 1, on zinc ores moving from southern New Mexico points to the smelters in the Kansas-Oklahoma gas field. The scale will be as follows. On ores of \$25 value per ton or less a rate of \$5 per ton will be made; over \$25 but not exceeding \$50 per ton \$6; and on ores over \$50 but not exceeding \$100 per ton, \$7 per ton freight will be charged. This will be of very material help to the mines of the Kelly and Fierro districts. The reductions in freight rates on fuel, timber and iron and steel products to mining points in the Southwest have not been promulgated as yet but are expected soon.

Part of the assets of the Arizona Copper Co. taken over by the Phelps Dodge Corporation consisted of the Arizona & New Mexico railroad, extending from the El Paso & South Western railroad at Hachita, N. M., to Clifton, Ariz., a distance of 110 miles. On Dec. 12 the state corporation commission approved the request of the E. P. & S. W. road to take over that property, which will in the future be operated by the E. P. & S. W. under lease as a branch line. Considerable reconstruction work will be started at once and a much improved service given at an early date.

The total shipments from the district for November amounted to 7 carloads, or 310 tons. Five of these were lump fluorspar from the Great Eagle mine and 100 tons of high-grade silver-lead ore from the Co-operative property.

In the District Court at Lordsburg recently the Anita Copper Co. took judgment by default in an action against the Octo Mining Co. for an indebtedness of approximately \$28,000.

Mogollon—The Mogollon Mines continue to operate steadily. About twenty miners from the Empire Zinc Co. were added to the force when the latter shut down last October. About eighty men were working.

Silver City—The silver properties of the Amory Stevens estate at Chloride Flat are under option and examination by the Phelps Dodge Corporation. It is understood that this company is not particularly interested in these properties but is desirous of securing certain holdings belonging to the estate that are situated in the Tyrone district. The option, however, could only be secured to cover a certain block of properties including the Tyrone and Chloride Flat holdings.

COLORADO

Conditions in Alma District Satisfactory—Activity at Leadville Reflected in Power Company's Report

(From Our Special Correspondent)

Leadville—Evidence of the revival of mining activity in the Leadville district is shown in the report of the local manager of the Colorado Power Co., who announces the following as to new power connections or resumptions since Sept. 1 last:

"The reopening of the Western Zinc Oxide plant on Sept. 23 was the turning point in the mining activities. The Blain shaft, operated by Cortellini & Co., the Graham Gulch shaft, operated by the C. & H. Mining Co., and the Henriette shaft, operated by W. E. Bowden & Co., were all started up on Oct. 1. On Nov. 11, the Shamus O'Brien, operated by Oscar Laurila, resumed operations. Power was turned on at the Tucson on Nov. 12, which is being operated under the management of John Harvey. The Chrysolite lease, operated by Cortellini & Co., began work on Nov. 23. Otto Thurn resumed operations on the Hibsche on Dec. 5, and Frank Mohar started up the Robert E. Lee on Dec. 7.

"The Utley zinc plant at Florence reopened Dec. 1 and this will open up a market for a large quantity of Leadville ore."

Silverton — While production this year from the Silverton district will show a marked decrease as compared with 1920, on account of the closing down of the Sunnyside mines, there has been more actual development of new mines than for many years past. Development work on various properties in different sections of the district has resulted in opening up promising orebodies, the output from which will greatly increase the district's production next year. This production can be greatly increased if reductions in the now prohibitive freight and treatment charges can be secured.

Alma—Mining conditions in the Alma district are satisfactory for this time of the year. Thus far the weather has been mild and little snow has fallen. This has aided the properties which resumed operations in the late fall and in most instances the outside work is well under way or completed.

The Mt. Lincoln Consolidation Mining Co. has its new electric compressor installed and is pushing work on the Hoosier tunnel. This will open up considerable new territory and make the low-grade ore and stope fillings in the old Russia workings available.

The Colorado Power Co. has about twenty men employed extending its power line from the station north of Alma to Buckskin and Mosquito gulches, a distance of about four miles. This will make electric power available for most of the operators in the district.

The Platte River Dredging Co., which is building a 9-cu.ft. dredge to be operated on the gravel bar near Fair-

play, Col., has its boat ready to float and nearly under cover. It will start installing the machinery as soon as it is delivered.

UTAH

Utah Apex-Utah Consolidated Decree Expected Soon—Grand Central at Mammoth Being Prepared for Increased Production

(From Our Special Correspondent)

Park City—Shipments for the week ended Dec. 10 amounted to 2,161 tons as compared with 2,068 tons the week preceding. Shipments were: Tintic Standard, 61; Judge allied companies, 1,172 tons; Silver King Coalition, 527; Ontario, 463 tons.

Bingham—Differences in the estimates of the Utah Apex and the Utah Consolidated as to the value of ore extracted by the Utah Consolidated from an orebody by court decree adjudged to belong to the Apex are under consideration by Judge Tillman D. Johnson of the United States district court at Salt Lake City. The statement of the Utah Consolidated puts the value of the ore at \$1,070,000 while that of Utah Apex fixes the amount at \$1,171,000. A conference between the attorneys on both sides was held on the afternoon of Dec. 10 in the chambers of the court, Judge Johnson being present also. A decree in the case is expected shortly.

Eureka—The lime quarry of the Chief Consolidated, which has been closed down for almost a month, has resumed work. The smelters in the Salt Lake Valley use a large tonnage of limestone, and these, as well as the sugar factories throughout the state, offer a market for the product of the quarry.

Ore shipments from the Tintic district for the week ended Dec. 16 amounted to 176 cars, this being an increase of ten cars over the output of the week preceding. Shippers were: Tintic Standard, 61; Chief Consolidated, 43; Victoria, 16; Dragon, 15; Iron Blossom, 12; Eagle & Blue Bell, 8; Mammoth, 4; Colorado, 4; Swansea, 4; Centennial-Eureka, 3; Plutus dump, 1; Showers, 1; Gemini, 1; Bullion Beck, 1; Empire Mines, 1; Tintic Drain Tunnel, 1.

Mammoth—The Grand Central mine in the Tintic district is being put into shape for increased production. The property is under lease to Paul Hilsdale. About sixty subleases have been let, and there are still a number of applications. The new management is making a thorough survey of the property, having three crews of surveyors at work. The mine is to be electrified, and the use of steam power done away with. Power will be available for pumping below water level.

Alta—Ore is reported to have been opened in the Emma mine on the west side of the Montezuma fault and north of the Bay City tunnel above water level, in hitherto unprospected ground. Orebodies in this mine have thus far been on the eastern side of the fault.

MONTANA

East Butte Completes New Shaft—Butte & Superior's Copper Ore on 2,200 Level Widens—Tuolumne's New Ore on 1,600 Level

BY A. B. KEITH

Butte—The annual report of the Davis-Daly Copper Co. for the fiscal year ended June 30 last, while belated, tells a story of progress from the standpoint of increasing its reserves, which was continued until recently when production was suspended until the company could receive the return for its copper that it feels itself entitled to. The situation now is that the company is in good shape to avail itself to the utmost of a good copper market when it arrives.

The tonnage of ore developed at the Colorado property during the company's fiscal year was 62,000 tons in excess of the amount mined, and this condition has been further improved since the year covered by the report ended.

Butte & Superior's body of copper ore on the 2,200 level is reported to be from 8 to 12 ft. wide, carrying 8 per cent of copper and more than an ounce of silver for each per cent of copper.

Tuolumne Copper has opened a commercial body of ore on the 1,600 level. An official of the company is credited with the statement that the ore already in sight is worth several times the amount of the Tuolumne's bond issue, which is for \$500,000, in his estimation. It appears apparent the company has located the zone of greatest mineralization on the 1,600, and with the strike of the vein veering to the north giving it over 800 ft. more of drifting it is believed that the tonnage possibilities are considerable.

The Tuolumne company has started deepening its Main Range shaft from the 18th to the 24th level. This suggests that the company has succeeded in financing its program of deep development. The 16th level continues in commercial ore.

The East Butte Copper has completed the raising of its new working shaft from the 1,800 level to the surface. The engineers made a bull's-eye in the center of a ring of slag designed as a collar for the shaft, and when the opening finally was poked through to the daylight, assistant general manager P. E. Beaudoin and other officials crawled through and the ceremony was completed after a handshake. This shaft was completed at about 50 per cent less cost than would have been entailed had the shaft been sunk. Because of beds of quicksand, gravel and clay within 400 ft. of the surface, it was necessary first to churn-drill a hole down to one of the mine levels to permit the ground to drain, with a consequent settling of the loose structure. When it was ascertained that the ground was safe to raise in, which was during July last, raising was started at a distance of about 800 ft. from the surface, with the finishing touches given it Dec. 10.

MICHIGAN

The Copper Country

No Date Set Yet For Calumet & Hecla's Resumption—Wolverine's Output Greater Than Last Year's

BY M. W. YOUNGS

Houghton—Though there are rumors of resumption by Calumet & Hecla and its subsidiaries on Feb. 1, no definite date has been set. When the mines are reopened, production will probably begin on a 50-per cent basis, increasing as the demand for metal grows. It is variously estimated it will require from thirty to ninety days to put all units of a mine in operation. Reassembling of machinery at hoisting and compressor plants and repairs to mill equipment will be quite a task. On the whole, the ground in all of the mines has held up well. Some of the stopes and drifts, no doubt, will have to be cleaned out, but little time will be wasted in this way.

Mohawk will finish the year with a production of close to 14,000,000 lb., equaling the 1916 output and greater than the production of any year since. It is understood to have no more than normal stocks of metal on hand, having managed to sell the greater part of its output from month to month. A full program of drifting and stoping is under way in all four operating shafts, while sinking is proceeding in Nos. 1 and 6 shafts. The yield holds well to the average of 24 lb. to the ton. This yield includes mass, a considerable amount of which is being mined.

Wolverine will have produced in excess of 4,000,000 lb. of copper this year, comparing favorably with the 1919 and 1918 outputs and exceeding that of 1920 by about 800,000 lb. Regular mining is being carried on in many of the levels of Nos. 3 and 4 shafts, and pillar mining is in progress on the 36th and 37th levels of No. 4. The recovery of rock from the pillars has exceeded expectations, the average yield being 15 lb. to the ton. In addition to regular mining, much rock is being obtained from cutting out the vein along the footwall in the older stopes on the upper levels. Wolverine still has much valuable ground to work out. A great deal of rock remains to be taken out along the footwall in many of the levels between Nos. 3 and 4 shafts from the 20th level to surface tributary to both shafts.

Construction of the new collar for Gratiot No. 2 shaft and bases for the new hoist, preliminary to the resumption of sinking, is well under way. Shaft repairs will be undertaken as soon as the collar is complete. It is possible that Seneca may send more rock to the mill in the spring, if warranted by a good metal market. Surveys have been made for track extensions from the mine to the Mineral Range, over which shipments will be made to the Point Mills plant. Before production will be attempted on a large scale, however, it will be necessary to install a new hoist at the Seneca shaft.

MINNESOTA

Mesabi Range

M. A. Hanna & Co. To Resume Work at Four Underground Mines

Chisholm—M. A. Hanna & Co. have issued orders to reopen four underground properties on the Mesabi iron range. At Chisholm, the Leonard No. 3 mine will resume with about 120 men. The No. 3 shaft is a new one on the north bank of the Leonard pit and has opened up the ore that could not be mined and trammed to the pit. The Fay mine at Virginia will employ about seventy-five men. The Thorne mine at Euhl will employ approximately seventy-five men. Near Hibbing, the Harold mine is to be placed in operation again with over 100 men. For the present these mines will run on single shift.

JOPLIN-MIAMI DISTRICT

Kanok Metal Co. Treats Record Tonnage in November—Vinegar Hill Zinc Co. Developing Mine Near Hockerville

BY P. R. COLDREN

Joplin—Convincing evidence that the zinc mines of the Tri-State district are not all reporting unusually light operations is offered in the record just reported for the Premier mine of the Kanok Metal Co. The Premier is located at Picher, Okla., and has been in operation for approximately three years. It divides its year into eight four-week months and four five-week months, and November was a five-week month, including thirty working days. In this five weeks the Premier lifted and sent through its mill a total of 30,142 tons of dirt. From this it produced 1,232 tons of zinc concentrates and 1,072 tons of lead concentrates, or a total tonnage of 2,304. The average recovery was 7.64 per cent (in local parlance), which is considered good dirt in this district, but not extraordinarily good for the Picher camp.

The heavy tonnage of dirt handled accounts for the good production of concentrates, and it can be considered large when it came from one shaft, equipped with the ordinary 1,200-lb. tubs or cans. There is another shaft in use for hauling men and steel, but all the dirt was brought up the one shaft. The hoisting was done in two eight-hour shifts per day, so it means an average of a can of dirt hoisted every thirty-four seconds for the entire thirty days. It is believed this is almost a record for hoisting from a single shaft in this district.

It is understood that the Vinegar Hill Zinc Co. is developing a good mine at the property formerly known as the Texas, located a short distance southwest of Hockerville, Okla., east of Picher. Production at present is not being pushed, but a good orebody is being developed.

The old Mutt & Jeff lead mine, on the Maher land, south of Joplin, is being reopened by Joplin miners.

ALABAMA

Rumored Henry Ford Holds Almost Half of Great Southern Steel Co.'s Acreage

BY GEORGE HUNTINGTON CLARK

Birmingham—Announcement in November of the acquirement by the Great Southern Steel Co. (incorporated by Chicago interests under a Delaware charter) of 101,000 acres of coal and ore lands, in close proximity to Birmingham, and 65 miles distant from Muscle Shoals, has been followed by a further but as yet unconfirmed statement to the effect that 45,000 acres of these holdings have passed into the ownership of Henry Ford.

The Chicago interests, organizing the Great Southern Steel Co., are now further credited with having extended their holdings through the acquirement or control of the Alabama Land Syndicate; White Iron & Coal Co.; Palatine Mining & Development Co.; and the Etowah Coal & Iron Co., so that they now own or control about 400,000 acres of mineral lands located in Etowah, Marshall, St. Clair, DeKalb, and Cherokee counties.

Included in these holdings are all the lands originally belonging to the Fort Payne Coal & Iron Co., also an option on the right of way and road bed of the Fort Payne & Eastern R.R., which extends 10 miles from Fort Payne into the Lookout Mountain coal field.

The authorized capital of the new steel company is stated to be \$105,000,000 for the merger contemplated.

There is no reliable confirmation and there is small probability of any definite Ford interest in the matter, which would be obviously premature.

As regards the 101,000 acres originally acquired, Charles E. Pain, counsel for the Great Southern Steel Co., is authority for the statement that estimates made by Robert W. Hunt, engineer, state that about 3,000,000 tons of ore and 1,700,000,000 tons of coking coal as raw material reserves are carried in the tracts. These estimates are based upon drill tests and exploitation work that has been in progress for some time and there are sufficient raw materials near by for fluxing purposes.

If these estimates are even conservatively approximated and prove at all possible of realization, developments of some magnitude may result when industrial conditions improve.

In iron making, one new blast furnace is scheduled to go into blast on Jan. 1. This is one of the Sheffield stacks of the Sloss-Sheffield Steel & Iron Co. The Sloss-Sheffield company is the largest producer of foundry iron in the South, with four stacks at Birmingham, two at Sheffield, and one at Florence; all of which have been idle during the year.

It is believed that the Republic Iron & Steel Co. will shortly become active in making iron, now that the installation of improved equipment as its Raimund red-ore mine on Red Mountain has been completed.

THE MARKET REPORT

Daily Prices of Metals

Dec.	Copper, N. Y., net refinery*	Tin		Lead		Zinc
	Electrolytic	99 Per Cent	Straits	N. Y.	St. L.	St. L.
15	13.50@13.625	33.25	33.75	4.70	4.35	4.85
16	13.625	33.125	33.75	4.70	4.35	4.85
17	13.625	33.125	33.50	4.70	4.35	4.85
19	13.625	32.625	33.00	4.70	4.375	4.85@4.90
20	13.625	32.50	33.00	4.70	4.375	4.85@4.90
21	13.625	32.50	32.875	4.70	4.375	4.85@4.90

*These prices correspond to the following quotations for copper delivered: Dec. 15, 13.75@13.875c.; Dec. 16 to 21 inc., 13.875c.

The above quotations are our appraisal of the average of the major markets based generally on sales as made and reported by producers and agencies, and represent to the best of our judgment the prevailing values of the metals for deliveries constituting the major markets, reduced to the basis of New York, cash, except where St. Louis is the normal basing point, or as otherwise noted. All prices are in cents per pound. Copper is commonly sold "delivered," which means that the seller pays the freight from the refinery to the buyer's destination.

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

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

London

Dec.	Copper			Tin		Lead		Zinc	
	Standard		Electrolytic	Spot	3 M	Spot	3 M	Spot	3 M
	Spot	3 M							
15	66 $\frac{1}{2}$	67 $\frac{1}{2}$	74	174 $\frac{1}{2}$	176	25 $\frac{3}{4}$	24 $\frac{1}{2}$	27 $\frac{1}{2}$	27 $\frac{1}{2}$
16	66 $\frac{1}{2}$	67 $\frac{1}{2}$	74 $\frac{1}{2}$	174 $\frac{1}{2}$	176 $\frac{1}{2}$	25 $\frac{3}{4}$	24 $\frac{1}{2}$	27 $\frac{1}{2}$	27 $\frac{1}{2}$
17	...	...	...	...	...	...	...	...	...
19	66 $\frac{1}{2}$	67 $\frac{1}{2}$	74 $\frac{1}{2}$	172 $\frac{1}{2}$	174 $\frac{1}{2}$	25 $\frac{1}{2}$	24 $\frac{1}{2}$	27 $\frac{1}{2}$	27 $\frac{1}{2}$
20	66 $\frac{1}{2}$	67 $\frac{1}{2}$	74 $\frac{1}{2}$	171 $\frac{1}{2}$	173 $\frac{1}{2}$	25 $\frac{1}{2}$	24 $\frac{1}{2}$	27 $\frac{1}{2}$	27 $\frac{1}{2}$
21	66 $\frac{1}{2}$	67 $\frac{1}{2}$	74 $\frac{1}{2}$	171 $\frac{1}{2}$	173 $\frac{1}{2}$	25 $\frac{1}{2}$	24 $\frac{1}{2}$	27 $\frac{1}{2}$	27 $\frac{1}{2}$

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

Silver and Sterling Exchange

Dec.	Sterling Exchange "Checks"	Silver			Dec.	Sterling Exchange "Checks"	Silver		
		New York Domestic Origin	New York Foreign Origin	London			New York Domestic Origin	New York Foreign Origin	London
15	419	99 $\frac{1}{2}$	65 $\frac{3}{4}$	35 $\frac{1}{2}$	19	420 $\frac{1}{2}$	99 $\frac{1}{2}$	66 $\frac{1}{2}$	35 $\frac{1}{2}$
16	416	99 $\frac{1}{2}$	65 $\frac{3}{4}$	35 $\frac{1}{2}$	20	420 $\frac{1}{2}$	99 $\frac{1}{2}$	66 $\frac{1}{2}$	35 $\frac{1}{2}$
17	417 $\frac{1}{2}$	99 $\frac{1}{2}$	67	36 $\frac{1}{2}$	21	420 $\frac{1}{2}$	99 $\frac{1}{2}$	66	35 $\frac{1}{2}$

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

Metal Markets

New York, Dec. 21, 1921

The approach of the Christmas holidays seems to have had a quieting effect on the metal markets during the last week, as inquiries were not so numerous as usual. Prices remained firm, however, and business is expected to improve again early in January.

Copper

Conditions are much the same as they were last week as far as domestic business is concerned. The larger producers are generally asking 14c., delivered, for first-quarter business, but are selling only an occasional carload. A few orders of 500 tons or thereabouts have been placed by those willing to meet the market, at 13.75@13.875c. The deliveries at the lower price were

for consumers near refineries where the freight rate is not over 15 or 20 points. No one in the last few days, so far as we are advised, has been willing to sell copper for any delivery to net 13.50c. f.o.b. refinery.

Export business has improved, Germany and France being the best customers. This business is being placed generally at 14.125@14.25c., c.i.f., so that members of the Copper Export Association can obtain a higher return by selling for export than on the domestic market. With export business satisfactory, they are not worrying about a temporary lull in domestic demand, and prices are unlikely to fall.

Lead

The official contract price of the American Smelting & Refinery Co. continues at 4.70c. This figure also repre-

sents the figure at which near-by lead can be obtained from other producers. February lead generally brings about 5 points' premium, but not much is being sold for such forward delivery. Desilverized continues somewhat scarcer than chemical lead. A prominent storage-battery company placed a large order for December to February delivery yesterday, the business being distributed. The St. Louis market is somewhat firmer, with quotations ranging from 4.35 to 4.40c. A little lead has been sold at 4.35c., and it is possible that lead can still be obtained from one interest at that price. Several sales have been made at 4.375c. Lead continues firm in London, and the possibility of American lead going abroad is still being considered. This may have had something to do with the slightly stronger feeling in the Middle West.

Zinc

The market has become firmer. Several producers are holding at 4.90c., St. Louis, and a few sales were made at that level, but the greater part of the week's business was transacted on a 4.85c. basis. There has been a stronger disposition to sell future zinc at a 5-point premium for each month forward. It would not be surprising to see prompt zinc sell for 5c. per lb. before the year is over. Possibility always exists of the advance loosening some lots of metal that have been weakly held, but the market has not been influenced in the recent advance by any such disturbance. High-grade zinc has been sold in fair volume at unchanged prices, 6c. with freight allowed.

Tin

Tin has been very quiet at the higher prices now being asked, which have been caused by the advance in sterling exchange as well as increased firmness in the London market. Consumers seem to have provided generally for their immediate needs before the price reached 30c. Tin for forward delivery has sold for approximately the same prices as spot metal, though in some transactions business was done at slightly lower levels.

Arrivals of tin, in long tons: Dec. 14, Australia, 35; Straits, 70; London, 275; 15th, Liverpool, 100; 16th, Straits, 100; 17th, Straits, 380.

Gold

Gold in London: Dec. 15th, 98s. 1d.; 16th, 98s. 10d.; 19th, 98s. 1d.; 20th, 97s. 8d.; 21st, 97s. 7d. The marked decrease in the price of gold with the increased firmness in sterling exchange will undoubtedly make conditions extremely difficult for some of the South African producers who have been doing little more than break even.

General stock of money in the United States, Dec. 1, 1921: Gold coin, \$3,545,125,101; standard silver dollars, \$354,662,378; subsidiary silver, \$272,828,861; United States notes, \$346,681,016; Federal Reserve notes, \$2,698,675,810; Federal Reserve Bank notes, \$118,533,400; National Bank notes, \$749,307,097; total, \$8,085,813,663. Stocks of gold have increased \$41,000,000 in the last month; of silver dollars, \$13,000,000; and outstanding notes have decreased \$14,000,000.

Foreign Exchange

Sterling has recovered close to the high figure reached several days ago, and the other European exchanges have also been firm. On Tuesday, Dec. 20, francs were 8.095c.; lire, 4.59c.; and marks, 0.59c. New York funds in Montreal declined to the lowest figure in two years, being quoted at 7½ per cent premium.

Silver

Silver prices have continued to fluctuate, with China and India operating on both sides of the market. Business, however, has been on a reduced scale, and the premium over the London equivalent has disappeared, New York and London prices being on an approximate parity. The market closes quiet.

Mexican Dollars—Dec. 15th, 49½; 16th, 49½; 17th, 51; 19th, 50½; 20th, 50½; 21st, 50½.

Other Metals

Quotations cover wholesale lots unless otherwise specified.

Aluminum—20c. per lb. for 99 per cent grade; 19c. for 98@99 per cent; 18c. for 94@98 per cent. Outside market nominal at 17@18c. for 98@99 per cent virgin grades.

Antimony—Chinese and Japanese brands, 4.50c.; W. C. C. brand, 5.25@5.75c. per lb. Cookson's "C" grade, spot, 9c. per lb. Chinese needle antimony, lump, nominal at 4c. per lb.

Iridium—Nominal, \$150@170 per oz.

Palladium—Nominal, \$55@60 per oz.

Platinum—\$75@78 per oz. Market quiet.

Quicksilver—\$49@50 per 75-lb. flask. San Francisco wires \$49.75. Market better.

The prices of the following metals remain unchanged from the figures published in these columns on Dec. 3: Bismuth, Cadmium, Cobalt, Molybdenum, Monel Metal, Nickel, Osmium, Rhodium, Selenium, Thallium and Tungsten.

Metallic Ores

Manganese Ore—23@24c., per unit, seaport; chemical ore, \$55@60 per gross ton, lump; \$75 per net ton, powdered. Nominal.

The market is generally exceedingly quiet, and prices on the following ores remain unchanged from the figures published in the Market Report in the Dec. 3 issue: Chrome, Iron, Magnetite, Molybdenum, Tantalum, Titanium, Tungsten, Uranium, Vanadium, Zircon, and Zirkite ores.

Zinc and Lead Ore Markets

Joplin, Mo., Dec. 17—Zinc blende, per ton, high, \$28.70; basis, 60 per cent zinc, premium, \$28; Prime Western, \$27@26; fines and slimes, \$25@23; average settling price, all grades of zinc, \$25.28.

Lead, high, \$58.40; basis 80 per cent lead, \$57; average settling price, all grades of lead, \$56.57 per ton.

Shipments for the week: Blende, 11,321; lead, 2,150 tons. Value, all ores, the week, \$407,900.

Zinc ore prices continue a steady advancement, with sellers holding firm and buyers trying to increase purchases without stimulating the market. Premium blende sold today on \$28, an advance of \$1 each of three weeks.

Lead prices were boosted today, with offerings of \$57 basis in an effort, presumably, to stop further purchases by an outside party that has been very active lately.

Platteville, Wis., Dec. 17—Blende, basis 60 per cent zinc, \$30. Lead ore, basis 80 per cent lead, \$55 per ton. Shipments for the week: Blende, 93; lead ore, 30 tons. Shipments for the year: Blende, 10,812; lead ore, 1,793 tons. Shipped during the week to separating plants, 818 tons, blende.

Non-Metallic Minerals

Feldspar—No. 1 pottery grade, \$6.50 per long ton; soap grade, \$7.50, f.o.b. North Carolina points. No. 1 Canadian, ground, \$23, f.o.b. Ohio points.

Fluorspar—Gravel, guaranteed 85 per cent CaF₂, and not over 6 per cent silica, \$20 to \$22.50 per ton, f.o.b. Kentucky enamel grades, \$32.50 to \$50. F.o.b. New Mexico points, 85 per cent grade, \$12.50 per ton; 95 per cent, \$25; 97 per cent, \$30.

Fuller's Earth—16 to 30 mesh, \$20 per ton; 30 to 60 mesh, \$20; 60 to 100 mesh, \$17; 100 mesh and over, \$15, f.o.b. Pennsylvania points. Market quiet.

Graphite—Ceylon lump, first quality, 5½@6½c. per lb.; chip, 4@5c.; dust, 2½@3½c.; No. 1 flake, 5@7c.; amorphous crude, \$15@42.50 per ton. All f.o.b. New York.

Talc—20 to 200 mesh, \$7@12 per ton, f.o.b. Vermont; \$8.25@13, f.o.b. points in Georgia.

Generally dull markets exist for the non-metallic minerals, and there is no quotable change in the following from the prices published in our Dec. 3 issue: Asbestos, Barytes, Bauxite, Borax, Chalk, China Clay, Emery, Gypsum, Kaolin, Limestone, Magnesite, Mica, Monazite, Phosphate Rock, Pumice Stone, Pyrites, Silica and Sulphur.

Mineral Products

Arsenic—7@7½c. per lb., f.o.b. New York; 6½@7c. for imports.

Potassium Sulphate—Powder, domestic, 90c.@1 per unit, basis 90 per cent, f.o.b. New York.

Sodium Nitrate—\$2.30 per cwt. ex vessel, Atlantic ports.

Copper Sulphate—Large crystals, 5.65c. per lb.; small crystals, 5.55c., f.o.b. New York.

The price of Sodium Sulphate is unchanged from the quotations published Dec. 3.

Ferro-Alloys

Ferrochrome—Carload lots, spot and contract, 60 to 70 per cent chromium, 6 to 8 per cent carbon, 12c. per lb. of chromium contained; 4 to 6 per cent carbon, 13c., f.o.b. works.

Ferromanganese—English and German, \$58.35@54, c.i.f. Atlantic seaports. Other quotations unchanged.

No quotable changes have taken place in the following ferro-alloys from the prices quoted in the Dec. 3 issue: Ferrotitanium, Ferrocromium, Ferromolybdenum, Ferrosilicon, Ferrotungsten, Ferro-Uranium, and Ferrovandium.

Metal Products

Copper Sheets—Current New York list price, 21.25c. per lb.; wire, 15@15.25c.

Yellow Metal—Dimension sheets, 17.75c.; sheathing, 16.25c.; rods ½ to 3 in., 14.75c.

Lead Sheets, Nickel Silver, and Zinc Sheets unchanged from Dec. 3 quotations.

Refractories

Prices on the following are unchanged from the figures published in the Dec. 3 issue: Bauxite Brick, Chrome Cement, Chrome Brick, Fire Brick, Magnesite Brick, and Silica Brick.

The Iron Trade

Pittsburgh, Dec. 20, 1921

Under date of Dec. 15 the National Tube Co. has issued new price lists on standard steel pipe, O. D. pipe, oil-country goods, and line pipe, reducing prices about \$5 a ton except line pipe, which is reduced 3 points, or about \$6. The reduction was caused by continued shading by independents, shallow in standard pipe but deep in line pipe and some classes of oil-country goods. The independents had sixty-day guarantees outstanding on standard pipe. The basing discount is now 71 per cent.

Though demand for steel products in general is light, it is widespread geographically and by industries. All buyers are proceeding conservatively, and consumption is probably decreased a trifle. An increase in demand is to be expected by Feb. 1. Steel ingot production in the first half of the new year is likely to range between 20,000,000 and 30,000,000 tons a year, against rates of 10,000,000 tons last July, 25,000,000 tons in October and November, and about 21,000,000 tons at present, capacity being about 52,500,000 tons.

Pig Iron—The Standard Sanitary Manufacturing Co. came into the market last week and bought foundry iron at \$19.50, Valley, the market having been nominally quotable at \$20.50, Valley. Bessemer remains at \$20 and basic at \$19, Valley, with practically no demand.

Coke

Connellsville—Furnace, \$3.35@3.50; foundry, \$4.25@4.75 per ton.

Lead Market Shows Small Fluctuations

**European Demand Is Strong and Stocks Are Low
—Mexican Lead Going Abroad—Spanish Output
Is Expected To Decrease—Germany a Good Buyer**

EDITORIAL MARKET STUDY

EVER SINCE SEPT. 23, when the market reached 4.70c. per lb., New York, lead price changes have been small and relatively unimportant. Although sales have been made periodically with more than customary briskness, the market has refused to move far, either up or down. Lead in its present position can hardly be thought of as a plaything for the speculative metal dealer. Its price changes on short swings of the market have afforded the speculator, who fortunately is a minor factor in the lead market, but little opportunity to exercise his proclivities.

At 4.70c. per lb. lead consumers seem to be able to purchase all the metal they require and producers willing to sell in any quantity. For a time in November it appeared that lead would reach higher levels by the end of the year, but the market has been unable to break away from the fascination of 4.70c. The reduction in freight rates from Missouri points to New York has made it possible for lead from the Middle West to compete in the New York market and has helped to keep the eastern price where it is.

GOOD POSSIBILITY OF EXPORTING DOMESTIC LEAD

Although export trade is unimportant in the American lead market, prices in the United States are greatly affected by those abroad, particularly the prices in the London metal market. American lead producers have up to now been concerned more over the possibilities of importing foreign lead into the United States and disturbing the domestic market than upon the prospect of exporting part of domestic production.

Early in 1921 large quantities of Spanish lead came into the United States, owing to the higher market level here, but at present, owing to a stronger and higher market in Europe, there is a possibility of shipping American lead abroad. International movements narrow down to a question of which market will yield the greatest profit to the producer. When the demand for lead is poor in Europe, lead, especially cheaply produced Mexican lead, is imported into the United States and sold in competition with American metal after payment of a duty. Conversely, if a better market exists abroad, Mexican metal seeks the European market, where the duty charge is not so important.

The heavy shipments of Spanish lead to the United States last spring resulted in greatly disturbing the domestic market, imported lead making itself immediately felt in the New York market, reducing prices in the East to a level with those of the Middle West, and stimulating lead producers in their fight for a tariff. As importations of foreign lead are at this time unimportant, the full freight differential is being expressed between the St. Louis and New York markets, which is as it should be.

FOUR COUNTRIES YIELD BULK OF WORLD'S LEAD

The four countries that are most important from a producing standpoint in the world's lead market are the United States, Spain, Australia, and Mexico. From a consuming standpoint, the United States, Germany, France, and Great Britain are the principal factors. The United States is producing enough lead for its own requirements and is independent of outside supplies. The consumption of lead has been so good that stocks have not had opportunity to pile up and become oppressive. Lead has been going steadily into the manifold channels of consumption open to it. Paint, cable, pipe and storage-battery manufacturers continue to take good-sized tonnages of the metal. Business has in general been brisker at the beginning of each month than at any other period.

Supply and demand seem to be nicely adjusted, judging from the steadiness of the market at its present level.

Demand for lead in Europe has been strong during the last few weeks. Ordinarily this demand is partly satisfied by the local production of various European countries, such as Germany, Poland, Spain, and France, plus importations from Australia. However, conditions in all of these countries are unsettled—if not politically, then industrially—affecting the production of each.

Germany is duplicating her activity in the copper market by her eagerness to absorb lead for manufacturing purposes. This is not strange when one considers the great necessity for the intense development of German export trade, and consequently of German manufactures, to pay a large reparations bill. Germany so long as she has a heavy indemnity to pay, should be a splendid market for raw materials, mineral, agricultural, and vegetable. Spanish lead and Mexican have been moving freely into Germany. There is a disposition to consider the fluctuations of mark exchange a deterrent to trade. However, Germany's activities in the copper markets and the unfulfilled predictions that exchange would adversely affect them, would indicate that exchange variations will have little to do with her ability to buy lead whenever necessary.

SPANISH GOVERNMENT REGULATIONS DISCOURAGE DEVELOPMENT

Not only have Spanish producers been the victim of labor troubles, but some of the recent legislation of the Spanish government has apparently not been passed with the purpose of stimulating the development of Spanish resources. This new law prevents the formation of new foreign mining companies in Spain—in other words it stops the introduction of outside capital into the development of Spain's mineral resources. This legislation may act as a boomerang to Spanish lead trade. Production in that country is expected to show a large decrease as a result.

France and Spain have engaged in a tariff war. Since Dec. 10 Spanish lead entering France has had to pay a higher tariff, so that Spanish lead may be diverted elsewhere. France is not a large lead producer, and is mainly dependent upon imports for an adequate supply of the metal. Of late French demands for lead have been strong.

Australia, which is normally the world's third largest producer, has been so hampered by labor troubles that production from there has been pitifully small considering the large mineral resources of the country. The rise and recent decline of Australian production is vividly shown by the following figures, which also show the production of Spain, Mexico, and the United States.

LEAD PRODUCTION OF AUSTRALIA, SPAIN, MEXICO, AND THE UNITED STATES, 1913-1920
In Short Tons

Year	Australia	Spain	Mexico	United States
1913	110,440	198,830	62,000	385,643
1914	101,790	143,525	23,600	472,125
1915	102,720	171,475	31,385	468,655
1916	134,070	147,405	19,965	506,490
1917	144,950	176,310	46,610	511,940
1918	163,370	169,710	88,500	503,702
1919	83,410	125,720	78,645	391,980
1920	7,800	175,195	84,200	440,220

Recent cable reports indicate a revival in mining by the Broken Hill companies, which feel that present metal prices are a sufficiently strong inducement to enlarge production of lead in the near future.

The United States has been fortunate in being able to take advantage of the disorder existing in other countries. Should the scarcity of lead continue in Europe, it will be natural to see London prices rise and be reflected in this market.

COMPANY REPORTS

Tomboy Gold Mines Co., Ltd.

A report of operations of the Tomboy Gold Mines Co., Ltd., for the year ended June 30, 1921, shows a realized profit of £18,006 0s. 2d. There has to be provided for depreciation:

	£	s	d	£	s	d
Plant and machinery.....	£17,687	0	10			
Reserved for taxes.....	3,000	0	0			
				£20,687	0	10
Debit balance.....				£2,681	0	8
Previous balance of loss.....				1,581	8	2
Net debit balance to profit and loss account				£4,262	8	10

From the appended statement of returns it can be seen that for the first six months ore of an average milling grade of \$5.24 per ton was treated, resulting in an operating profit of approximately \$100,000; during this period the best stopes had to be drawn upon, in view of the fact that local loans had to be repaid, but when Mr. Kelsey took up the management in January the higher grade ore was for the time being exhausted and he at once advised that, looking at the mine as a whole, future profits would depend upon treating large tonnages at low cost.

REVENUE AND EXPENDITURES

Dry tons ore milled, 197,557, yielding bullion worth.....			\$56,637.72
Concentrates worth.....			789,729.32
60-Mill clean-up—bullion.....			24,367.69
60-Mill clean-up—concentrates.....			3,481.85
Miscellaneous (copper bullion).....			2,139.66
			\$876,356.24
Less loss on boarding house, rents.....			5,267.58
			\$871,088.66
Mining and development expenses \$1.73 per ton.....	\$340,214.37		
Milling..... .65 per ton.....	127,209.06		
Concentrating (including transportation to railway).....	.82 per ton	162,970.88	
Water supply.....	.19 per ton	37,991.14	
Assay.....	.04 per ton	7,371.25	
60-Mill clean-up.....	.02 per ton	4,735.72	
General expenses.....	.31 per ton	61,684.46	
Taxes and insurance.....	.22 per ton	43,219.16	
			\$785,396.04
Total expense.....	\$3.98 per ton		
Profit.....			\$85,692.62

Davis Daly's Quarterly Report

A report of the Davis Daly Copper Co. for the three months ended Sept. 30, 1921, states that conditions at the property have changed little during the period covered. The mines are being operated at the minimum of activity, and the directors are considering the advisability of suspending Colorado operations, so as to conserve good ores for better copper markets and lower costs of operation.

Development of ore reserves continues at a satisfactory rate. Despite 22,961 tons exhausted by mining, the ore reserves were increased from 337,316 tons to 394,813 tons at the end of the period, a net increase of 17.05 per cent and in copper content of 10.44 per cent. Of the total tonnage of ore reserves 45 per cent is above the 2,500 level and the rest below.

Shipments from the Hibernia have decreased during the quarter. By Jan. 1 the ore-bearing veins should have all been cut on the 750 level, and fairly definite information of what to expect in the way of production from this level should be available.

Total development for the quarter, including Hibernia, was 2,742 ft., comprising 869 ft. of crosscuts, 803 ft. of drifts, 946 ft. of raises, and 124 ft. of shaft sinking.

Tonnage for the quarter, including Hibernia, amounted to 35,423, producing 2,076,064 lb. of copper and 385,825 oz. of silver. The average assay of ore shipped from the Colorado was 5.12 per cent copper and 5.22 oz. of silver to the ton and from the Hibernia 24.05 oz. of silver to the ton.

Operating receipts and disbursements were: Ore returns \$219,072.17; miscellaneous revenues, \$5,341.56; total receipts were \$224,413.73. The disbursements were: Development, \$24,416.04; mining cost, \$91,623.61; equipment, \$5,070.91; Butte general expense, \$19,721.23; Boston expense, \$12,612.12. Total disbursements were \$153,443.91.

Davis Daly Shows a Loss for 1920-21

A report of operations of Davis Daly Copper Co. for the fiscal year ended June 30, 1921, states that production amounted to 8,456,062 lb. of copper, 1,463,182.5 oz. of silver, 2,608.2 oz. of gold, 2,127,290 lb. of lead, and 5,060,368 lb. of zinc. Net operating loss was \$411,230.87, as the following account shows:

RECEIPTS		
Ore returns.....	\$1,311,938.78	
Precipitates.....	901.31	
Miscellaneous revenues.....	20,353.19	
Total receipts.....		\$1,333,193.28
DISBURSEMENTS		
Mining cost.....	\$1,246,507.00	
Butte expenses.....	81,672.43	
Boston disbursements.....	34,534.43	
Taxes.....	49,596.53	
Total disbursements.....		1,412,310.39
Depletion.....	\$286,382.74	\$79,117.11
Depreciation.....	45,731.02	
		332,113.76
Net operating loss.....		\$411,230.87

Barnes-King Development Co.

A report of operations of the Barnes-King Development Co. shows the following operating results for the quarter ending Sept. 30, 1921:

Balance June 30, 1921.....		\$95,066.32
RECEIPTS		
Received during the quarter as follows:		
Shannon bullion.....	\$78,878.50	
North Moccasin royalties.....	1,505.63	
Interest.....	919.19	
Overpayment on accounts received.....	10.00	
Total receipts for quarter.....		\$81,313.32
Total balance.....		\$176,379.64
DISBURSEMENTS		
Shannon property: Operations—mining and milling 8,627 tons of ore (exclusive of depreciation).....	\$59,990.13	
Piegan-Gloster: General expense (exclusive of depreciation).....	1,454.08	
North Moccasin: General expense (exclusive of depreciation).....	1,712.01	
Kendall: General expense.....	182.81	
Black Hawk: Operations—development.....	579.86	
Betsy Baker: On option.....	\$200.00	
Operations—development.....	2,251.00	
Total Betsy Baker expense.....	2,451.00	
Miscellaneous Expense:		
Examination of new properties.....	1,749.17	
Tax Matters—Rowland Thomas & Co.....	112.50	
Capital stock tax.....	443.00	
Total miscellaneous expense.....	2,304.67	
Increase in inventories.....	1,714.07	
		\$70,388.63
Deduct:		
Decrease in accounts receivable.....	\$1,670.18	
Increase in accounts payable.....	2,052.05	3,722.23
		\$66,666.40
Balance:		
Cash on hand and in banks.....	\$81,845.82	
Bullion in transit.....	27,867.42	\$109,713.24
Deduct:		
September, 1921, payroll.....	\$11,455.55	
September, 1921, accounts payable.....	12,131.62	
		23,587.17
Leaving funds available from Sept. 30, 1921.....		\$86,126.07

In addition the company also owns Liberty Bonds amounting to \$50,000.

MINING STOCKS

Week Ended December 17, 1921

Stock	Exch.	High	Low	Last	Last Div.
COPPER					
Ahmeek.....	Boston	63	59	62½	Sept. '20, Q \$0.50
Alaska-Br. Col. new.	N. Y. Curb	2½	2½	2½	.....
Allouez.....	Boston	24	23	24	Mar. '19 1.00
Anaconda.....	New York	50	48½	48½	Nov. '20, Q 1.00
Arcadian Consol.....	Boston	3½	3	3½	.....
Ariz. Com'l.....	Boston	10	9½	9½	Oct. '18, Q .50
Big Ledge.....	N. Y. Curb	*30	*26	*28	.....
Bingham Mines.....	Boston	†13½	†12½	13	Sept. '19, Q .25
Calumet & Arizona.....	Boston	.....	.....	58	Sept. '21 Q .50
Calumet & Hecla.....	Boston	280	258	273	June '20, Q 5.00
Canada Copper.....	N. Y. Curb	*42	*29	*38	.....
Centennial.....	Boston	10	9½	10	Dec. '18, SA 1.00
Cerro de Pasco.....	New York	36½	35	35½	Mar. '21, Q .50
Chile Copper.....	New York	16½	14½	15	.....
Chino.....	New York	29½	27	27	Sept. '20, Q .37½
Columbus Rexall.....	Salt Lake	.....	.....	*10	.....
Con. Arizona.....	N. Y. Curb	*4	*3	*3	Dec. '18, Q .05
Con. Copper Mines.....	N. Y. Curb	1½	1½	1½	.....
Copper Range.....	Boston	40½	39½	40	Sept. '20, Q .50
Crystal Copper.....	Boston Curb	*56	*48	*55	.....
Davis-Daly.....	Boston	6½	6½	6½	Mar. '20, Q .25
East Butte.....	Boston	11½	10½	11½	Dec. '19, A .50
First National.....	Boston Curb	*90	*75	*85	Feb. '19, SA .15
Franklin.....	Boston	2	2	2	.....
Gadsden Copper.....	Boston Curb	*49	*46	*49	.....
Granby Consol.....	New York	30	28½	29	May '19, Q 1.25
Greene-Cananea.....	New York	29½	27½	27½	Nov. '20, Q .50
Hancock.....	Boston	3½	2½	3	.....
Howe Sound.....	N. Y. Curb	2½	2½	2½	Jan. '21, Q .05
Inspiration Consol.....	New York	42½	39½	41½	Oct. '20, Q 1.00
Iron Cap.....	Boston Curb	8	7½	8	Sept. '20, K .25
Isle Royale.....	Boston	24½	23½	23½	Sept. '19, SA .50
Kennecott.....	New York	27½	26½	26½	Dec. '20, Q .50
Keweenaw.....	Boston	2	1½	2	.....
Lake Copper.....	Boston	3½	2½	3	.....
La Salle.....	Boston	2	1	2	.....
Magma Chief.....	N. Y. Curb	.....	.....	*8	.....
Magma Copper.....	N. Y. Curb	26½	22½	24½	Jan. '19, Q .50
Majestic.....	Boston Curb	*5	*3	*5	.....
Mason Valley.....	Boston	1½	1½	1½	.....
Mass Consolidated.....	Boston	3	2½	3	Nov. '17, Q 1.00
Miami Copper.....	New York	28	27	27½	Nov. '21, Q .50
Michigan.....	Boston	2	2	2	.....
Mohawk.....	Boston	59	57½	58½	Nov. '20, Q 1.00
Mother Lode Coal.....	N. Y. Curb	5½	5½	5½	.....
Nevada Consol.....	New York	15½	14½	15	Sept. '20, Q .25
New Cornelia.....	Boston	18½	16½	18½	Aug. '20, K .25
North Butte.....	Boston	14½	12½	13½	Oct. '18, Q .25
North Lake.....	Boston	†50	†20	*24	.....
Ohio Copper.....	N. Y. Curb	*12	*10	*10	.....
Old Dominion.....	Boston	25½	25	25	Dec. '18, Q 1.00
Oscoda.....	Boston	35½	32	34	June '20, Q .50
Phelps Dodge.....	Open Mar.	†185	†175	.....	Oct. '21, Q 1.00
Quincy.....	Boston	46½	45	46	Mar. '20, Q 1.00
Ray Consolidated.....	New York	16	15½	15½	Dec. '20, Q .25
Ray Hercules.....	N. Y. Curb	*19	*16	*19	.....
St. Mary's Min. Ld.....	Boston	44½	43	44	Dec. '21, K 1.00
Seneca Copper.....	Boston	.....	.....	24½	.....
Shannon.....	Boston	1½	1	1	Nov. '17, Q .25
Shattuck Arizona.....	New York	9½	8	9	Jan. '20, Q .25
South Lake.....	Boston	†1	†50	*60	.....
Superior & Boston.....	Boston	1½	1½	1½	.....
Tenn. C. & C. cfs.....	New York	11	10½	10½	May '18, I 1.00
Tuolumne.....	Boston	*70	.....	*67	May '13 .10
United Verde Ex.....	Boston Curb	30	28½	30	Nov. '21, Q .25
Utah Consol.....	Boston	2	2	2	Sept. '18, .25
Utah Copper.....	New York	66½	63	64	June '21 Q .50
Utah Metal & T.....	Boston	1½	1½	1½	Dec. '17, .30
Victoria.....	Boston	2	1½	1½	.....
Winnona.....	Boston	*40	*40	*40	.....
Wolverine.....	Boston	12½	10½	11½	.....

NICKEL-COPPER

Internat. Nickel.....	New York	13½	12½	12½	Mar. '19, .50
Internat. Nickel, pf.....	New York	70	69½	69½	Nov. '21, Q 1.50

LEAD

National Lead.....	New York	87	85	85½	Sept. '21, Q 1.50
National Lead, pf.....	New York	107½	107½	107½	Dec. '21, Q 1.75
St. Joseph Lead.....	New York	14	13½	14	Sept. '21, Q .25

QUICKSILVER

New Idria.....	Boston	†75	†50	*50
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ZINC

Am. Z. L. & S.....	New York	14½	12½	13½	May '20, 1.00
Am. Z. L. & S. pf.....	New York	40½	38	39	Nov. '20, Q 1.50
Butte C. & Z.....	New York	6½	5½	5½	June '18, .50
Butte & Superior.....	New York	22	18	20½	Sept. '20, 1.25
Callahan Zn-Ld.....	New York	7½	6½	6½	Dec. '20, Q .50
New Jersey Zn.....	N. Y. Curb	124½	121	123	Nov. '21, Q 2.00
Yellow Pine.....	Los Angeles	*45	*45	*45	Sept. '20, Q .03

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

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

Stock	Exch.	High	Low	Last	Last Div.
GOLD					
Alaska Gold.....	New York	.....	.....	.....	.....
Alaska Juneau.....	New York	.....	.....	.....	.....
Carson Hill.....	New York	13½	11½	12	June '20, Q \$0.10
Cresson Consol. G.....	N. Y. Curb	2½	2½	2½	.....
Dome Extension.....	Toronto	*71	*69	*70	.....
Dome Mines.....	New York	19	18	18	Oct. '21, Q .25
Florence Goldfield.....	N. Y. Curb	*30	*26	*28	.....
Golden Cycle.....	Colo. Springs	*72	*72	*72	June '21, Q .02
Goldfield Consol.....	N. Y. Curb	*3	*3	*3	Dec. '19, .05
Hollinger Consol.....	Toronto	7.80	7.74	7.79	Dec. '21, 4 wks. .05
Homestake Mining.....	New York	56	54½	54½	Nov. '21, M .25
Kirkland Lake.....	Toronto	*33	*28½	*30	.....
Lake Shore.....	Toronto	1.22	1.19	1.20	Nov. '21, K .02
McIntyre-Porcupine.....	Toronto	1.99	1.94	1.98	Sept. '21, K .05
Porcupine Crown.....	Toronto	*13	*11	*11½	July '17, .03
Porcupine V. N. T.....	Toronto	*18	*17	*17½	.....
Portland.....	Colo. Springs	*42	*42	*42	Oct. '20, Q .01
Schumacher.....	Toronto	*35	*28½	*31	.....
Silver Pick.....	N. Y. Curb	*50	*50	*50	.....
Teek Hughes.....	Toronto	*15½	*14½	*15	.....
Tom Reed.....	Los Angeles	*40	*37	*40	Dec. '19, .02
United Eastern.....	N. Y. Curb	2½	2½	2½	Oct. '21, Q .15
Vindicator Consol.....	Colo. Springs	*20½	*20	*20½	Jan. '20, Q .01
White Caps Mining.....	N. Y. Curb	*4	*4	*4	.....
Yukon Gold.....	N. Y. Curb	1½	1½	1½	June '18, .02½

SILVER

Batopilas Mining.....	New York	*24½	*20	*21	Dec. '07, I .12½
Beaver Consol.....	Toronto	.....	.....	.....	May '20, K .03
Coniagas.....	Toronto	1.60	1.35	1.50	May '21, Q .12½
Crown Reserve.....	Toronto	*9½	*8	*9½	Jan. '17, .05
Kerr Lake.....	N. Y. Curb	3½	3½	3½	Oct. '21, Q .12½
La Rose.....	Toronto	*34	*32½	*32	Apr. '18, .02
McKinley-Dar-Sav.....	Toronto	*17	*14	*15	Oct. '20, Q .03
Mining Corp. Can.....	Toronto	1.15	1.00	1.15	Sept. '20, Q .12½
Nipissing.....	N. Y. Curb	7	6½	7½	Oct. '21, Q .03
Ontario Silver.....	New York	4½	4	4½	Jan. '19, Q .50
Ophir Silver.....	N. Y. Curb	.....	.....	.....	Jan. '12, .10
Temiskaming.....	Toronto	*27	*25	*27	Jan. '20, K .04
Trethewey.....	Toronto	*9½	*9	*9½	Jan. '19, .05

GOLD AND SILVER

Boston & Montana.....	N. Y. Curb	*89	*85	*88	.....
Cash Boy.....	N. Y. Curb	*6	*5	*5	.....
Dolores Esperanza.....	N. Y. Curb	1½	1½	1½	.....
El Salvador.....	N. Y. Curb	*10	*5	*6	.....
Jim Butler.....	N. Y. Curb	*7	*7	*7	Aug. '18, SA .07
Jumbo Extension.....	N. Y. Curb	*3	*2	*3	June '16, .05
Louisiana Con.....	N. Y. Curb	.....	.....	.....	.....
MacNamara M. & M.....	N. Y. Curb	*11	*11	*11	May '10, .02½
Tonopah-Belmont.....	N. Y. Curb	1½	1½	1½	Apr. '21, Q .05
Tonopah-Divide.....	N. Y. Curb	*66	*56	*61	.....
Tonopah-Extension.....	N. Y. Curb	1½	1½	1½	Oct. '21, Q .05
Tonopah Mining.....	N. Y. Curb	1½	1½	1½	Oct. '21, SA .05
West End Consol.....	N. Y. Curb	*83	*80	*83	Dec. '19, SA .05

SILVER-LEAD

Caledonia.....	N. Y. Curb	*6	*5	*5	Jan. '21, M .01
Cardiff M. & M.....	Salt Lake	†1.00	†85	*92	Dec. '20, .15
Chief Consol.....	Boston Curb	3	2½	3	Aug. '21, Q .05
Consol. M. & S.....	Montreal	18½	18½	18½	Oct. '20, Q .62½
Daly Mining.....	Salt Lake	†3.00	.....	.....	July '20, Q .10
Daly-West.....	Boston	†3	†1½	.....	Dec. '20, Q .25
Eagle & Blue Bell.....	Boston Curb	†3	†2	.....	Apr. '21, K .05
Electric Point.....	Spokane	*4	*3	*3	May '20, SA .03
Eureka-Crossus.....	N. Y. Curb	*29	*26	*28	.....
Federal M. & S.....	New York	13½	10	12½	Jan. '09, 1.50
Florence Silver.....	New York	43½	34	42½	Dec. '21, Q 1.00
Grand Central.....	Spokane	*18½	*17	*18	Apr. '19, .01½
Hecla Mining.....	Salt Lake	†49	†36	*36	Jan. '21, K .01
Judge M. & S.....	N. Y. Curb	4½	4½	4½	Sept. '21, Q .10
Iron Blossom Con.....	N. Y. Curb	*24	*18	*24	Apr. '20, Q .02½
Prince Consol.....	Salt Lake	.....	.....	.....	2.50 Sept. '20, Q .12½
Marsh Mines.....	N. Y. Curb	*6	*3	*6	June '21, I .02
Rambler-Cariboo.....	Salt Lake	*6½	*6	*6	Nov. '17, .02½
Rex Consol.....	Spokane	*4½	*4	*4½	Feb. '19, .01
South Hecla.....	N. Y. Curb	*8	*7	*8	.....
Standard Silver-Ld.....	Salt Lake	†50	†20	.....	Sept. '19, K .15
Stewart Mining.....	N. Y. Curb	*10	*10	*10	Oct. '17, .05
Tamarack-Custer.....	N. Y. Curb	*3	*2	*2	Dec. '15, .05
Tintic Standard.....	Spokane	2.20	2.15	2.15	Jan. '21, K .04
Utah Apex.....	Salt Lake	1.95	1.77½	1.85	July '21, Q .05
Wilbert Mining.....	Boston	3	2½	2½	Nov. '20, K .25
.....	N. Y. Curb	*1	Nov. '17, .01

VANADIUM

Vanadium Corp.....	New York	33½	31½	32½	Jan. '21, Q 1.00
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ASBESTOS

Asbestos Corp.....	Montreal	53	53	53	Oct. '21, Q 1.50
Asbestos Corp., pf.....	Montreal	76	76	76	Oct. '21, Q 1.75

SULPHUR

Freeport Texas.....	New York	15½	14½	15	Nov. '19, Q 1.00
Texas Gulf.....	New York	35½	32½	34½	Dec. '21, Q 1.00

MINING, SMELTING AND REFINING

Amer. Sm. & Ref.....	New York	47½	45½	45½	Mar. '21, Q 1.00
Amer. Sm. & Ref. pf	New York				

